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DRAFT SCOPING REPORT (SR) AND PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT (POSEIA)

PROPOSED DEVELOPMENT OF THE HARTEBEEST HOEK SOLAR PV1 LOCATED ON THE REMAINDER OF THE FARM HARTEBEEST HOEK 31, EMTHANJENI LOCAL MUNICIPALITY, PIXLEY KA SEME DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.



Application in terms of the National Environmental Management Act of 1998 (Act No. 107 of 1998), as amended, and the 2014 Environmental Impact Assessment (EIA) Regulations, as amended.

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DFFE PROJECT REFERENCE:	Pre-Application: 2022-11-0045
SES REFERENCE NUMBER:	12/HERC/DSR/04/2024
DATE:	30 April 2024

- Environmental Impact Assessments • Basic Assessments • Environmental Management Planning
- Environmental Control & Monitoring • Public Participation • Broad scale Environmental Planning



DRAFT SCOPING REPORT**PROPOSED DEVELOPMENT OF THE HARTEBEEST HOEK SOLAR PV1 LOCATED ON THE REMAINDER OF THE FARM HARTEBEEST HOEK 31, EMTHANJENI LOCAL MUNICIPALITY, PIXLEY KA SEME DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.****PROJECT INFORMATION**

Report Ref. No:	12/HERC2/DSR/03/24
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Date:	Report details	Responsible person
17/02/2023	Original Compilation	Madeleine Knoetze and Ameesha Sanker (EAPASA # 4372)
08/05/2023	Updates to the report and appendices based on project description changes	Madeleine Knoetze and Ameesha Sanker (EAPASA # 4372)
16/06/2023	Updates to the report and appendices based on project description changes	Madeleine Knoetze and Betsy Ditcham (EAPASA #1480)
16/02/2024	Review of the Scoping Report by client	Lloyd Barnes
30/04/2024	Draft Scoping Report published for public review	Madeleine Knoetze (EAPASA #3230)

Expertise

Sharples Environmental Services cc (SES) is an independent environmental consultancy and has since 1998 been actively engaged in the fields of environmental planning, assessment and management. We advise private, corporate and public enterprises on a variety of differing land use applications ranging from large-scale PV and CPV renewable energy facilities, residential estates, resorts and golf courses to municipal service infrastructure installations and the planning of major arterials. SES has offices in George and in Cape Town.

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GLOSSARY OF TERMS

Alternatives	In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to – <ol style="list-style-type: none"> i. The property on which or location where it is proposed to undertake the activity; ii. The type of activity to be undertaken; iii. The design or layout of the activity; iv. The technology to be used in the activity, and; v. The operational aspects of the activity.
Competent Authority (CA)	The decision-making authority responsible for evaluating the viability of the proposal and issuing the appropriate Authorisation. Also see Department of Forestry, Fisheries and Environment.
Department of Agriculture, Environmental Affairs and Land Reform (DAELR)	The Provincial Directorate of the National Department of Forestry, Fisheries and Environment.
Department of Forestry, Fisheries and Environment (DFFE)	The National Directorate of the National Department for Forestry, Fisheries and the Environmental. This Department is responsible for evaluating the viability of the development proposal and issuing the appropriate Authorisation. Also see Competent Authority.
Environment	The surroundings within which humans exist and that are made up of <ol style="list-style-type: none"> i. The land, water and atmosphere of the earth; ii. Micro-organisms, plant and animal life; iii. Any Part or combination of (i) and (ii) and the interrelationships among and between them; and iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
Environmental Authorisation	The authorisation by a competent authority of a listed activity.
Environmental Assessment Practitioner (EAP)	The person responsible for planning, management and co-ordination of environmental impact assessment, strategic environmental assessments, environmental management plans or any other appropriate environmental instrument introduced through regulations.
Environmental Impact	An environmental change caused by some human act.
Environmental Impact Assessment (EIA)	In relation to an application to which scoping must be applied, means the process of collecting, organizing, analyzing, interpreting and communicating information that is relevant to the consideration of that application. This process necessitates the compilation of an Environmental Impact Report (described below), which describes the process of examining the environmental effects of a proposed development, the anticipated impacts and proposed mitigatory measures.
Environmental Impact Report (EIR)	A report assessing the potential significant impacts as identified during the Scoping phase (described below).
Environmental Management Programme (EMPr)	A management programme designed specifically to introduce the mitigation measures proposed in the Reports and contained in the Conditions of Approval in the Authorisation.
Interested and Affected Party (I&AP)	Any individual, group, organization or associations which are interested in or affected by an activity as well as any organ of state that may have jurisdiction over any aspect of the activity.
NEMA EIA Regulations	The EIA Regulations means the regulations promulgated in terms of the National Environmental Management Act (Act 107 of 1998), as amended (Government Notice No. R 324, R 325, R 326 and R 327 in the Government Gazette of 7th April 2017 refer).
No-go Alternative	The option of not proceeding with the activity, implying a continuation of the current situation / status quo.
Public Participation Process (PPP)	A process in which potential Interested and Affected Parties are given an opportunity to comment on, or raise issues relevant to, specific matters.
Registered Interested and Affected Party	All persons who, as a consequence of the Public Participation Process conducted in respect of an application, have submitted written comments or attended meeting with the applicant or Environmental Assessment Practitioner; all persons who have requested the applicant or the EAP in writing, for their names to be placed on the register and all organs of state which have jurisdiction in respect of the activity to which the application relates.
Scoping process	A procedure for determining the extent of and approach to an EIA, used to focus the Environmental Impacts Assessment to ensure that only the significant issues and reasonable alternative are examined in detail.
Scoping Report	The report describing the issues identified during the Scoping Process
Significant Impact	Means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspect of the environment.

ABBREVIATIONS

BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent Authority
CBA	Critical Biodiversity Area
DAERL	Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (Provincial)
DFFE	Department of Forestry, Fisheries and Environment (National)
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
DPWI	Department of Public Works and Infrastructure
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GN	Government Notice
GNR	Government Notice Regulation
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Parties
IDP	Integrated Development Plan
IRP	Integrated Resource Plan
LED	Local Economic Development
LM	Local Municipality
LSDF	Local Spatial Development Framework
LUPO	Land Use Planning Ordinance (Ordinance 15 of 1985)
NDP	National Development Plan 2030
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:PAA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
NEM:AQA	National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004)
NEM:WA	National Environmental Management: Waste Act, 2008
NERA	National Electricity Regulation Act, 2006 (Act No. 4 of 2006)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PAOI	Project Area of Influence
PPP	Public Participation Process
PSDF	Provincial Spatial Development Framework
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SANS	South African National Standard
SDF	Spatial Development Framework
SES	Sharples Environmental Services cc
VIS	Visual Impact Statement
ZVI	Zone of Visual Influence

BACKGROUND AND PURPOSE OF THIS REPORT

It is a requirement according to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, as amended (GNR 326 of 2017), that once an application is submitted to obtain an Environmental Authorisation in terms of the NEMA EIA Regulations, as amended, that potential or registered Interested and / or Affected Parties (interested in the proposed development or affected by the proposed development) are afforded a consultation period (at least 30 days) on the Draft Scoping Report before their comments are taken into account and responded to in a Final Scoping Report.

The Draft Scoping Report will be made available for public comment from **13 May 2024 – 13 June 2024 (30+ days)**. An electronic version of the report has been placed on the SES website to be accessed by the public, and a hard copy of the report has been placed at the De Aar Public Library, opposite the intersection of Amelia Street and Station Street, De Aar (30°39'1.02"S 24° 0'42.83"E).

The Application form has been completed and submitted to the **Department of Forestry, Fisheries and Environment (DFFE)** was submitted concurrently with the Draft Scoping Report.

As per the legislated process, the Draft Scoping Report must be made available to identified Potential Interested & Affected Parties and Automatically Registered Key Authorities to review in order to provide comments for a period of **30+ days**. Following the public participation, the Scoping Report must be finalised and submitted to DFFE for decision making purposes (Acceptance/Rejection).

REQUIRED CONTENT OF A SCOPING REPORT AS PER THE 2014 NEMA EIA REGULATIONS, AS AMENDED

Appendix 2 of Government Notice 326 (7 April 2017) of the National Environmental Management Act No.107 of 1998 (NEMA) 2014 Environmental Impact Assessment (EIA) Regulations states the requirements for the content of a **Scoping Report** to be as per the table below. For ease of reference, we have noted in the table below where this required information can be found.

"A scoping report must contain the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include the following:"

DRAFT SCOPING REPORT

PROPOSED DEVELOPMENT OF THE HARTEBEEST HOEK SOLAR PV1 LOCATED ON THE REMAINDER OF THE FARM HARTEBEEST HOEK 31, EMTHANJENI LOCAL MUNICIPALITY, PIXLEY KA SEME DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.

Table 0-1: Required content of a Scoping Report according to the 2014 NEMA EIA Regulations and where in this Report the required content can be found

<p>a) details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;</p>	<p>Section 1.4 and Annexure J</p>
<p>b) the location of the activity, including- (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;</p>	<p>Section 4.1 and Annexure A</p>
<p>(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;</p>	<p>Appendix A</p>
<p>(d) a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;</p>	<p>Section 2.3 and Section 4.2</p>
<p>(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;</p>	<p>Section 2</p>
<p>(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;</p>	<p>Section 7</p>
<p>(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including - (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</p>	<p>Section 5 – Alternatives Section 6 – Environmental Attributes Section 8 – Public Participation Section 1 – Impacts & Risks Section 10 – Concluding Statement</p>
<p>(viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;</p>	
<p>(i) a plan of study for undertaking the environmental impact assessment process to be undertaken, including- (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; (iii) aspects to be assessed by specialists;</p>	<p>Annexure I</p>

DRAFT SCOPING REPORT**PROPOSED DEVELOPMENT OF THE HARTEBEEST HOEK SOLAR PV1 LOCATED ON THE REMAINDER OF THE FARM HARTEBEEST HOEK 31, EMTHANJENI LOCAL MUNICIPALITY, PIXLEY KA SEME DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.****Table 0-1: Required content of a Scoping Report according to the 2014 NEMA EIA Regulations and where in this Report the required content can be found**

<p>(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;</p> <p>(v) a description of the proposed method of assessing duration and significance;</p> <p>(vi) an indication of the stages at which the competent authority will be consulted;</p> <p>(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and</p> <p>(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;</p> <p>(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 managed and monitored.</p>	
<p>(j) an undertaking under oath or affirmation by the EAP in relation to-</p> <p>(i) the correctness of the information provided in the report;</p> <p>(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and</p> <p>(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;</p>	Annexure K
<p>(k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;</p>	Annexure K
<p>(l) where applicable, any specific information required by the competent authority; and</p>	N/A
<p>(m) any other matter required in terms of section 24(4)(a) and (b) of the Act.</p>	N/A

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1. INTRODUCTION AND BACKGROUND

1.1. Background to the Proposed Project

In recent years, South Africa's primary electricity service provider, Eskom Holdings SOC Ltd, has been under increasing pressure due to the electricity supply shortcomings experienced in the country. This has been experienced as the nationwide electricity demand continues to exceed the available electricity supply.

Due to the high GHG emissions intensity experienced as a result of the use of charcoal fire infrastructure, new legislation, plans and policies aimed toward providing reliable, renewable, low carbon energy generation sources were promulgated for the country.

Amongst these documents, the LEDS 2050 (UNFCCC, 2020) provides numerous strategies and targets to steer the Country towards Net Zero Carbon Emissions by 2050. Beyond the sector specific mitigation measures developed by the LEDS 2050, four (4) auxiliary measures were presented (UNFCCC, 2020). One of which included the phasing out of inefficient fossil fuel subsidies. The LEDS 2050 aims to phase out numerous coal-fired power stations in South Africa between 2030 and 2050. This strategy is supported by the application of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) as introduced in 2009. The REIPPPP is in line with the National Development Plan 2030 (NPC, 2013) and the National Infrastructure Plan 2050 (NPWI, 2022) and has since been supported by the identification of the Strategic Transmission Corridors (STC) and the Renewable Energy Development Zones (REDZ) with their accompanying procedures aimed at streamlining the renewable energy sectors' environmental processes. The legislative context of the REIPPPP has been described in Section 2.3.8.

Sharples Environmental Services cc (SES) has been appointed by Hartebeest Hoek Solar PV1 to undertake the environmental assessment on in accordance with the [National Environmental Management Act, 1998 \(Act 107 of 1998\) \(NEMA\)](#), in terms of the [Environmental Impact Assessment \(EIA\) Regulations of 2014, as amended \(Government Notice Regulation \(GNR\) 326 of 2017\)](#), for the Proposed Hercules Photovoltaic (PV) Solar Cluster Project.

1.1.1. Broad-scale context of the Hercules solar PV cluster

Hartebeest Hoek Solar PV1 proposes the construction and installation of the utility scale solar PV farm as part of a greater Solar PV cluster (to be known as the Hercules Solar Cluster).

The proposed cluster will be located on the Remainder of the Farm Riet Fountain No. 6 (Hanover Major Registration division), the Remainder of the Farm Roode Kraal No. 28 (Hanover Major Registration division), and Remainder of the Farm Hartebeest Hoek No. 31 (Hanover Major Registration division), Emthanjeni Local Municipality, Northern Cape. This does not include the properties affected as part of the grid infrastructure.

The Future Hercules Solar PV Cluster will have a total combined output capacity of up to 1 330 MW, with each proposed utility scale solar PV facility carrying a generation capacity of up to 405 MW.

The combined extent of the affected properties being considered, is approximately 7881 ha in total (excluding the properties upon which the transmission corridors are proposed). For ease of reference throughout this report, the following holds reference:

- **Study area:** Total extent of the affected properties and the transmission corridors (to be undertaken through a separate authorisation process).

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- **Development areas:** Numerous specialists were appointed to determine the sensitivity of the study area and to provide no-go areas specifically relating to their respective fields of expertise. The development areas equate to the total extent of the available portions of land following the site verifications done by the appointed specialists. The findings of the site verifications (baseline studies) conducted has been attached as Appendix G of this report.
- **Proposed solar PV development:** The proposed utility scale solar PV farm applicable to the current application. The Future Hercules Solar Cluster will be comprised of up to eight (8) individual proposed utility scale solar PV farms.
- **Proposed transmission lines:** The proposed distribution lines associated with the proposed development, to be addressed in a separate application.

Table 1-1 below details the extent, affected properties and output capacities of the respective proposed solar PV developments. Figure 1-1 indicates the extent of the respective solar PV developments.

Figure 1-2 below indicates the locations of the concepts described above as well as the overall development layouts which will be applied for through the various applications. The figure also indicates the proposed 132 kV transmission lines which will be applied for through separate applications.

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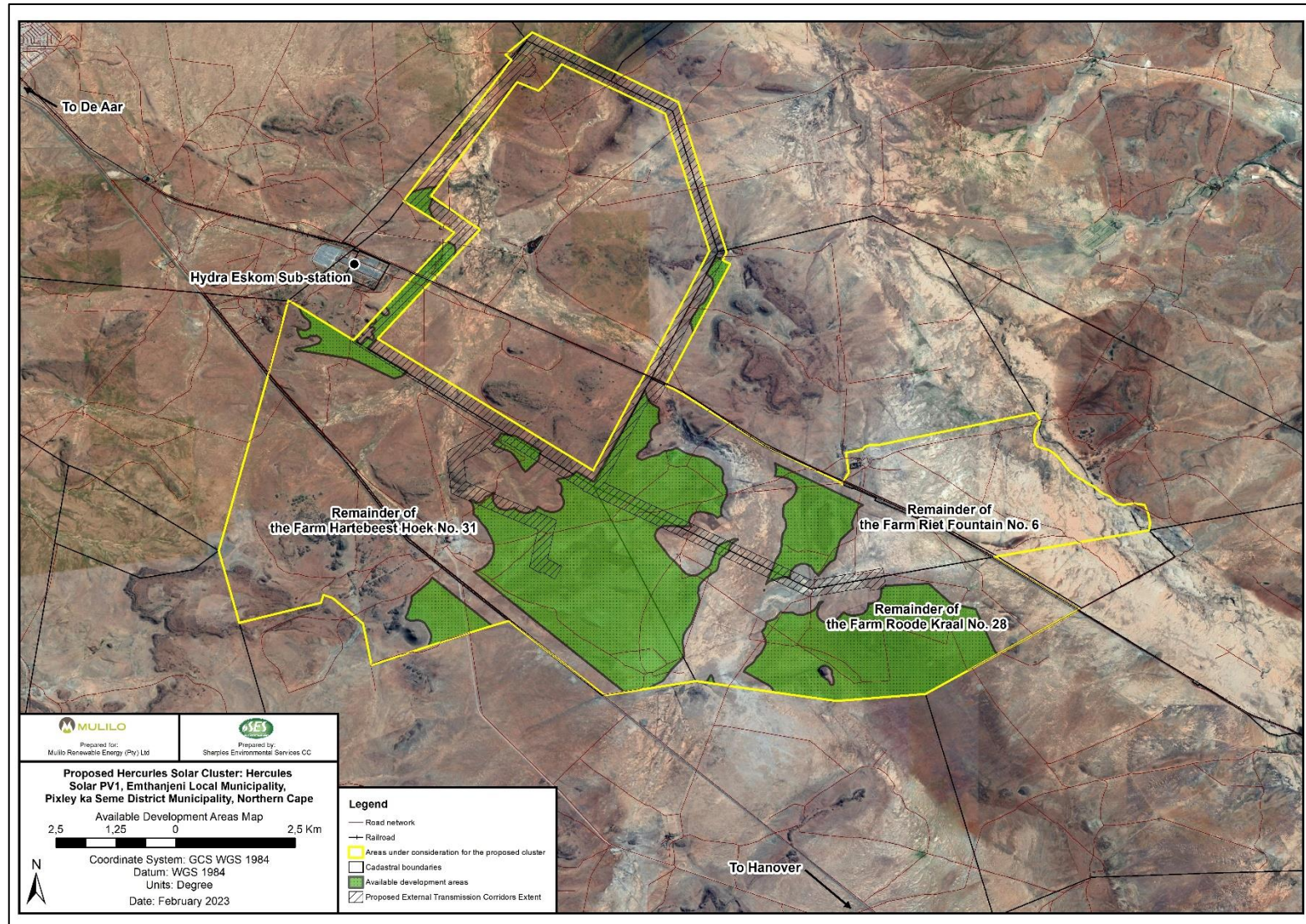


Figure 1-1: Extent of originally considered areas, including the three main property portions and the original extent of the proposed transmission corridors (Source: GoogleEarth, as accessed in April 2024).

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Table 1-1. Summary of the Hercules Cluster descriptions.

Technology	Approximate Extent	Output capacity	Affected properties
Study area of cluster (including transmission corridor area of impacts)	7881 ha	1 330 MW	<ul style="list-style-type: none"> Remainder of the Farm Riet Fountain No. 6 Remainder of the Farm Roode Kraal No. 28 Remainder of the Farm Hartebeest Hoek No. 31
Combined Solar PV Cluster size and output capacity (Complete extent of the Future Hercules Solar Cluster – including areas of avoidance)	4 105 ha	1 330 MW	<ul style="list-style-type: none"> Remainder of the Farm Riet Fountain No. 6 Remainder of the Farm Roode Kraal No. 28 Remainder of the Farm Hartebeest Hoek No. 31
Proposed Solar PV developments			
Hercules Solar PV1	1 112 ha	315 MW	<ul style="list-style-type: none"> Remainder of the Farm Riet Fountain No. 6 Remainder of the Farm Hartebeest Hoek No. 31 (only a portion of the access road) Remainder of the Farm Roode Kraal No. 28 (only a portion of the access road)
Hartebeest Solar PV1	1 041 ha	303 MW	<ul style="list-style-type: none"> Remainder of the Farm Hartebeest Hoek No. 31
(This Application)			
Jupiter Solar PV1	832 ha	307 MW	<ul style="list-style-type: none"> Remainder of the Farm Hartebeest Hoek No. 31 Remainder of the Farm Roode Kraal No. 28
Roode Kraal Solar PV1	1 120 ha	405 MW	<ul style="list-style-type: none"> Remainder of the Farm Roode Kraal No. 28 Farm No. 150 (only a portion of the access road – existing access road to be used on this portion)

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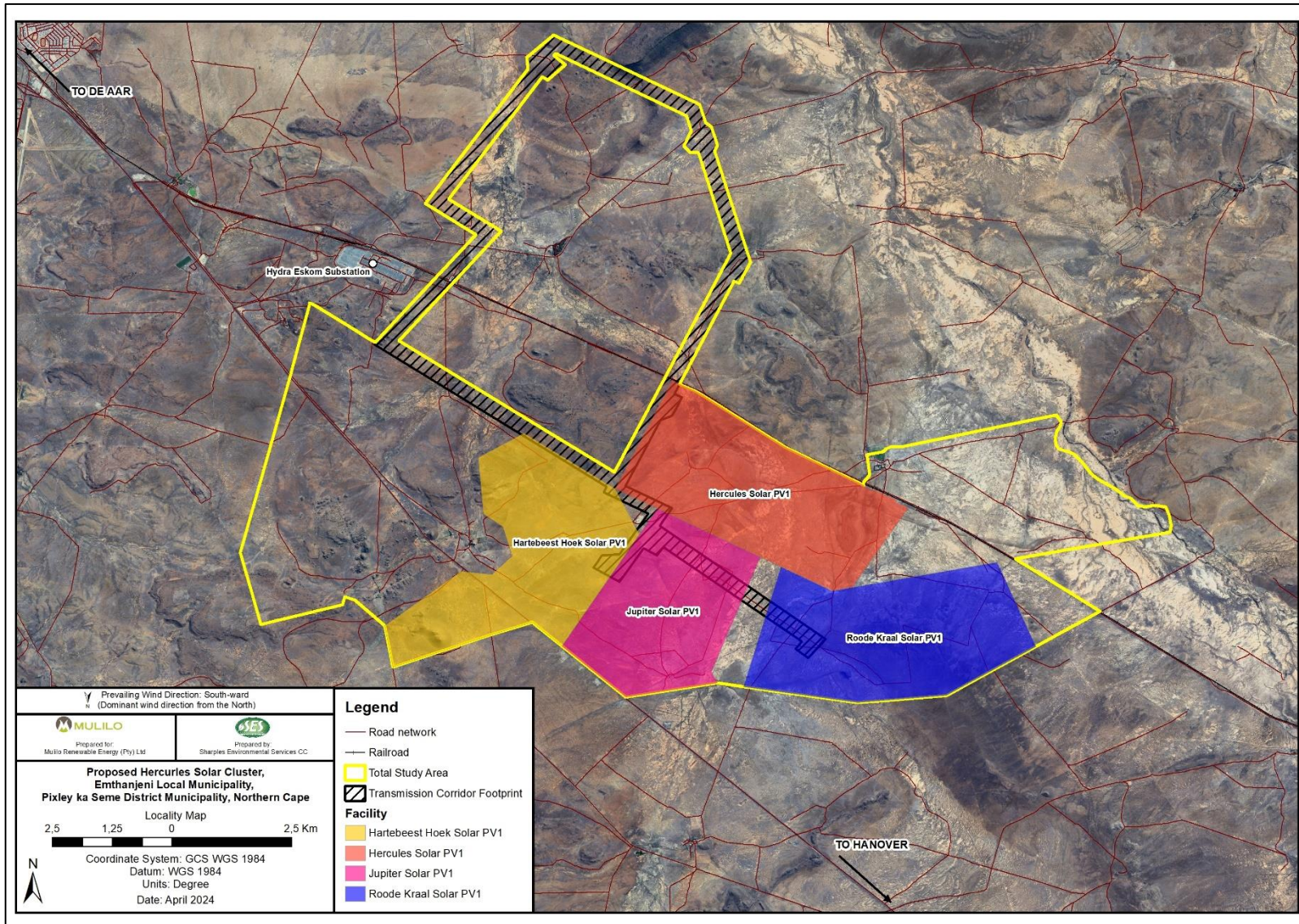


Figure 1-2: Full extent of the Future Hercules Solar Cluster and the locations of the individual proposed utility scale Solar PV farms (Source: GoogleEarth, as accessed in April 2024).

1.2. Solar PV Life-Cycle Analysis

This subsection aims to provide an overview of the Cradle-to-Grave synopsis of these systems and provide context toward achieving a sustainable project life of the proposed development. This will be used to inform the *Impacts* and the *Need and Desirability* of the proposed development.

According to Zhang & Dornfeld (2010), there are eight (8) aspects contributing toward the Life-cycle-analysis and resultant environmental impacts of a Solar PV System:

- (1) Obtaining Materials;
- (2) Manufacturing Electricity Use;
- (3) Manufacturing Facilities and Overhead;
- (4) Manufacturing Infrastructure;
- (5) Transportation;
- (6) Balance of Systems and Installation;
- (7) Operations, Maintenance and Transmission; and
- (8) End of Life.

This Life-cycle Analysis will use these aspects as the base of further anticipated processes and impact assessment.

(1) Obtaining Materials

This entails obtaining the materials to be used during the manufacturing stage of the infrastructure to be installed. This stage greatly contributes to the overall impact of the infrastructure. It should be noted that independent studies conducted to evaluate the impact of obtaining the materials do not take into consideration the impact of the transportation for the recovery of the required materials (Zhang & Dornfeld, 2010).

During the manufacturing phase of the Life-Cycle of the infrastructure, the primary components required include aluminium, solar glass, silicone and ethylene-vinyl acetate. The secondary components include copper, silver, lead and tin (amongst others) (Vacha, et al., 2021). This phase of the Life-Cycle includes the mining, transportation, production and extraction of the required materials which the solar infrastructure is comprised out of.

For the purpose of this Scoping and EIA process, these processes will not be considered as part of the impacts. Recommendations toward the sustainable commissioning of infrastructure will be made during the EIA phase and have been touched upon in the 'Scoping' impacts as raised in Section 9.

(2) Manufacturing Electricity Use

It is assumed that a considerable amount of electricity would be required during the manufacturing stage of the solar PV panels (and associated infrastructure). The main consensus amongst studies regarding this matter, reflects that either grid energy or installed solar infrastructure is used during the manufacturing phase (Zhang & Dornfeld, 2010).

For the purpose of this Scoping and EIA process, this factor will not be considered as part of the impacts. Recommendations toward the sustainable commissioning of

infrastructure will be made during the EIA phase and have been touched upon in the 'Scoping' impacts as raised in Section 9.

(3) Manufacturing Facilities and Overhead

The manufacturing facilities within which the solar PV panels and supporting infrastructure are manufactured largely contributes toward the anticipated environmental impact of any solar PV development. These facilities rely, amongst others, on the process tools, climate control equipment, de-ionized water, nitrogen and clean dry air. During the Life-Cycle of the solar PV panels, the facilities where the infrastructure is manufactured contributes toward almost half of the environmental impacts of the manufacturing phase (Zhang & Dornfeld, 2010). The overhead of the manufacturing facilities includes offices, warehouses, lavatories, and other components required by the manufacturing plant.

For the purpose of this Scoping and EIA process, this factor will not be considered as part of the impacts. Recommendations toward the sustainable commissioning of infrastructure will be made during the EIA phase and have been touched upon in the 'Scoping' impacts as raised in Section 9.

(4) Manufacturing Infrastructure

This includes the manufacturing of the solar PV infrastructure as well as support on-site buildings/structures (Sub-stations, offices etc). According to Zhang & Dornfeld (2010), the environmental impact of the manufacturing processes associated with the required infrastructure is directly proportional to the functional life of the proposed solar PV facility. Due to the longevity of the infrastructure (approximately 20-30 years, with an additional 5-10 years depending on the quality of the maintenance procedures conducted during the operational phase (see (point 8) below for details)), the technology used would become outdated prior to the complete failure of the infrastructure. The functional life of the on-site buildings (hard structures) will depend on the climatic conditions of the area within which the proposed development is located.

Hernandez *et al.* (2014), identified numerous environmental impacts for the construction, operational and decommissioning phases of utility scale solar farms. During the construction stage of establishment, environmental impacts include the use of environmental toxicants and flammable materials, the construction of the power plant, transmission corridors, substation infrastructure and roads as well as the removal of vegetation.

Recommendations/mitigation toward the sustainable construction of on-site buildings and installation of infrastructure have been proposed as part of the impact mitigation section (Section 9) of this Report.

(5) Transportation

Once the manufacturing process of the solar PV panels has been completed, the transportation of the infrastructure is required from the manufacturing site to the eventual installation site of the solar PV-panels. Depending on the manufacturing and installation locations, respectively, the infrastructure will either be transported via shipping or trucking, depending on the source of the infrastructure. At the End-of-Life

of the infrastructure, transportation from the installation location to the processing location would be required (this will require similar capital resources).

Recommendations toward sustainable commissioning of infrastructure will be made during the EIA phase and have been touched upon in the 'Scoping' impacts as raised in Section 9.

(6) Balance of Systems and installation

This aspect is influenced by numerous factors, such as terrain type, the type of solar PV system/network to be installed, the mounting system required, the additional components to be installed and the orientation of the panels relative to the solar alignment.

The environmental impact of the construction and installation phase also includes the usage of environmental toxicants and flammable materials, the requirement of a vast extent of unoccupied land, the installation of the power plant, surface grazing and the removal of vegetation (Hernandez, et al., 2014).

Recommendations/mitigation toward the sustainable construction and installation of infrastructure have been proposed as part of the impact mitigation section (Section 9) of this Report.

(7) Operations, Maintenance and Transmission

According to the IFC's Project Developer's Guide for Utility-Scale Solar Photovoltaic Power Plants (IFC, 2015), PV power plants have comparatively low maintenance and servicing requirements, where a balance between maximising production and minimising costs is required. As such, an operation & maintenance (O&M) contract is to be put into place to provide measures toward extending the life of the solar array.

Maintenance (which forms part of the O&M) can be divided into Scheduled and Unscheduled Maintenance, where the first is aimed toward preventing failures and faults and the latter is aimed toward responding to failures and faults.

- Scheduled Maintenance includes module cleaning and carrying out checks of the module connection integrity and the junction boxes. Hot spot identification (detected through thermography), inverter servicing, checks ensuring structural integrity, tracker servicing, vegetation control and balancing of the plant also form part of the maintenance procedures.
- Unscheduled maintenance involves replacement of broken components, rectifying faults and repairing faults.

As part of the O&M phase of a solar PV project, adequate spare part supplies are required to be stored on-site. This includes fuses, mounting structure pieces, junction boxes, cabling components, communication equipment, modules, spare inverters, spare motors and sensors.

Recommendations/mitigation toward the sustainable operation and maintenance of infrastructure have been proposed as part of the impact mitigation section of this Report.

(8) End of Life

The life of solar PV panels is approximately 25 to 30 years where the rate at which the panels produce electricity reduces significantly after approximately 20 years after being installed (Ndzibah, et al., 2021). Due to the invention of solar PV panels being relatively young, the longevity of the infrastructure and the fast-paced evolution of the technologies, the end-of-life processes associated with Solar PV manufacturing have not been extensively evaluated (Zhang & Dornfeld, 2010)

The feasibility of a modified Triple-R approach of a sustainable end-of-life to Solar PV components has been previously explored (Ndzibah, et al., 2021). This approach considered Reusing, Repair and Recycling the Solar PV components of, or, alternatively the entirety of the solar PV panels (Figure 1-4). It is proposed that an evaluation of each individual unit be done in order to identify whether the panels could be reused, should be repaired or should go through recycling processes (where the individual components can be redistributed into the production line) (Ndzibah, et al., 2021).

In the case of reusing solar panels, if properly maintained and no failures have been recorded for the device during its primary lifetime (first 20-25 years), the Solar PV panel can be afforded a second life, where it could provide an additional 5 to 10 years' for electricity generation. Although not efficient enough to contribute to the National Grid, these panels could be reused in rural areas, schools, or other institutions.

In the case of repairing the solar panels, similar to the inspections done on the reused panels, inspections can be done on faulty solar PV panels in order to identify the causes of the failure. According to IRENA approximately 19% of recorded failures involve cable or Junction Box failures, which could be replaced in the country of use.

Recycling entails the extraction of components from existing infrastructure for the use in the Manufacturing stage of the solar PV panels. The solar panels contain various materials that can be recovered. More than 95 % of the components a Solar PV panel (c-Si monocrystalline or polycrystalline) can be recycled and classified as non-hazardous materials (IRENA & IEA-PVPS, 2016). Other components of the solar PV panels would require special treatment (due to the presence of silicon, silver, tin and lead) (Padoan, et al., 2019).

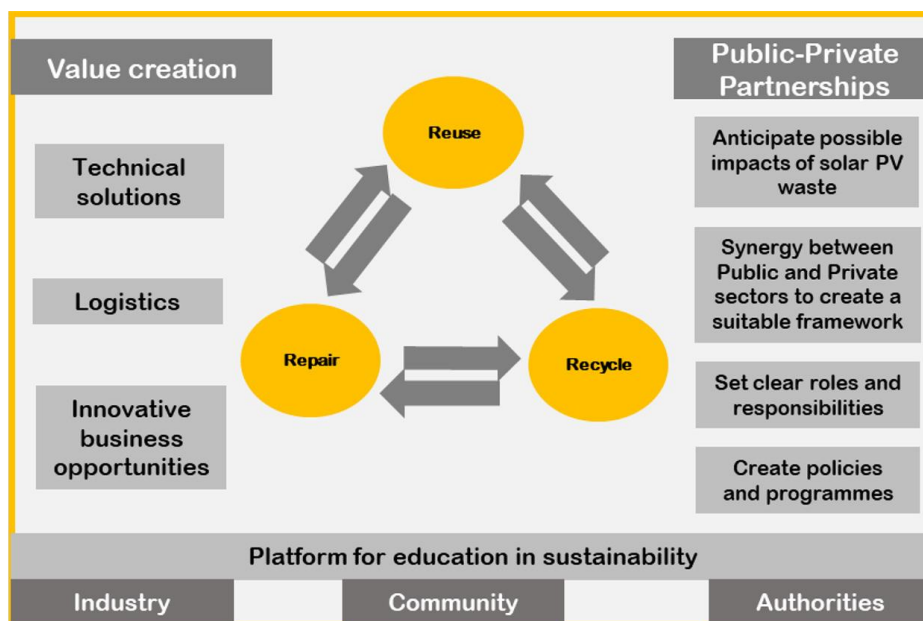


Figure 1-4. End-of-Life processes (Source: Ndzibah et al., 2022).

The End-of-Life of Solar PV panels provides an opportunity towards *Value Creation* in the form of new business opportunities commissioned for (a) solar PV panel decommissioning, (b) specialised logistics services (such as panel collection and transportation), (c) recycling services (in terms of disassembling the decommissioned solar PV panels), and (d) services for the specialised treatment of hazardous waste (Ndzibah, et al., 2021).

With proper education, training and business development regarding the specific requirements of sustainable management of the End-of-Life of solar PV-panels, a significant amount of benefits would be seen, such as decreased environmental, spatial and health impacts associated with solar PV panel waste, increased efficiency, improved adaptation to new technologies and a natural transition toward low carbon energies and a greater awareness of responsible management by citizens (Ndzibah, et al., 2021).

Recommendations/mitigation toward the sustainable decommissioning of infrastructure have been proposed as part of the impact mitigation section of this Report. Similarly, the sustainable transportation measures have been recommended as part of the impact mitigation section (Section 9) of this Report.

1.3. Summary of Development Proposal

1.3.1. Brief overview of proposed development

It is proposed to construct a solar PV farm, as part of the proposed Hercules Solar PV Cluster including all auxiliary infrastructure on part of the remainder of Farm Hartebeest Hoek 31 (Hanover Major Registration Division).

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The proposed development will have an extent of approximately 1 041 ha (with a development footprint of approximately 688 ha) and will have a total maximum generation capacity of up to 303 MW. The development will include the following infrastructure (Figure 1-5):

- **Solar field:**
 - Solar Arrays: PV modules;
 - Single axis tracking technology maximum height of 5m (aligned north-south);
 - Solar module mounting structures comprised of galvanised steel and aluminium;
 - Foundations which will likely be drilled and concreted into the ground; and
 - Solar measurement and weather stations;
 - Central/string Inverters and MV transformers in in field;
 - DC coupled Battery Energy Storage System (BESS) containers distributed through PV field located adjacent to inverters;
 - Lithium Ion battery Cells, Modules, Racks and containers;
 - Power Conversion Equipment;
 - Battery Management System; and
 - Energy Management System.
- **Associated Infrastructure**
 - Medium Voltage (MV =22/33 kV) overhead powerlines and underground cables;
 - MV Collector stations;
 - Access road;
 - Internal gravel roads;
 - Fencing;
 - General maintenance area;
 - Storm water channels and berms;
 - Water storage tanks and pipelines;
 - Temporary work area during the construction phase (i.e. laydown area); and
 - O&M buildings, store.
- **Project IPP Substation;**
 - 132kV substation with an area of 200m x 200m;
 - HV transformer;
 - Substation Control Building;
 - HV metering, Scada and protection building;
 - MV collector switchgear buildings; and
 - Compensation equipment (Filters capacitors reactors statcoms).
- **AC coupled BESS installation (with an area of 400m x 400m) at project substation and laydown area:**
 - Solid Sate Battery technology- either Lithium-Ion or Sodium Sulphide (NaS);
 - Battery Cells, Modules, Racks and containers;
 - Power Conversion Equipment;
 - Battery Management System;
 - Energy Management System;
 - MV transformers;
 - MV cabling and collector stations;
 - Fencing;
 - Offices, workshop; and
 - Fire Protection systems.

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The grid connection infrastructure for each project (which will be handed over to Eskom) may include:

- **Onsite Switching Station (SS), adjacent to the IPP Substation;**
 - 132kV Overhead Power Line (OHPL) – 30 m height from the switching station, with a length of <15km to a yet to be determined connection point;
 - Extension of the 132kV Busbar at the MTS;
 - 132kV Feeder Bay at the MTS;
 - Extension of the 400kV Busbar at the MTS; and
 - Installation of a new 400/132kV Transformer and bay at the MTS.

A detailed description of the proposed development has been provided in Section 4 of this report.

It should be noted that the gridlines associated with this development will undergo a separate environmental authorisation process. These gridlines will also affect properties not listed as part of this application.

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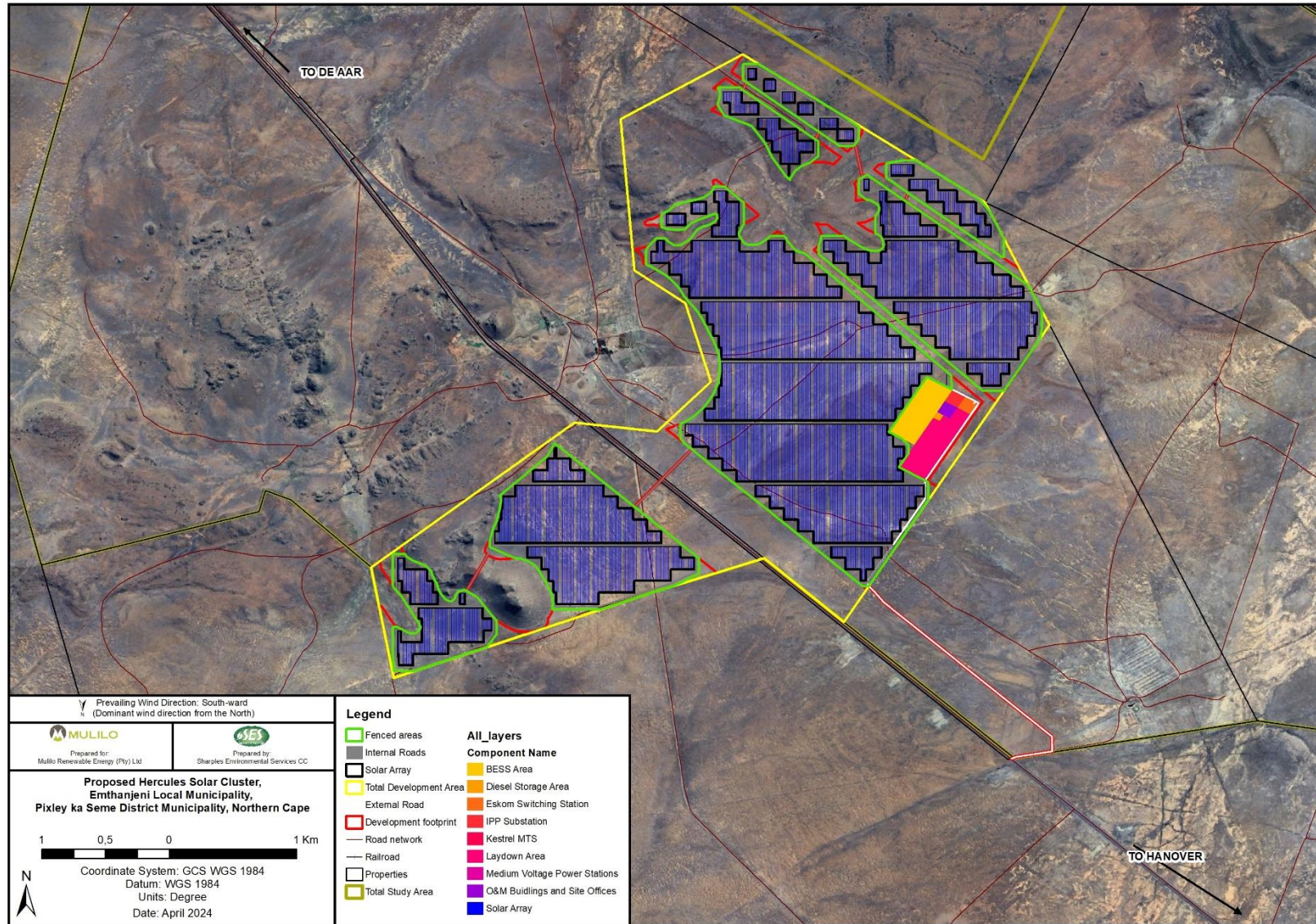


Figure 1-5: Proposed Preferred Site Layout Plan for the proposed Hartebeest Hoek Solar PV1 development (as per Appendix C1)

1.4. Details of the Environmental Assessment Practitioner (EAP)

Sharples Environmental Services cc is an independent environmental consultancy and has since 1998 been actively engaged in the fields of environmental planning, assessment and management. We advise private, corporate and public enterprises on a variety of differing land use applications ranging from large-scale PV and CPV renewable energy facilities, residential estates, resorts and golf courses to municipal service infrastructure installations and the planning of major arterials. SES has offices in George and in Cape Town.

The Responsible EAP and main contributing author this report is **Madeleine Knoetze**. However, **Ameesha Sanker** was a prominent contributing author of this report. Please see the table below for the reporting details. **Betsy Ditcham** has been the managing EAP of the project since the inception of the project.

REPORTING DETAILS		
Date:	Report details	Responsible person
17/02/2023	Original Compilation	Madeleine Knoetze, Ameesha Sanker (EAPASA # 4372) and Betsy Ditcham (EAPASA #1480)
08/05/2023	Updates to the report and appendices based on project description changes	Madeleine Knoetze, Ameesha Sanker (EAPASA # 4372) and Betsy Ditcham (EAPASA #1480)
16/06/2023	Updates to the report and appendices based on project description changes	Madeleine Knoetze and Betsy Ditcham (EAPASA #1480)
16/02/2024	Review of the Scoping Report by client	Lloyd Barnes
30/04/2024	Draft Scoping Report published for public review	Madeleine Knoetze (EAPASA #3230) and Betsy Ditcham (EAPASA #1480)

Madeleine holds a Bachelor of Science in Environmental Sciences from the Nelson Mandela Metropolitan University obtained in 2014. She has 9 years' experience in the environmental field, she has proven competency in the compilation of environmental assessments, water use licence applications, legal compliance, on-site monitoring, rehabilitation reporting, aquatic impact assessments and Geographic Information Systems (GIS). To date she has completed numerous environmental assessments, management plans, licencing applications, aquatic assessments and audits within the private and governmental spheres. Madeleine is registered with EAPASA as a certified Environmental Practitioner (EAPASA #3230).

Ameesha obtained her BSc. Geological Science (Environmental and Engineering), from the University of KwaZulu-Natal and a BSc. (Hons) in Environmental Management from UNISA. Her experience extends to 9+ years' in environmental management, assessments and compliance monitoring, predominantly in the infrastructure, water and sanitation industry. Ameesha is registered with EAPASA as a certified Environmental Practitioner (EAPASA # 4372).

Betsy has a Bachelor of Science Honours Degree in Wildlife Management from the University of Pretoria and a Bachelor of Science Degree (Zoology and Ecology) obtained from the University of Cape Town in 2005. She has 14 years' experience in the environmental field, including environmental assessments, legal compliance, on-site compliance monitoring, cleaner production and business greening and sustainability (carbon and environmental footprinting). In her time as a consultant, she has compiled a number of environment assessments and management plans for both private and governmental clients. Betsy is a shareholder of SES and registered with EAPASA as a certified Environmental Practitioner (EAPASA # 1480).

Please refer to **ANNEXURE J** to view the Curriculum Vitae for Ameesha Sanker and Betsy Ditcham.

2. LEGISLATION AND POLICY PERTAINING TO THIS APPLICATION

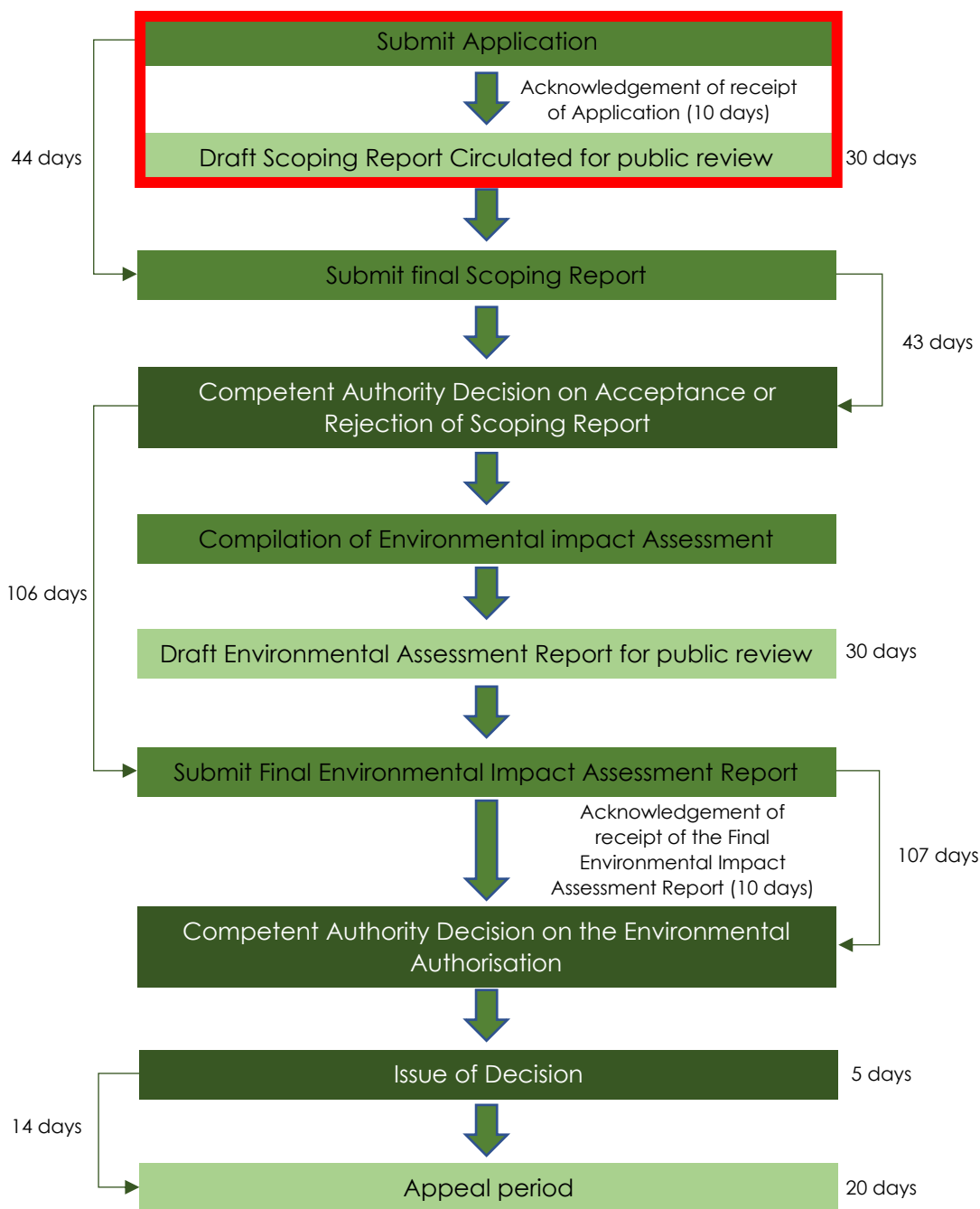
2.1. The Scoping / EIA Process

Due to extent and the nature of the proposed development, numerous "Listed Activities" in terms of the 2014 EIA Regulations promulgated in December 2014, as amended in 2017 (Government Notice Regulation (GNR) 326 of 2017), have been triggered. "Listed Activities" in terms of Listing Notice 2 of 2014, as amended (GNR 325 of 2017) have been triggered as a result of the extent and the proposed layout of the development. As stated in sub-regulation 3(2) of the aforementioned Regulations, "*The investigation, assessment and communication of the potential impact of activities must follow the procedure as prescribed in regulations 21, 22, 23 and 24 of the Environmental Impact Assessment Regulations, published in terms of Section 24(5) of the Act, unless otherwise indicated by the Minister in a government notice.*" Therefore, it is required to undertake a Full Scoping and EIA Process. The Scoping and EIA Process have been outlined in the *Please refer to Section 2.3.8 for the various Regulations affecting the legislative decision-making timeframes as they specifically relate to the Energy Grid.

Figure 2-1 below. The **Competent Authority (CA)** is the National Department of Forestry, Fisheries and Environment (DFFE).

The EIA process is informed by the 2014 Environmental Impact Assessment (EIA) Regulations Government Notice No. R 326 (7th April 2017) and typically follows three main phases, namely, an **Application Phase**, a **Scoping Phase and associated consultation Phase**, and an **Environmental Impact Assessment Phase and associated consultation** as illustrated in the Figure below.

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*Please refer to Section 2.3.8 for the various Regulations affecting the legislative decision-making timeframes as they specifically relate to the Energy Grid.

Figure 2-1: The Scoping / EIA Process

According to Appendix 2 of the EIA Regulations of 2014, as amended (GNR 326 of 2017; GNR 517 of 2021) as required in terms of Regulation 21(3) of the EIA Regulations of 2014. The objective of the "Scoping" Process is to, through a consultative process to:

- Identify the **relevant policies and legislation** relevant to the activity;
- Motivate the **need and desirability** of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through identification of impacts and risks and ranking process of such impacts and risks;
- Identify and confirm the **preferred site**, through a detailed site selection process, which includes an identification of impacts and risks 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 preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

2.2. List of Significant Regulations, Guidelines, Frameworks & Policies

The following Regulations (Acts) pertain to this development proposal and have been considered during the assessment process:

- The Constitution of South Africa (Act 108 of 1996);
- The National Environmental Management Act (NEMA), Act No 107 of 1998, as Amended;
- The Environmental Impact Assessment Regulations of 2014, as amended (GNR 326 of 2017), including the following:
 - Listing Notice 1 of 2014, as amended (GNR 327 of 2017);
 - Listing Notice 2 of 2014, as amended (GNR 325 of 2017); and
 - Listing Notice 3 of 2014, as amended (GNR 324 of 2017).
- National Environmental Management Biodiversity Act (Act 10 of 2004);
- National Waste Act (Act No. 59 of 2008);
- National Water Act (Act No. 36 of 1998);
- National Forest Act (Act No. 84 of 1998);
- National Electricity Regulations Act (Act No. 4 of 2006) including the determinations applicable to the proposed development;
- National Heritage Resources Act (Act No 25 of 1999);
- The National Veld and Forest Fire Act (Act No 101 of 1998)
- The National Health Act (No. 61 of 2003) and Health Act 63 of 1977;
- Conservation of Agricultural Resources Act – CARA (Act 43 of 1983);
- Subdivision of Agricultural Land Act (Act 70 of 1970);
- Occupational Health and Safety Act (Act 85 of 1993);
- National Building Regulations and Building Standards Act (Act No 103 of 1977);
- Infrastructure Development Act (Act No.23 of 2014);
- Land Use Planning Act (LUPA) (Act No. 3 of 2014);
- Spatial Planning and Land Use Management Act (Act No 16 of 2013);
- National Roads Act (No. 93 OF 1996);
- Road Traffic Management Corporation Act (No. 20 OF 1999);
- The Municipal Systems Act (Act 32 of 2000);
- The Physical Planning Act (Act 125 of 1999); and
- Climate Change Bill (Bill No. 9 of 2022).

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The following guidelines pertain to this development proposal and have been considered during the assessment process:

- Guideline for Determining the Scope of Specialist Involvement in EIA Processes;
- Guideline for the Review of Specialist Input into the EIA Process;
- Guideline for Involving Biodiversity Specialists in EIA Processes;
- Guideline for Involving Heritage Specialists in EIA Processes;
- Guideline for Involving Visual and Aesthetic Specialists in EIA Processes;
- Guideline for Environmental Management Plans;
- Guideline on Public Participation;
- Guideline on Alternatives;
- Guideline on Need and Desirability, 2017;
- DEAT (2002) Scoping, Information Series 2 ((Integrated Environmental Management Information Series: Impact Significance);
- DEA (2010), Guideline on Need and Desirability, Integrated Environmental Management Guideline Series 9; and
- DEAT (2004), Life Cycle Assessment, Integrated Environmental Management, Information Series 9.

National, Provincial & Municipal Development Planning Frameworks considered during the assessment process include:

- National Development Plan 2030 (2012);
- Northern Cape Provincial Spatial Development Framework (PSDF) 2019;
- Emthanjeni Municipality Integrated Development Plan (IDP) 2011/2022;
- Pixley Ka Seme Municipality Integrated Development Plan (IDP) 2022-2027; and
- Pixley Ka Seme Municipality Spatial Development Framework (SDF) (2019).

With regards to the compliance with the energy infrastructure related documents and guidelines, the following documents were taken into consideration for the proposed development:

- Eskom Transmission Generation Connection Capacity Assessment of the 2024 Transmission Network (2022);
- Eskom Transmission Development Plan for 2020-2029 (2019);
- Renewable Energy Generation Plant Setbacks to Eskom Infrastructure (2020);
- Department of Energy's (DoE's) Integrated Resource Plan (IRP) 2010-2030;
- DEA, Strategic Environmental Assessment for Electricity Grid Infrastructure in South Africa (2019);
- DoE, Integrated Resource Plan (2019);
- Electricity Regulation Act of 2006 (Act No. 4 of 2006) and all determinations under these Regulations, including:
 - Renewable Energy (Solar Park) Programme (GNR 603 of 2016); and
 - GNR 753 of 2020 providing the determination of the requirement for the procurement of additional energy resources.
- The procedure to be followed in applying for Environmental Authorisation for large scale electricity transmission and distribution development activities identified in terms of section 24(2)(a) of the National Environmental Management Act, 1998 when occurring in Geographical Areas of Strategic Importance, 2018 (GNR 113 of 2018).
- Expanded geographical areas of strategic importance for the development of electricity transmission and distribution infrastructure and of procedures to be followed

when applying for or deciding on environmental authorisations for large scale electricity transmission or distribution development activities identified in terms of section 24(2)(a) of the National Environmental Management Act, 1998 when occurring in geographical areas of strategic importance, 2021 (GNR 383 of 2021);

2.3. Summary Description of Most Significant Policy Documents

2.3.1. The Constitution of South Africa (Act No 108 Of 1996)

The Constitution of South Africa is the supreme law of the country of South Africa. It provides the legal foundation for the existence of the republic, sets out the rights and duties of its citizens, and defines the structure of the government.

Section 24 of The Constitution states the following:

Everyone has the right —

- *to an environment that is not harmful to their health or well-being; and*
- *to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that —*
 - *prevent pollution and ecological degradation;*
 - *promote conservation; and*
 - *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

2.3.2. The NEMA, Act No 107 of 1998, as amended, and the EIA Regulations of 2014, as amended

The National Environmental Management Act (NEMA; No. 107 of 1998, as amended) gives effect to the Constitution of the Republic of South Africa (Act No. 108 of 1996) by providing a framework for co-operative environmental governance and environmental principles that enable and facilitate decision-making on matters affecting the environment. The NEMA requires that an environmental authorisation (EA) be issued by a competent authority (CA) before the commencement of an activity listed in Environmental Impact Assessment (EIA) Regulations in terms of Listing Notices 1, 2 and 3 of 2014, as amended (G.N.R 324, 325, 326 & 327 published on the 7th April 2017).

Due to the fact that this development proposal triggered activities listed in Listing Notice 2 of 2014, as amended (GNR 325 of 2017), in terms of the EIA Regulations of 2014, as amended (GNR 326 of 2017), a Full Scoping & EIA Process is required and the respective reports (Scoping and EIA) must be submitted to the Department of Forestry, Fisheries and Environment (DFFE) before they issue Hartebeest Hoek Solar PV1 with a decision on the EA (either approval or rejection of the development proposal).

2.3.3. National Environmental Management: Biodiversity (Act 10 of 2004)

This Act controls the management and conservation of South African biodiversity within the framework of NEMA. Amongst others, it deals with the protection of species and ecosystems that warrant national protection, as well as the sustainable use of indigenous biological resources. Sections 52 & 53 of this Act specifically make provision for the protection of critically endangered, endangered, vulnerable and protected ecosystems that have undergone, or

have a risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention through threatening processes. The proposed development is located within the Northern Upper Karoo Ecosystem Type, which has a threat status of Least Concern.

2.3.4. Conservation of Agricultural Resources Act – CARA (Act 43 Of 1983)

Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983) provides for the regulation of control over the utilisation of the natural agricultural resources to promote the conservation of soil, water and vegetation, as well as to provide measures for combating weeds and invader plant species. The CARA also defines different categories of alien plants.

The purpose of this act is to ensure the long-term sustainable use and conservation of natural agricultural resources. The CARA has the objective to provide for the conservation of the natural agricultural resources of the Republic through the maintenance of the production potential of land, combating and prevention of erosion, and weakening or destruction of the water sources, the protection of the vegetation and the combating of weeds and invader plants. It is the only legislation promoting the sustainable use of natural agricultural resources at farm level.

The land capability of the proposed development area varies between **Very Low to Moderate**.

2.3.5. National Water Act (Act No 36 of 1998) - NWA

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) provides the framework for the sustainable management of South Africa's water resources. It aims to protect, use, develop, conserve, manage and control water resources as a whole, promoting integrated water resource management that involves participation of all stakeholders. The NWA declares the national government to be the public trustee of the nation's water. The NWA is administered by the national Department of Water and Sanitation (DWS) via regional offices.

The following section 21 "water uses" **require Water Use Authorisation (either in the form of a Water Use License (WULA) or a General Authorisation (GA) Water Use Registration:**

- 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.*

The proposed development requires a Water Use License (WUL) in terms of Chapter 4 and Section 21 (a), (c) and (i) of the NWA (Act No. 36 of 1998) and this must be secured prior to the commencement of construction.

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The following water uses have been identified for the project:

- Section 21 (a): Taking water from a water resource
- Section 21 (c): Impeding or diverting the flow of a watercourse
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse

These water uses will be associated with the following activities:

- The construction of infrastructure within the regulated area of the identified watercourses.
- The site will be equipped with conservancy tanks for the purpose of containing wastewater prior to the removal thereof through the commissioning of a honeysucker.
- The use of existing tracks crossing watercourses for the purpose of the proposed development.
- Earthworks and storm water runoff and erosion/sediment during construction
- Storm water runoff management during operation.
- Boteholes will be drilled to service the proposed development.

The findings of the Aquatic Risk Matrix Assessment undertaken by The Biodiversity Company show that due to development risk being calculated as 'Low - Moderate' (after mitigation), therefore the development cannot be authorised in terms of the GA (General Authorisation) for Section 21 (a), (c) and (i) water use under this scenario and requires a full license application.

A water use license (WUL) will be applied for through the online eWULAA system.

2.3.6. National Forest Act (Act No 84 of 1998)

The purpose of this National Forest Act (Act No. 84 of 1998) (NFA) is to:

- promote the sustainable management and development of forests for the benefit of all;
- create the conditions necessary to restructure forestry in State forests;
- provide special measures for the protection of certain forests and trees;
- promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes;
- promote community forestry;
- promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.

The NFA is governed by the National Department of Forestry, Fisheries and the Environment (DFFE).

2.3.7. National Heritage Resources Act (Act No 25 of 1999) (NHRA)

The protection and management of South Africa's heritage resources is controlled by the National Heritage Resources Act (Act No. 25 of 1999) (NHRA). The Northern Cape Heritage Resources Authority (NCHRA) is the enforcing authority in the Northern Cape and is a Stakeholder for this environmental process. As this process forms part of the REIPPPP, comments from the South African Heritage Resources Agency (SAHRA), will be required in terms of Section 38 of the NHRA. An application will be lodged through the South African Heritage Resource Information System (SAHRIS), through which SAHRA will comment on the proposal. Section 38(8) also makes provision for the assessment of heritage impacts as part of an EIA process.

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The NHRA requires relevant heritage authorities to be notified regarding this proposed development, as the following activities are relevant:

- a) *the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- b) *the construction of a bridge or similar structure exceeding 50 m in length;*
- c) *any development or other activity which will change the character of a site—*
 - i. *exceeding 5 000 m² in extent; or*
 - ii. *involving three or more existing erven or subdivisions thereof; or*
 - iii. *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - iv. *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- d) *the re-zoning of a site exceeding 10 000 m² in extent;*

Formal comment will be requested from SAHRA as part of the EIAR phase of the proposed development. The palaeontological desktop assessment indicated that the sensitivity of the proposed development area varied between moderate and very high sensitivity. The sensitivity of the proposed development area will be verified once the specialist's impact assessment report has been received (to be included as part of the EIR).

2.3.8. National Electricity Regulation Act, 2006 (Act No. 4 of 2006)

The National Electricity Regulations Act of 2006 (NERA) aims to establish a national regulatory framework for the electricity supply industry, to make the National Energy Regulator the custodian and enforcer of the national electricity regulatory framework, and to provide licences and registration in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

Section 34(1) of the Electricity Regulations Act of 2006 states the following:

34. New generation capacity

(1) The Minister may, in consultation with the Regulator –

(a) determine the new generation capacity is needed to ensure the continued uninterrupted supply of electricity;

(b) determine the types of energy sources from which electricity must be generated, and the percentages of electricity that must be generated from such sources;

(c) determine that electricity thus produced may only be sold to persons in the manner set out in such notice;

(d) determine that electricity thus produced must be purchased by the persons set out in such notice;

(e) require that new generation capacity must-

(i) be established through a tendering procedure which is fair, equitable, transparent, competitive and cost-effective;

(ii) provide for private sector participation.

On 27 May 2016, the Minister of Energy, in consultation with the National Energy Regulator of South Africa (NERSA) promulgated the Renewable Energy (Solar Park) Programme 2016, a Determination under Section 34(1) of the Electricity Regulation Act, 2006. The Electricity Regulations on New Generation Capacity (GNR 721 of 2009) as promulgated in terms of the NERA (Act 4 of 2006) introduced the of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) whereby which the rules and guidelines of the REIPPPP bidding programme were defined.

The Renewable Energy (Solar Park) Programme 2016 relies on the REIPPPP to facilitate the achievement of the renewable energy targets of the Republic of South Africa, including the procurement of 1500 MW allocated to the National Electricity Grid that is required to be

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produced from these energies between the time span of 2026-2028 (GNR 603 of 2016). The requirements have also been established in line with 'Table 5' of the National Development Plan 2030. This document outlines the status quo of the infrastructure of South Africa, as well as creating path towards obtaining key milestones.

In 2016, the Cabinet approved the strategic corridors, which were promulgated in GNR 113 of 2018 by the Department of Environmental Affairs (DEA). The promulgated Strategic Transmission Corridors (STC) were done so under the NEMA (Act No. 107 of 1998) with the aim of allowing simplified and streamlined application procedures regarding transmission infrastructure. As contemplated in the provisions of GNR 113 of 2018, when a transmission/distribution project (Activity 9 of Listing Notice 2 of 2014, as amended [GNR 325 of 2017] must be triggered) is located within one or more STCs, the project would be subject to a Basic Assessment Process. This process to be followed is not subject to the sensitivities of the proposed development site. These Strategic Transmission Corridors were evaluated through the consultation of a Strategic Environmental Assessment conducted by CSIR (DEA, 2016)) as commissioned by the DEA. Similarly, in February 2021, the Department of Forestry, Fisheries and Environment (DFFE) identified a series of geographic areas of strategic importance for the development of large-scale wind and solar photovoltaic energy facilities known as Renewable Energy Development Zones (REDZ). The procedures specifically relating to the electricity infrastructure have been illustrated below.

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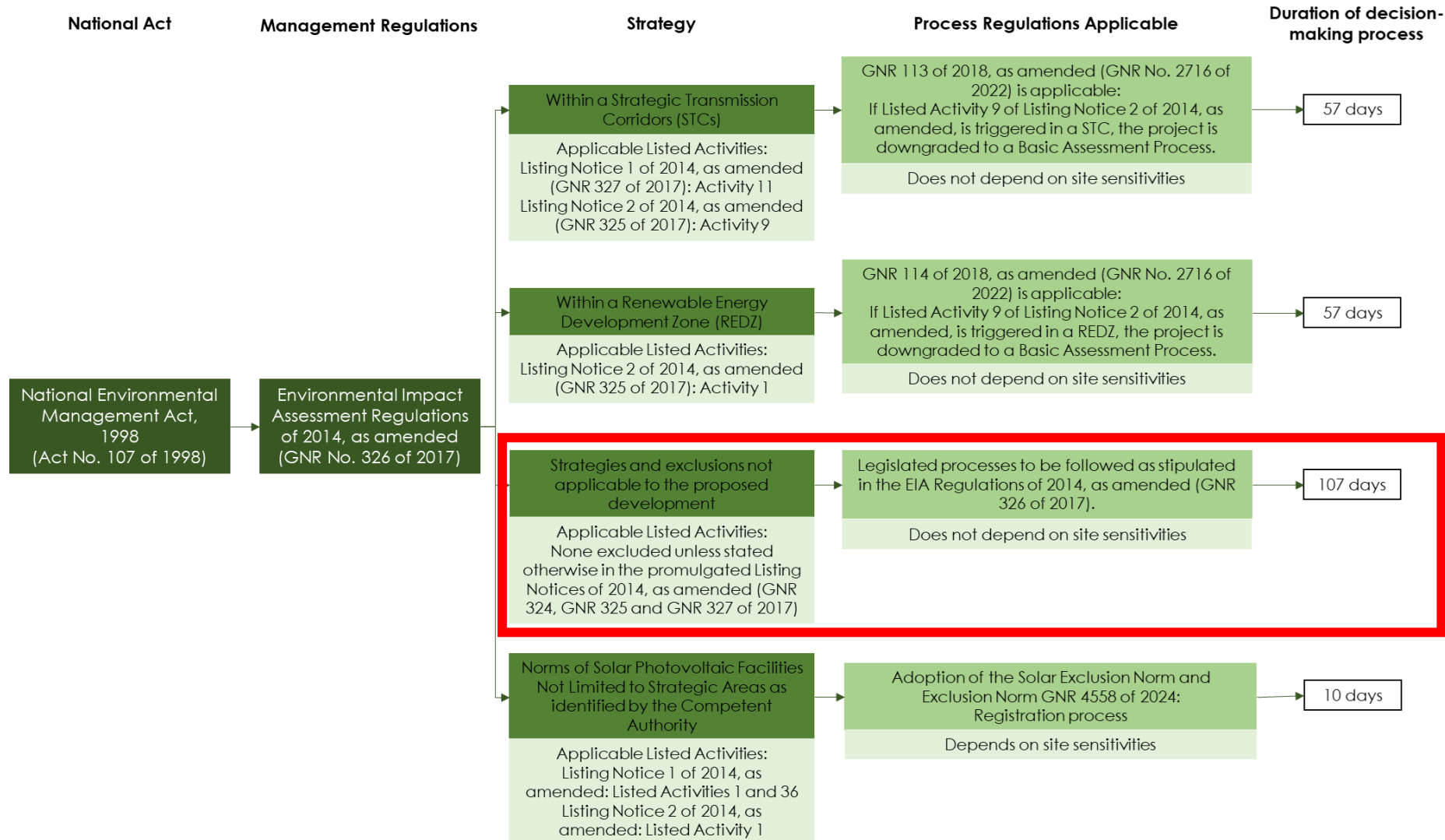


Figure 2-2: Legislative processes of electricity generation and distribution corridors, indicating the process to be followed relevant to the proposed development.

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Infrastructural projects that would require the approval of the Listed Activities triggered in terms of the EIA Regulations of 2014, as amended (GNR 326 of 2017) as stipulated in the respective notices would follow a shortened approval route, where the decision-making timeframe of the Competent Authority is 57 days.

Please note a standard has been adopted for the development of transmission infrastructure (powerlines and substations) under GN 2313 of July 2022 in terms of the NEMA (Act 107 of 1998). The Norm has been adopted for the development of solar photovoltaic facilities as well (GNR 4558 of 2024 in terms of the NEMA (Act No. 107 of 1998).

This Standard excludes the projects, which are in areas identified by the screening tool as being of medium or low environmental sensitivity (and have been confirmed as such by the relevant specialists), from obtaining environmental authorization should they be located in an STC as identified in GNR 113 of 2018, as amended. The activities applicable to this standard is Activities 11 and 47 of Listing Notice 1 of 2014, as amended, and Activity 9 of Listing Notice 2 of 2014, as amended. **The Norms and Standards will not apply to the proposed development; however the transmission corridors will be within the provisions of GNR 113 of 2018,**

The proposed development is located within the Central Transmission Corridor as promulgated in 2018. The location of the proposed development relative to the STC and REDZ have been indicated in Figure 2-3 below.

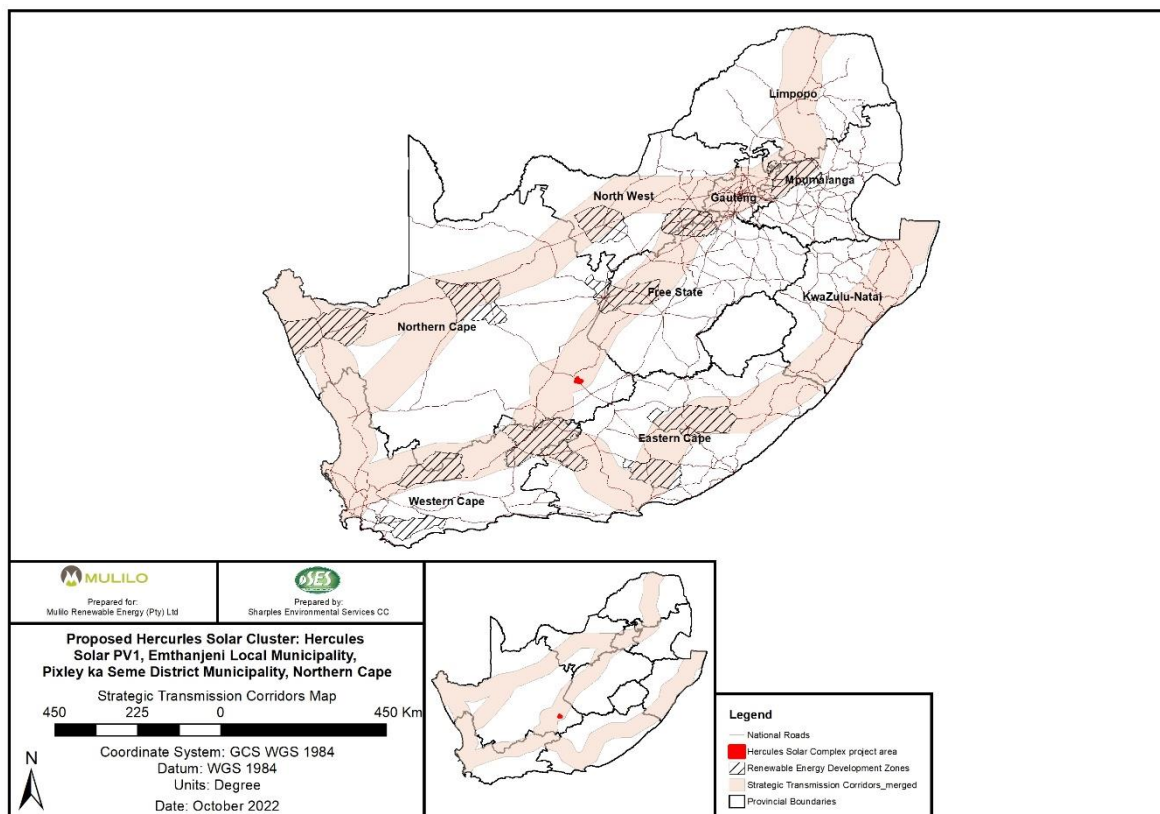


Figure 2-3: Strategic Transmission Corridors (STC) and Renewable Energy Development Zones (REDZ) as promulgated (Source: DFFE, as accessed October 2022).

2.3.9. The National Development Plan 2030 (2012)

The National Development Plan (NDP) (NPC, 2013) contains a plan aimed at eliminating poverty and reducing inequality by 2030. Chapter 4, Economy infrastructure – The foundation of social and economic development, is relevant to, and supports the establishment of the proposed renewable energy development. This section of the document is to be read in conjunction with the DoE's Integrated Resources Plan (IRP) (DMRE, 2019) that seeks to increase the private participation and investment in this field through the involvement of independent investors. The IRP (DMRE, 2019) is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment (minimize negative emissions and water usage).

The NDP 2030 (NPC, 2013) notes that South Africa is in dire need of an improved electricity distribution regime. This will be achieved by means of:

- Investment into human and physical capital;
- Improvement of governmental support for combating illegal use;
- The improvement of the demand-side management; and
- Widening participation and accelerate investment of the electricity sector through the division of the power grid between Eskom (the National Energy Regulator) and Independent Power Producers (IPPs).

2.3.10. Emthanjeni Local Municipality Integrated Development Plan (2017-2022)

The Emthanjeni Municipality's vision is to lead sustainable development for inclusive economic growth. The IDP identifies 7 Key Performance Areas (KPA's) that underpin the vision, namely:

- KPA 1: Basic Services and Infrastructure Development
- KPA 2: Institutional Development and Municipal Transformation
- KPA 3: Good Governance and Public Participation
- KPA 4: Financial Viability
- KPA 5: Local Economic Development
- KPA 6: Safety and Security
- KPA 7: Social Development

KPA's 1, 2 and 5 are most relevant to the proposed development.

As part of the NDP 2030 (NPC, 2013) and by extension the IRP (DMRE, 2019), identified the municipality as a Strategic Transmission Corridor (STC), the area has the capability of becoming a centre of renewable energy.

The Manufacturing sector shows potential of growth through the introduction of Renewable energy projects in and near De Aar, where the municipality depends on the Manufacturing sector to promote renewable energy generation. This, coupled with the various planned projects, will immensely promote growth on the economy.

2.3.11. Provincial and Local Level Policy and Planning

Refer to Section 6.8 of this report for an in-depth assessment of provincial and local policies and legislation.

2.4. Approvals Required Pre-Construction and Planning Phase

The table below summarises the various environmental and planning approvals required from the various Authorities, before the construction of the development may take place.

Table 2-1: Summary Pre-Construction Environmental & Planning Approvals Required

Competent Authority	In terms of Legislation	Type of Approval / Licence / Required
Department of Forestry, Fisheries and Environment (DFFE)	National Environmental Management Act (NEMA) and the 2014 EIA Regulations (April 2017)	Environmental Authorisation required in terms of the NEMA EIA Regulations (2014), as amended, for the activities listed in section 2.5 below.
Department of Water Affairs & Sanitation (DWS)	The National Water Act (NWA)	A Water Use Authorisation is required for approval of the following water uses: 21a) – taking water from a water resource; 21c) – impeding or diverting the flow of water in a watercourse; 21i) - altering the bed, banks, course or characteristics of a watercourse;
Northern Cape Heritage Resources Authority/ South African Heritage Resources Agency	National Heritage Resources Act (NHRA) – Section 38	Comments and approval will be requested from the SAHRA.
Emthanjeni Local Municipality	Emthanjeni Spatial Planning and Land Use Management By-Law, Northern Cape Province, 2015	The rezoning of the properties as shown on the layout plan need to be approved by the Municipality.
Civil Aviation Authority	Civil Aviation Act, 2009 (Act No. 13 of 2009), in terms of the Civil Aviation Regulations, 2011	A license for the establishment of a solar development is required from the CAA.

The above environmental approvals are informed by the Environmental Impact Assessment (EIA) process, an integrated process through which information regarding the proposed development will be collected, organized, analysed and communicated to the relevant authorities for consideration.

A legislative review of the proposed development has been included in

2.5. Listed Activities in Terms of the EIA Regulations (2017)

The following activities are being applied for in terms of the EIA Regulations of 2014, as amended (GNR 326 of 2017; GNR 517 of 2021):

- Listing Notice 1: Activity No. 1, 11, 12, 14 19, 24, 27 and 28; and
- Listing Notice 2: Activity 1 and 15;
- Listing Notice 3: Activity 10

Table 2-2: Listed Activities in terms of the NEMA Environmental Impact Assessment Regulations (2014) of 2014, as amended (GNR 326 of 2017), that are proposed to be triggered and therefore require an application for Environmental Authorisation to be submitted to the DFFE.

Activity #	Description of Activity as per GN No. R 327	Reason for Listing or NOT listing.
LISTING NOTICE 1 (GN No. R327 of 7th April 2017): Basic Assessment		
1	<p>The development of facilities or infrastructure for the generation of electricity from a renewable resource where-</p> <p>(i) the electricity is more than 10 megawatts but less than 20 megawatts; or</p> <p>(ii) the output is 10 megawatts or less but the total extent of the facility covers less than a hectare.</p> <p>Excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs</p> <p>(a) within an urban area; or</p> <p>(b) on existing infrastructure</p>	<p>The proposed Hartebeest Hoek Solar PV1 development will have a total maximum generation capacity of up to 303 MW and will be located outside of an urban area. The extent of the proposed development is approximately 1 041 ha, with a proposed project footprint of up to 688 ha. The proposed development will exceed the generation capacity as stipulated in by the thresholds stipulated in the activity.</p>
11	<p>The development of facilities or infrastructure for the transmission and distribution of electricity—</p> <p>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or</p> <p>(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is —</p> <p>(a) temporarily required to allow for maintenance of existing infrastructure;</p> <p>(b) 2 kilometres or shorter in length;</p> <p>(c) within an existing transmission line servitude; and</p> <p>(d) will be removed within 18 months of the commencement of development.</p>	<p>The proposed development is located outside of an urban area and will see to the construction of an on-site Eskom switching station as well as a 132kV IPP Substation Therefore, the distribution capacity will be within the thresholds of this activity. Furthermore, the internal electricity reticulation of the proposed development will be within this threshold as well.</p>
12	<p>The development of—</p> <p>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</p> <p>(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</p> <p>excluding—</p> <p>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p>	<p>The proposed development will be constructed through areas identified as wetlands (by the National Wetlands Map, the National Freshwater Priority Areas (NFEPA) delineation, and the specialist's screening tool sensitivity verification). The cumulative extent of the impacted wetland areas is approximately 0.5 ha. With the only impact on the watercourses resulting from the access road leading to the proposed development and internal access roads leading from one portion of the farm to another. Therefore, the impact on the watercourses will exceed the 100 square metre threshold.</p>

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Activity #	Description of Activity as per GN No. R 327	Reason for Listing or NOT listing.
	<p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</p>	
14	<p>The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</p>	<p>Fuel (and lubricants), electrolyte solution and powder cement may be required on site during various stages of the project.</p>
19	<p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</p> <p>(a) will occur behind a development setback;</p> <p>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p> <p>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies</p>	<p>Sections of the proposed development will intercept the delineated wetlands on site. This would involve the movement of material in the watercourse. The cumulative extent of the impacted wetland areas is approximately 0.5 ha, and will therefore result in the volume of soil to be impacted upon to exceed the volume perimeter.</p>
24	<p>The development of a road—</p> <p>(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</p> <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</p>	<p>The proposed development will include the construction of access roads and internal roads. The roads used for the purpose of the construction phase and the access road of the proposed development will have a width of approximately 10 m. The proposed internal roads to be used for the purpose of the operational phase of the proposed development, will have a width of 8 m. Therefore, the proposed development footprint will exceed the 8 m threshold.</p>
27	<p>The clearance of an area of 1 hectare or more but less than 20 hectares of indigenous vegetation.</p>	<p>The proposed development project footprint is covered by indigenous vegetation and will have an extent of approximately 1041 ha. However, only up to 688 ha of the vegetation will be cleared for the purpose of the proposed</p>

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Activity #	Description of Activity as per GN No. R 327	Reason for Listing or NOT listing.
28	<p>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:</p> <ul style="list-style-type: none"> i. will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or ii. will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; 	<p>development. The proposed development footprint will exceed the 20 ha threshold.</p> <p>The proposed development will be located on a portion of land which is currently used for the purpose of Agricultural practices (Game farming and small-scale livestock). The proposed development site is approximately 1041 ha and the area to be cleared is up to 688 ha. Therefore, the proposed development footprint will exceed the 1 ha threshold.</p>
LISTING NOTICE 3 (GN No. R324): Basic Assessment		
10	<p>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 30 but not exceeding 80 cubic metres. (g) Northern Cape:</p> <ul style="list-style-type: none"> i. In an estuary; ii. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland; iii. Outside urban areas: <ul style="list-style-type: none"> a. A protected area identified in terms of NEMPAA, excluding conservancies; b. National Protected Area Expansion Strategy Focus areas; c. Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; d. Sites or areas identified in terms of an international convention; e. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; f. Core areas in biosphere reserves; g. Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; h. Areas seawards of the development setback line or within 1 kilometres from the high-water mark of the sea if no such development setback line is determined; or i. Within 500 metres of an estuary; or iv. Inside urban areas: <ul style="list-style-type: none"> a. Areas zoned for use as public open space; 	<p>Fuel (and lubricants), electrolyte solution and powder cement may be required on site during various stages of the project. It is anticipated that the no more than 80 cubic metres of dangerous goods will be present on site at any one moment. The proposed storage areas (O&M Buildings and site camp) and BESS is located within 100 m from the edge of the nearest watercourse.</p>

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Activity #	Description of Activity as per GN No. R 327	Reason for Listing or NOT listing.
	<ul style="list-style-type: none"> b. Areas designated for conservation use in Spatial Development Frameworks adopted by the Competent Authority or zoned for conservation purpose; or c. Within 500 metres of an estuary. 	
LISTING NOTICE 2 (GN No. R325): Scoping & Environmental Impact Reporting		
1	<p>The development of facilities for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, <i>excluding there such development of facilities or infrastructure is for photovoltaic installations and occurs-</i></p> <ul style="list-style-type: none"> (a) within an urban area; or (b) on existing infrastructure. 	<p>The proposed development of the Hartebeest Hoek Solar PV 1 project will see to the installation of infrastructure with a total maximum generation capacity of up to 303 MW. The exclusions of this activity are not applicable to the proposed development. Therefore, the proposed development footprint will exceed the 20 MW threshold.</p>
15	<p>The clearance of an area of 20 hectares or more of indigenous vegetation, <i>excluding where such clearance of indigenous vegetation is required for –</i></p> <ul style="list-style-type: none"> (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan. 	<p>The proposed development will see to the clearance of up to 688 ha of indigenous vegetation. Therefore, the proposed development footprint will exceed the 20 ha threshold. The exclusions of this activity are not applicable to the proposed development.</p>

Table 2-3. Legislative permitting requirements applicable to the proposed Hartebeest Hoek Solar PV1 development.

Act/Regulation Nr.	Abbreviation	Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation					
Act No. 108 of 1996	-	Constitution of the Republic of South Africa	The National Environmental Management Act (NEMA; No. 107 of 1998, as amended) gives effect to the Constitution of the Republic of South Africa (Act No. 108 of 1996) by providing a framework for co-operative environmental governance and environmental principles that enable and facilitate decision-making on matters affecting the environment. The NEMA requires that an environmental authorisation (EA) be issued by a competent authority (CA) before the commencement of an activity listed in Environmental Impact Assessment (EIA) Regulations in terms of Listing Notices 1, 2 and 3 of 2014, as amended (G.N.R 324, 325, 326 & 327 published on the 7th April 2017).	Applicable to all authorities.	No permitting requirements exists in terms of this legislation. Compliance with the legislation is achieved through the submission of an application for environmental authorisation as through seeking environmental approval the respective and cumulative environmental impacts (biophysical, social and economic) of a proposed development have been considered and the best practicable outcome has been explored. Through this promoting sound decision-making and sustainable development. An Environmental Authorisation is required for the proposed development in terms of the Constitution.
Act No. 107 of 1998	NEMA	National Environmental Management Act	The NEMA aims to promote sustainable development, ensuring the continuation of development whilst promoting the conservation of natural resources as far as practically possible. The Environmental Impact Assessment (EIA) Regulations promulgated in terms of Sections 24 and 44 of the NEMA, provides a tool towards achieving sustainable development. Through the promulgation of the EIA Regulations of 2014, as amended (GNR 326 of 2017; GNR 517 of 2021) it is prohibited that Listed Activities identified in the various listing notices (GNR 327, GNR 324 and GNR 325) may not commence unless authorised in terms of the EIA Regulations of 2014, as amended (GNR 326 of 2017; GNR 517 of 2021).	Department of Forestry, Fisheries and Environment (DFFE) – Competent Authority Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL) – Commenting Authority	The various listed activities that would likely be triggered by the proposed development have been identified and discussed in Table 2-2 above. The identified listed activities are currently under consideration and will be assessed as part of the Environmental Impact Assessment phase of the proposed development. The preliminary assessment of the potential impacts which may be seen as a result of the activities have been identified and discussed in Section 9 of this Scoping Report.

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Act/Regulation Nr.	Abbreviation	Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			Considering the nature of the proposed activities (including the total maximum output capacity of the proposed development and the total maximum anticipated area of clearance that will be required towards the fulfilment of the output capacity), a Scoping and Environmental Impact Assessment Reporting Process in terms of Regulation 15 of the EIA Regulations must be followed in order to ensure compliance with the NEMA.		An Environmental Authorisation is required for the proposed development in terms of the NEMA.
Act No. 73 of 1989	ECA	Environment Conservation Act	<p>The Noise Control Regulations (GNR 154 of 1992) have been promulgated in terms of the ECA contain regulations applicable to the control of noise in a number provinces (including the Northern Cape).</p> <p>The Noise Control Regulations provides that the local authority is the managing authority of the Regulations, it further also provides the prohibitions in terms of noise impacts and the instruments to be used to measure noise impact. Where infringement occurs, the penalties associated with the non-conformance have also been stipulated.</p> <p>In terms of Regulation 4 of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof.</p> <p>Furthermore, the DFFE promulgated the National Biodiversity Offset Guidelines in 2023. These guidelines, bring to effect the requirements and the parameters under which a biodiversity offset would be required.</p>	DFFE and DAERL Emthanjeni Local Municipality (ELM)	<p>During the construction phase of the proposed development, noise impacts are anticipated. However, based on the location of the proposed development in relation to the nearest town (De Aar) and the homesteads (>500 m), and through the implementation of adequate mitigation, as preliminarily described in Section 9 of this Scoping Report, as well as which will be further explored in the EIAR of the proposed development (and the associated EMPr to be compiled for the proposed development), minimal noise impacts are expected to be exercised onto the receptors.</p> <p>There is no requirement for a noise permit in terms of the ECA.</p> <p>The need for an offset will be determined during the Impact Assessment Phase of the proposed development.</p>
Act No. 36 of 1998	NWA	National Water Act	Section 21 of the NWA provides a list of activities for which a proponent is to obtain a water use licence.	Breede-Olifants Catchment	The proposed development is located within proximity to a number of

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Act/Regulation Nr.	Abbreviation	Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			<p>This is applicable unless the proposed water use activity falls within the description of Schedule 1 of the NWA (therefore, would be considered an existing lawful use), the activity falls within the ambit of a General Authorisation (should the legislation make allowance for it – therefore, if the GA Regulations have been promulgated and appropriately been renewed as required by law), or if the responsible authority waives the need for a licence in terms of the NWA.</p> <p>The description of the water uses in terms of the NWA includes consumptive and non-consumptive water uses, as well as disturbance to the natural regime of the water resources (taking water from a resource, whether underground or surface water). Diverting or disturbing the banks of a resource, in-stream storage of water, recreational uses of water, etc.</p>	Management Agency	<p>watercourses classified in terms of the definition as presented in the NWA. Furthermore, the proposed development will require the drilling boreholes which will service the proposed development during the development phase. Therefore, a water use application must be lodged on the Electronic Water Use Licence Application and Authorisation System (e-WULAAS) for Section 21 (a), (c) and (i) water uses. This process will be undertaken once an Environmental Authorisation has been obtained for the proposed development and the project has become a preferred bidder part of the REIPPPP.</p> <p>A water use licence is required for the proposed development in terms of the NWA.</p>
Act No. 25 of 1999	NHRA	National Heritage Resources Act	The protection and management of South Africa's heritage resources is controlled by the National Heritage Resources Act (Act No. 25 of 1999) (NHRA). The Northern Cape Heritage Resources Authority (NCHRA) is the enforcing authority in the Northern Cape and is a Stakeholder for this environmental process. As this process forms part of the REIPPPP, comments from the South African Heritage Resources Agency (SAHRA), will be required in terms of Section 38 of the NHRA.	Northern Cape Heritage Resources Authority / Ngwabo-Boswa Jwa Kapa Bokone (NBKB)	An application must be lodged through the South African Heritage Resource Information System (SAHRIS), through which SAHRA will comment on the proposal. Section 38(8) also makes provision for the assessment of heritage impacts as part of an EIA process.
Act No. 43 of 1983	CARA	Conservation of Agricultural Resources Act	Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983) provides for the regulation of control over the utilisation of the natural agricultural resources to promote the conservation of soil, water and vegetation, as well as to provide measures for combating weeds and invader plant species. The	DFFE / Department of Agriculture	An alien and invasive management plan will be required for the proposed development.

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Act/Regulation Nr.	Abbreviation	Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			<p>CARA also defines different categories of alien plants.</p> <p>The purpose of this act is to ensure the long-term sustainable use and conservation of natural agricultural resources. The CARA has the objective to provide for the conservation of the natural agricultural resources of the Republic through the maintenance of the production potential of land, combating and prevention of erosion, and weakening or destruction of the water sources, the protection of the vegetation and the combating of weeds and invader plants. It is the only legislation promoting the sustainable use of natural agricultural resources at farm level.</p>		
Act No. 21 of 2007	AGAA	Astronomy Geographic Advantage Act	This act gives the Minister of Science and Technology the power to protect areas, through regulations, that are of strategic national importance for astronomy and related scientific experiments.	SARAO	A comment confirming the impact on the astronomic installations must be obtained from SARAO.
Act No. 13 of 2009	CAA	Civil Aviation Act	These acts aim to ensure the safety of aircrafts within the republic. Through the Obstacles Regulations, a number of activities which needs permission from the Authority has been provided. Furthermore, the CAA and the AA provides guidelines towards ensuring visibility of the structures which would potentially compromise the operational activities of the civil aviation industry.	South African Civil Aviation Authority (CAA)	An Obstacles application must be lodge with the CAA for the proposed development.
Act No. 74 of 1962	AA	Aviation Act			
Act No. 16 of 2013	SPLUMA	Spatial Planning and Land Use Management Act	The SPLUMA gives effect to the Local Municipality's Land Use Management Scheme and provides a framework under which the Local Municipalities evaluate the land use management applications within their municipalities.	ELM	As the proposed development property is zoned as Agriculture, the proposed development will require a rezoning application in terms of the Local Municipality's land use scheme in order to align the proposed development with the Municipal policies.

3. ASSUMPTIONS AND LIMITATIONS

The impact tables in Section 1 include the identified potential environmental impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of impact, the degree to which the impact can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated.

These impact tables are however only "scoping" stage assumptions and will be refined with input from the relevant specialists in the EIA Phase.

The evaluation of the impacts have been presented based on the information available from other REIPPPP projects in the surrounding area.

An additional limitation to the assessment of the impacts includes the impact of the manufacturing phase of the infrastructure, which will not be accounted for by the proposed development. The cumulative impacts and mitigations aimed toward limiting these impacts have been incorporated into Section 1 of this report.

As discussed in Section 1, due to solar PV technology being relatively new, the longevity of the infrastructure and the rapid pace of technologic advancements, the impact of the End-of-Life of the infrastructure has not been well documented. The cumulative impacts and mitigations aimed toward limiting these impacts have been incorporated into Section 1 of this report.

This Scoping Report was informed by baseline studies sourced from various specialists, addressing various themes. These studies have been included in Appendix G. A summary of the limitations, uncertainties and gaps in knowledge as per specialist input, includes:

Agricultural Compliance Statement:

- There were no specific assumptions, uncertainties or gaps in knowledge or data that affected the findings of this study.

Social Assessment:

- Assumptions
 - Identification of social issues
 - A site visit will be undertaken during the Assessment Phase of the SIA. The identification of social issues is based on the authors experience with undertaking in the region of 130 SIAs for solar and wind energy facilities and the associated infrastructure (substations, transmission lines, roads etc.). Based on this the author is confident that the majority of social issues have been identified.
 - Technical suitability
 - It is assumed that the development site represents a technically suitable site for the establishment of the proposed PV SEF Cluster and associated infrastructure.
 - Strategic importance of the project
 - The strategic importance of promoting renewable and other forms of energy is supported by the national and provincial energy policies.
 - Fit with planning and policy requirements

- Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard, a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported.
- Limitations
 - Demographic data
 - Some of the provincial documents do not contain data from the 2011 Census and or 2016 Household Community Survey. However, where required the relevant 2011 and 2016 data has been provided.
 - Site visit
 - A site visit will be undertaken during the Assessment Phase of the SIA. The site visit will include interviews with interested and affected parties. However, as indicated above, the author is confident that the majority of social issues have been identified.

Terrestrial Biodiversity Assessment:

- The assessment area was based on the area provided by the client and any alterations to the footprint and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The scoping assessment has been completed at a desktop level only. All datasets and species lists have been considered for the local area and surrounds; and
- The species likelihood of occurrence is based on desktop information and might be changed after the assessment.

Aquatic Biodiversity Assessment:

- It is assumed that the client has provided the specialist with all available data and information surrounding the project at the time of writing;
- It is assumed that all of this information is relevant and accurate;
- A single season aquatic ecology survey was completed for this assessment. Thus, temporal trends were not investigated;
- No baseline biomonitoring data/report(s) are available for the project area. Therefore, information presents the findings of the single season aquatic survey;
- Due to the ephemeral nature of the watercourses in the project area, the lotic systems contained insufficient water depth or flow there the macroinvertebrate and fish methodologies described could not be applied and therefore the focus of this report was habitat preservation;
- No alternatives were provided for this assessment as the layout of the PV Cluster was still in the design phase at the time of writing the report. Therefore, for the purposes of the DWS risk assessment of Section 9, the entire footprint of the PAOI is assumed to be developed;
- Any alterations and/or missing GIS information pertaining to the development layout subsequent to this assessment may affect the accuracy and/or outcomes of the assessment; and

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- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m.

Visual Assessment:

- Assumptions:
 - Awareness that 'visual' implies the full range of visual, aesthetic, spatial, cultural, and spiritual aspects of the environment, which together contribute to the local character and 'sense of place' of the area, and that 'visual' considerations are part of the cultural landscape.
 - Understanding that 'impact' means a 'noticeable change' to the status quo when perceived under normal conditions; and that change is not necessarily negative, but may contain positive, neutral, and/or negative aspects in varying degrees.
 - Identification of all significant visual heritage resources, including protected areas, scenic drives, sites of special interest and tourist destinations, together with their relative importance within the broader context of the region.
 - Acknowledging the dynamic nature of landscape processes; including geological, biological, horticultural, and human settlement patterns, which contribute to landscape character, visual heritage attributes and scenic amenity value.
 - The need to include quantitative criteria, such as 'visibility'; and qualitative criteria, such as 'aesthetic value' or 'sense of place' to achieve a balanced perception of visual impact (i.e., the rational and the intuitive; the measurable and the immeasurable).
 - The need to include visual input as an integral part of the project planning and design process, so that the visual findings and recommended measures for mitigation can influence final designs pro-actively.
 - The need to determine the heritage value and significance of visual and aesthetic resources responsibly through a rigorous process, of which public engagement forms an essential component.
- Limitations:
 - The significance of cultural resources is dynamic and multifaceted, and the perception of visual impact may be interpreted subjectively, particularly as interest groups and societal values change over time. Thus, it is not always possible to provide a definitive visual statement of significance.
 - Timing and Availability of Information: This report is based on information available at the time of writing and may be subject to review and revision, should additional or more detailed information become available at a later stage
 - Accuracy of Material: This report assumes that all material supplied by others (including specialist assessments, historical, planning and land-use background research) is an accurate and true reflection of the issues governing the property and its proposed development.
 - The geographic aspects of this report rely on a combination of topocadastral maps at scales 1:500 000, 1:250 000 and 1:50 000, together with Google-Earth LIDAR data and GIS information at various scales as recent and as contemporary as possible. However, newer buildings and buildings still under construction may not be reflected.
 - Detailed LiDAR information of the site context is not always available digitally; therefore, the visual simulations rely on landform as an indication of visibility. At

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grade, the screening effect of existing trees and buildings may reduce visibility significantly.

- With respect to the quality and age of the base data used, Google Earth Pro high-resolution 2021 aerial photography has served as reliable and accurate source data for three-dimensional mapping; in addition to the ESRI base plan information provided by the Department of Agriculture Enterprise, through gis.elsenburg.com Cape Farm Mapper tool.

4. DETAILED DESCRIPTION OF THE PROPOSED PROJECT

4.1. Site Location and Description of Property

4.1.1. Summary Table and Site Details

Please refer to Table 4-1 below which provides a summary of the site details associated with this proposed development and associated services (road, water, stormwater and sewage) infrastructure.

Table 4-1: Summary Table: Site Details

Province	Northern Cape	
District Municipality	Pixley Ka Seme District Municipality	
Local Municipality	Emthanjeni Local Municipality	
Ward number(s)	Ward No 6	
Nearest town(s)	De Aar	
Portion name(s) and numbers	Remainder of Farm Hartebeest Hoek 31	
List of Properties, Ownership & Extent of each Property Associated with Proposed Solar PV Development:		
PROPERTY	OWNERSHIP	EXTENT
Remainder of Farm Hartebeest Hoek 31	Private	3 638 ha
Extent of Site (Development Footprint / Disturbed Area)	The portion of the farm that will be subdivided and rezoned as part of this application measures approximately 1041 ha in extent.	
SG Code	C0300000000003100000	
Physical Address	N10 South-bound, De Aar, Northern Cape	
Co-ordinates of Hartebeest Hoek Solar PV1:	30°46'17.76"S 24° 7'3.13"E	

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4.1.2. Proposed Development Location

The future Hercules Solar PV Cluster is situated approximately 15 km South-East of De Aar, spanning across reciprocal sides of the N10. The proposed Hartebeest Hoek Solar PV1 development is located towards the North of the N10. The site is bordered by a Transnet railway line toward the north-east.

The dominant land uses of the proposed development footprint include game farming, holding gemsbok (*Oryx gazella*), Wildebeest (*Connochaetes gnou*), and Springbok (*Antidorcas marsupialis*), amongst others. Limited areas have also been used for sheep and cattle grazing. The topography of the proposed development site is predominantly flat – lowly undulating, with some areas of inclined rocky outcrops. Detailed descriptions of the receiving environment have been provided in Section 6.

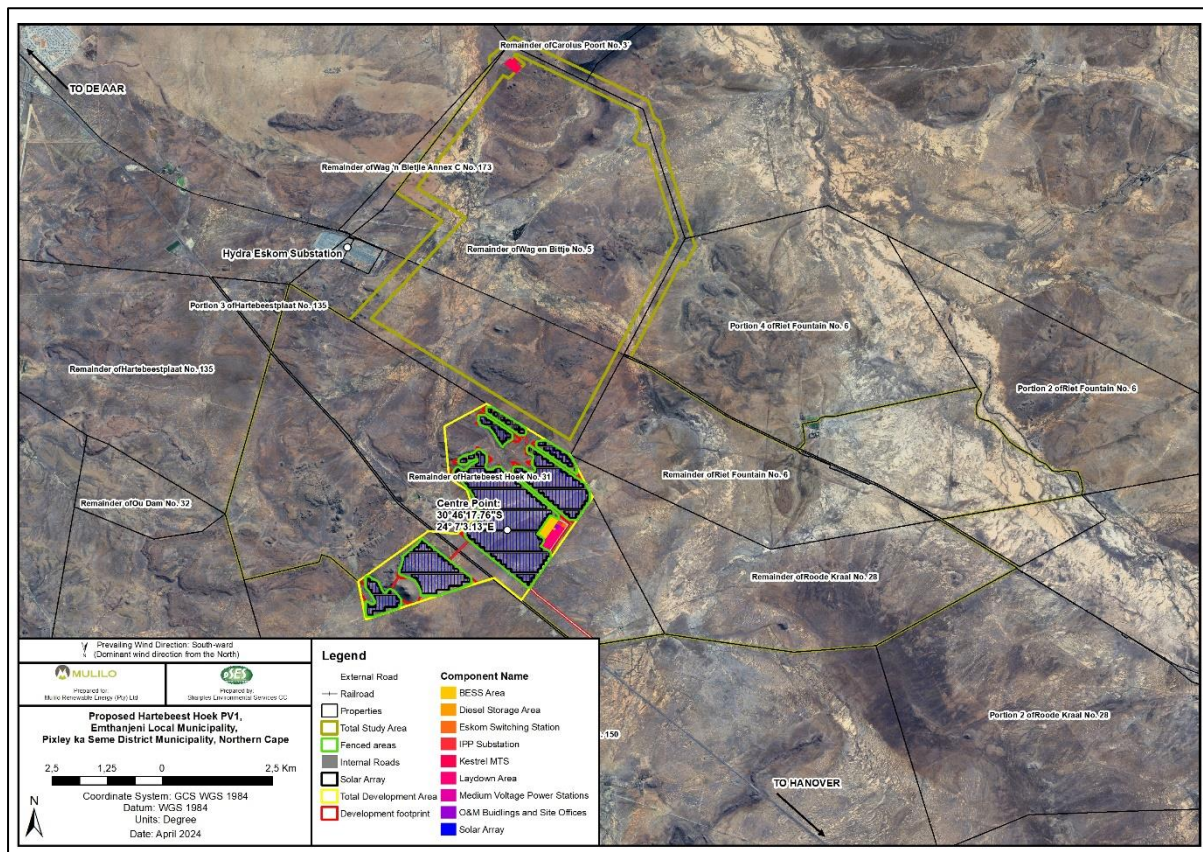


Figure 4-1: Layout map of the proposed Hartebeest Hoek Solar PV1 development (indicating the relationship between this application and the full extent of the proposed solar farm cluster).

According to the 2020 South African National Landcover Data as obtained from the DFFE's E-GIS database (DFFE, 2020), the proposed development site contains the following features:

Table 4-2. 2020 South African National Land Cover for the proposed development area (DFFE, 2020).

Land type
Artificial waterbodies
Extraction sites
Fallow lands: Old fields
Herbaceous wetlands
Karoo Fynbos Shrubland
Natural Grassland
Natural Wooded Land
Planted Forest
Shrubs
Temporary Crops
Transport
Unconsolidated
Village

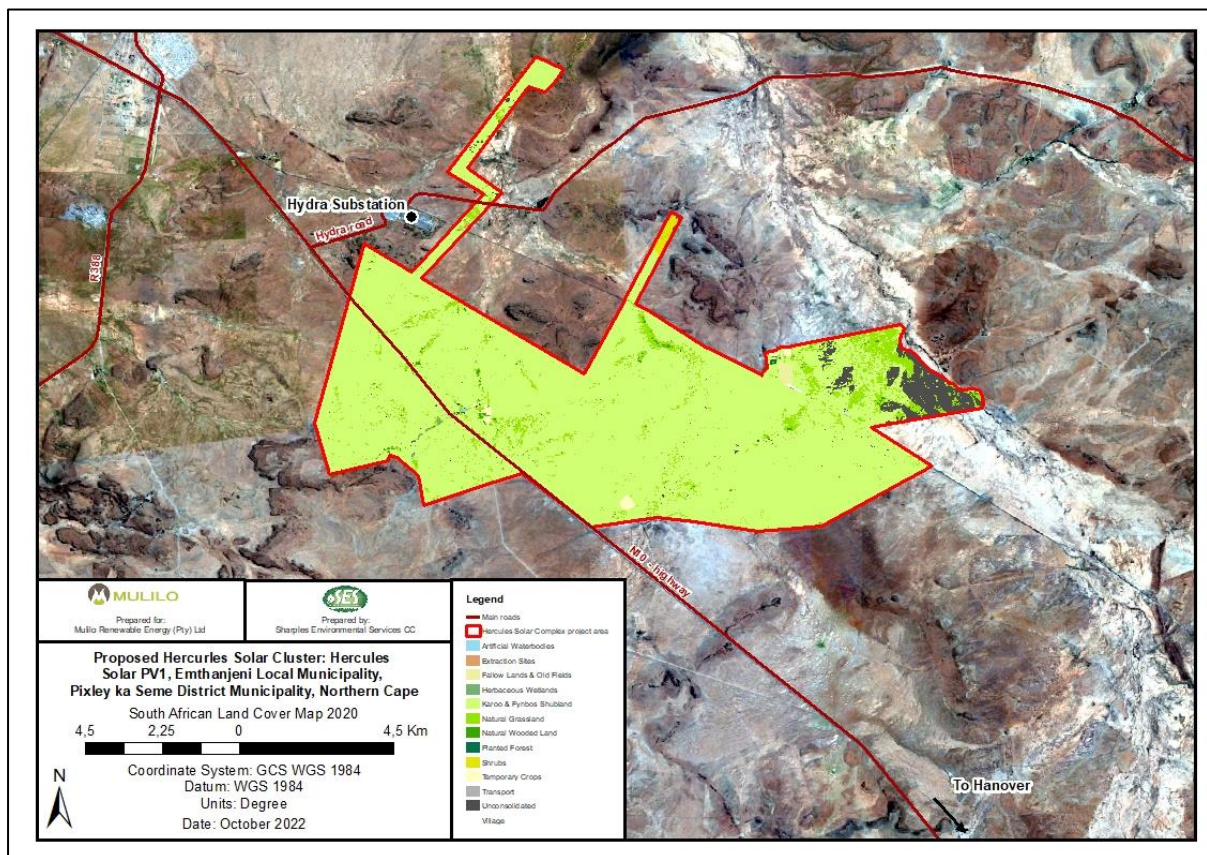


Figure 4-2. 2020 South African National Land Cover for the proposed development area (DFFE, 2020).

Based on the change analysis conducted for the dataset the area has seen very little transformation from its inherited land types between 1990 and 2022.

4.1.3. Similar Projects within proximity to the proposed development cluster

As per the findings of the DFFE Screening Tool, numerous projects have been approved within a 30 km radius around the future Hercules Solar PV Cluster. The approved projects have been listed in Table 4-3 and Figure 4-3 below. The list of approved projects did not include all approved projects within the surrounding area. The additional approved projects have also been listed and indicated in the table and figure below.

Table 4-3. Similar projects within proximity to the proposed development.

Screening reference	EIA reference nr	Classification	Distance from proposed area	Map reference
1	12/12/20/2250/1	Solar PV	0	1
2	12/12/20/2500/AM3	Solar PV	13.1	2
3	12/12/20/2025/2	Solar PV	12	3
4	12/12/20/2025/1	Solar CSP	12	3
5	12/12/20/2048/1	Solar PV	12.5	4
6	14/12/16/3/3/2/382/2	Solar PV	1.6	5
7	12/12/20/2025	Solar CSP	12	3
8	12/12/20/2250/5	Solar PV	8.1	6
9	12/12/20/1673	Solar PV	13.1	2
10	12/12/20/2048/2	Solar PV	12.5	5
11	12/12/20/2258/4	Solar PV	15.5	7
12	14/12/16/3/3/2/382/7	Solar PV	1.6	5
13	12/12/20/2250/3	Solar PV	3	6
14	12/12/20/2250/4	Solar PV	5.9	6
15	14/12/16/3/3/2/382/5/AM3	Solar PV	1.6	5
16	12/12/20/2250/2	Solar PV	0	1
17	14/12/16/3/3/2/382/1	Solar PV	1.6	5
18	14/12/16/3/3/2/403	Solar PV	28	8
19	12/12/20/2500	Solar PV	13.1	2
20	14/12/16/3/3/2/382/5	Solar PV	1.6	5
21	12/12/20/2177	Solar PV	0.1	9
22	12/12/20/2025/2/A	Solar PV	12	3
23	12/12/20/2250	Solar PV	0	6
24	12/12/20/2048/4	Solar PV	12.5	4
25	12/12/20/2048/3	Solar PV	12.5	4
26	14/12/16/3/3/2/403	Solar PV	28	8
27	14/12/16/3/3/2/382/6	Solar PV	1.6	5
28	14/12/16/3/3/2/382/3	Solar PV	1.6	5
29	12/12/20/2498/AM3	Solar PV	9.7	10
30	14/12/16/3/3/2/382/4	Solar PV	1.6	5
Unlisted Projects				
31	12/12/20/1651	On-shore Wind	0	11
32	14/12/16/3/3/2/744	Solar PV	8.3	12
33	12/12/20/2463	On-shore Wind	13.5	13
34	14/12/16/3/3/2/740	Solar PV	39.9	14

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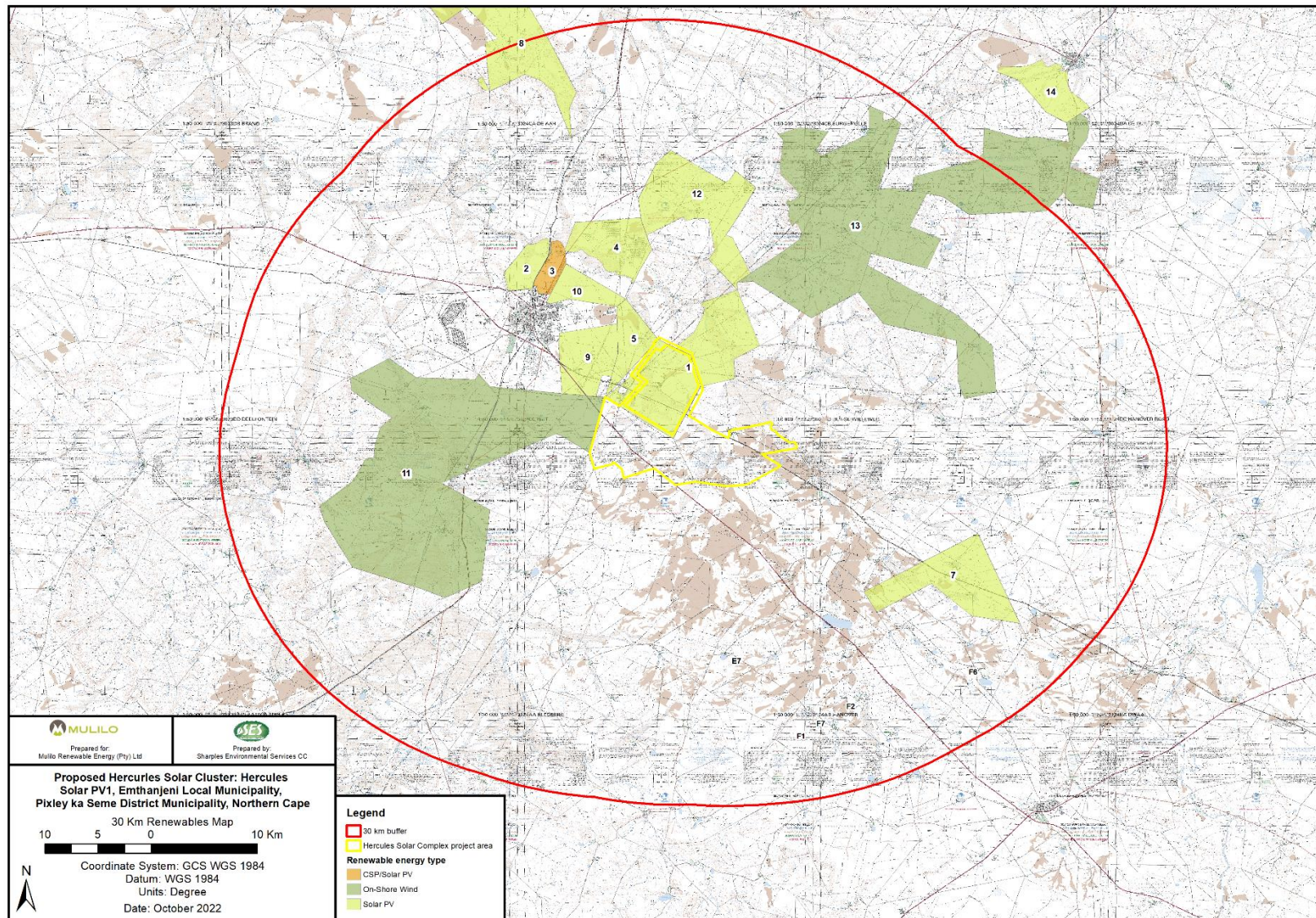


Figure 4-3. Map indicating the location of the proposed Hercules Solar PV Cluster relative to the approved solar projects within a 30 km radius.

4.2. Detailed Description of the Proposed Development

4.2.1. Proposed Development

It is proposed to construct a solar PV farm on a part of three portions of farmlands located approximately 15 km South-East of De Aar in the Northern Cape. The construction of the proposed Hartebeest Hoek Solar PV1 development will include the development of all auxiliary infrastructure as well. The proposed development will account for 13 % of the Hartebeest Hoek Solar PV Cluster development area.

The construction period of the proposed development will be between 18 and 24 months and will see to the employment of approximately 350 individuals during the construction phase. Approximately 20 individuals will be employed during the operational phase of the proposed development. The contribution factors of the workers during all phases of the proposed development will be:

- 70 % of the workers will be unskilled;
- 25% of the workers will be semi-skilled; and
- 5 % of the workers will be skilled.

The project will see to the establishment of an array of solar PV modules grouped into panels of 20 modules each. Every module is comprised of a series of individual solar cells. The solar PV panels of the proposed Hartebeest Hoek Solar PV1 development will cover an array of approximately 342 ha and will be bordered by a regularly surveyed perimeter road and appropriate fencing. This application does not account for any infrastructure to be located outside of the fence line (specifically the overhead transmission lines leading from the on-site switching station to the Eskom distribution substation, which will form part of a separate application), other than the infrastructure indicated on the preferred layout alternative map (Figure 5-3).

The PV panels will be raised approximately 75 cm above ground level, in order to provide adequate grazing opportunities for small animals (such as sheep) underneath the solar panels and will have single axis tracking technology allowing maximisation of solar energy harvesting for conversion to electrical energy.

The proposed external transmission corridors will form part of separate applications. These transmission corridors will allow the connection of on-site switching station to the future substation located on the farm Wag 'n Bittje 5, where it will be connected to the national grid.

Access road

The proposed Solar PV development will be accessible via existing road connections leading from the N10. The proposed development will make use of the existing road network, including tracks and informal roads to minimize the impact of the proposed development on the receiving environment. Figure 4-4 indicates the proposed development layout overlain by the road network as obtained from the DRDLR (2016 dataset). A map with the Base Plan of the Existing Infrastructure has also been included as Appendix B of this Report.

Stormwater Management

The terrestrial and aquatic baseline study for the proposed development was completed by The Biodiversity Company (2022). Through this assessment it was indicated that, though the Shrubland vegetation (the primary affected vegetation type) was not considered watercourses, these areas do play an important role in the infiltration of the water towards the

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drainage lines. Additionally, the access roads, albeit existing tracks will be formalized to a certain extent. Localized stormwater management and erosion control measures will be required and will be incorporated into the Environmental Management Programme (EMPr) to be composed for the proposed development. These measures must be applied during the construction and operational phase of the proposed development.

Potable water

Potable water would be required during both the construction and operational phases of the proposed development. During the construction phase water will be required for the construction of the on-site 132kV substation, warehouses, and offices. Additionally, water will be required for general consumption purposes by the labourers building and installing the infrastructure. During the operational phase water will be required for sanitary provisions and will also be used during the scheduled maintenance procedures in order to clean the infrastructure as part of the M&O contract. As part of the proposed construction phase of the proposed development, water will be sourced from the Local Municipality and during the operational phase, the site will be equipped with boreholes for the purpose of water provision. The infrastructure associated with the water provisions infrastructure will be located within the footprint of the O & M Buildings area.

Sewer considerations

With regards to sanitary provisions, during the construction phase of the proposed development, the labourers and other site personnel will be provided with portable toilets which will be emptied once a week, or as required. The ratio of portable toilets (men to women) will be in alignment with the requirements of the Operation Health and Safety Act, 1993 (Act No. 85 of 1993) (OSHA). During the operation phase of the proposed development, sanitary facilities will be installed as part of the construction of the office buildings. Conservancy tanks will be used for the purpose of wastewater management during the operational phase of the proposed development. The conservancy tanks will be located within the footprint of the O & M Buildings area.

Waste management considerations

During the construction phase of the proposed development, construction waste will be generated. This includes, but is not limited to cement bags, disposable containers and wrappings and general waste. Construction waste will also include metal, wooden insulator crates, left-over cables, paper, cardboard and aluminum. During the operational phase, waste to be generated includes general waste and the discarded components that become faulty. It should be noted, that should the reuse, repair, recycle approach be followed, as described below (Section 1.2), there would be limited waste associated with the decommissioning of faulty components during the construction period.

All sanitation (water and sewer) and waste removal services will be obtained through the respective service provision sectors of the De Aar Local Municipality. Services level agreements will be arranged with the local municipality in due course and will be submitted to the relevant departments once made available.

The following is proposed to be developed as per the **Site Layout Plans** shown in **Appendix C** and in the **figures** below:

Table 4-4. Summary of the proposed infrastructural requirements of the Hartebeest Hoek Solar PV1.

Component	Description
Output capacity of the proposed Hartebeest Hoek Solar PV1	The output capacity of the proposed solar farm will be up to 303 MW.
Height of PV panels	4.5 m
Area of the PV Array	Approximately 466.91 ha
Number of inverters required	Each of the Medium Voltage Substations on site will be equipped with an inverter. Additionally, both the IPP Substation and the Eskom Switching Station will be equipped with inverters. Therefore, a minimum amount of 30 inverters will be required for the proposed development (one for each of the medium voltage stations and one for each of the main substations).
Area to be occupied by inverters/transformers/substations	The total area covered by buildings will include the following: <ul style="list-style-type: none"> • The twenty-four (24) 22/33 kV Medium Voltage stations: 720 m² (with an area of 30 m²) each. • The Control Rooms: Included into the area of the substation • The Warehouses and areas required as part of the O&M Contract: 10 000 m² • 132 kV substation and busbar: 10 000 m² • 132kV/400kV switching station and busbar: 10 000 m²
Control rooms	The total area to be occupied by inverters/transformers/substations equates to approximately 3.7 ha. The control rooms will be located within the boundaries of the substations. Each substation will be equipped with two control rooms. The respective substations will have an area of 10 000 m ² , respectively and be 20 000 m ² in extent collectively.
Warehouses and workshops	An area will be allocated towards the buildings required as part of the O&M Contract in order to allow for the smooth operation of the facilities. The area of this allocated area will be approximately 10 000 m ² .
Capacity of the on-site substations	The on-site substation will have an output capacity of 132 kV and will be 200 m x 200 m in extent and will therefore have an area of 20 000 m ² .
Area occupied by both permanent and construction laydown areas	10.8 ha
Total Area occupied by buildings	The total area covered by buildings will include the following: <ul style="list-style-type: none"> • The twenty four (24) 22/33 kV Medium Voltage stations: 720 m² (with an area of 30 m²) each. • The Control Rooms: Included into the area of the substation • The Warehouses and areas required as part of the O&M Contract: 10 000 m² • 132 kV substation and busbar: 10 000 m² • 132kV/400kV switching station and busbar: 10 000 m²
Total length of internal roads	The total area to be occupied by inverters/transformers/substations equates to approximately 3.7 ha. 52.31 km
Total width of internal roads	8-10 m
Access roads	The proposed development area will be accessed from the N10 highway through the use of existing farm roads leading into the proposed development area.
Proximity to the grid connections	The proposed development is approximately 12.96 km away from the Pixley substation which has been approved as part of a separate development.
Height of fencing	3 m
Type of fencing	To be determined at a later stage
Height of overhead powerlines (leading to the substation and busbay)	The 132 kV powerlines will have a height of 30 m. This powerline will lead from the 132kV on-site substation to the 132kV/400kV busbar.
Servitude width of internal overhead powerlines	The servitude width of the internal overhead powerlines will be 32 m.

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Component	Description
Switching station dimensions	Each of the substations will be 100 m x 100 m and will therefore have an area of 10 000 m ² .
Battery Energy Storage System	The Battery Energy Storage System (BESS) will occupy an area of approximately 10 ha. The BESS will have capacity to store sufficient energy to provide electricity for up to 6 hours. The construction footprint of the BESS will also be used as the laydown and site camp area during the construction phase of the proposed development.
Additional infrastructure	
Sewer infrastructure	During the construction phase of the proposed development, portable toilets will be used. During the operational phase of the proposed development a conservancy tank will be installed. The tank will be emptied by an appropriately registered waste removal company and be disposed of at an appropriately licenced waste water treatment facility.
Potable Water connections	During the construction phase, the proposed development will make use of municipal water supply for the provision of potable water on site. Boreholes will be drilled for the purpose of constant water supply in the operational phase.
Prefabricated offices	During the construction phase of the proposed development, numerous prefabricated offices would be required. These offices will be introduced upon inception of the construction phase of the proposed development and will be removed once the construction activities have concluded.
Diesel Storage Area	A designated diesel storage area will be present on site. The site will have a footprint of approximately 2500 m ² .

Please refer to the Site Layout Plan in **Appendix C1**.

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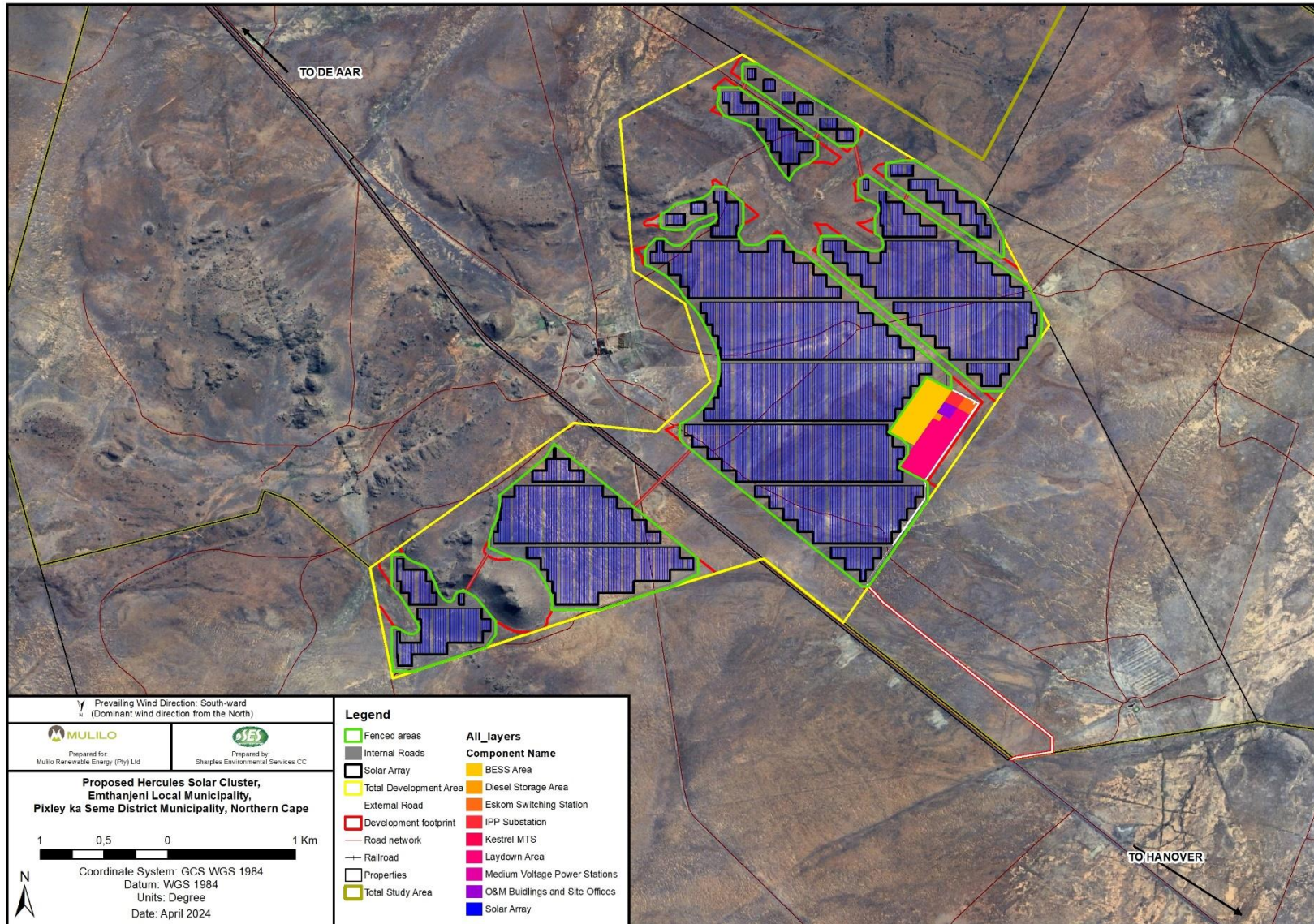


Figure 4-4: Layout map of the proposed Hartebeest Hoek Solar PV1 development.

5. ALTERNATIVES

"Alternatives", in relation to a proposed activity, denotes different means of meeting the general purposes and requirements of the activity, which may include alternatives to –

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

5.1. Description of Process to Reach the Preferred Alternative

5.1.1. Development Site Location and Layout Alternative

5.1.1.1. Process to Reach Preferred Alternative Location & Layout

To provide context toward the placement of the proposed solar PV farms within the future Hercules Solar PV Cluster, this section will consider the full extent of the study area as contemplated in Section 1.1.1 above.

As part of the layout configuration numerous factors were taken into consideration. These factors have been discussed below:

- Upon initial inspection (as conducted by the EAP), and further liaison with the directly affected landowners, the landowner requested that a portion of the remainder of the farm Riet Fountain 6 be excluded from the areas under consideration for the placement of the future Hercules Solar PV Cluster.
- Specialists were appointed to undertake baseline assessments on the various farm portions which were under consideration for the future Hercules Solar PV Cluster. The following baseline specialist assessments were used to inform the layout of the proposed development:
 - *Heritage and cultural resources*: No areas of specific significance were identified during the baseline assessment. However, the specialist indicated that outcrops located on site would potentially be considered of Very High Significance.
 - *Palaeontological resources*: The baseline Palaeontological assessment identified numerous areas of High and Very High Significance which were taken into consideration during the planning phase of the proposed development. These areas have not been avoided by the layout. However, the layout has been designed in such a way so as to not impact on the potential resources (the specialist indicated that excavations were not to exceed a maximum of 1.5 m in depth);
 - *Terrestrial biodiversity assessment*: The baseline terrestrial biodiversity assessment identified numerous watercourses within the boundaries of the proposed Hercules Solar Cluster study area. Further consultation with the specialist indicated a 200 m buffer would be proposed around the inland water resources identified through the baseline assessment. This was recommended based on the approach followed by the approved solar farms in the

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surrounding areas. This is aimed at mitigating the potential impact on the avian species likely to utilise these areas. Additionally, a 3 km no-go area was proposed around the anticipated location of the Verreaux's Eagle's nest, with a 5 km limited infrastructure boundary (area of limitation for the solar array). A 750 m buffer was proposed around the Greater Kestrel Nests observed on site. The sills, hills and outcrops were also identified as having a very high sensitivity.

- *Aquatic Assessment:* Numerous watercourses were identified within the boundaries of the future Hercules Solar PV Cluster study area. The following buffers have been applied to the water resources:
 - *Drainage lines:* 50 m buffers; and
 - *In-land water resources:* 200 m buffers.
- *Agricultural assessment:* Two areas of significance were observed by the Agricultural specialist. These areas have been excluded during the determination of the developable areas of the proposed development.
- *Visual assessment:* The visual baseline assessment identified numerous receptors of high sensitivity. This included:
 - The watercourses and their associated buffers;
 - The ridges (sills, hills and outcrops);
 - The N10 and its 300 m buffer;
 - The railway and its 250 m buffer; and
 - The homesteads and their associated 500 m buffers.

The findings of the various specialists have been incorporated into Section 6 below. Additionally, the baseline assessments conducted by the appointed specialists have been included as Appendix G of this Report.

The layout of the future Hercules Solar PV Cluster was specifically done in a manner to have minimal impact on any natural resources occurring within the confines of the study area. Figure 5-1 below provides an overlay of the various sensitivities and the layout of the Hercules cluster based on the abovementioned findings. Figure 5-3 provides the overlay of the proposed Hartebeest Hoek Solar PV1 development (this application) with the site sensitivities identified.

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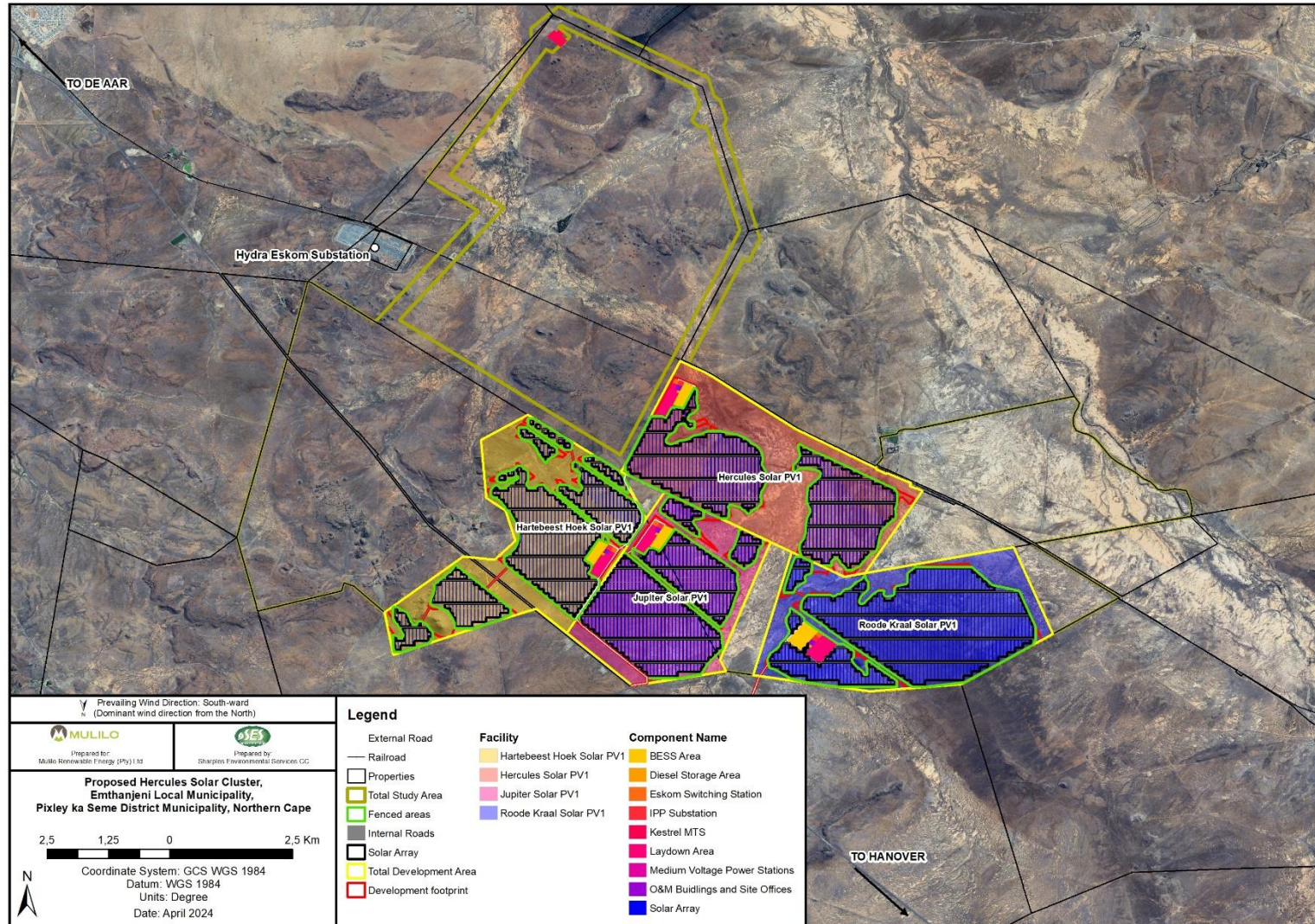


Figure 5-1: Layout of the proposed Hercules Cluster (also included as Appendix C1).

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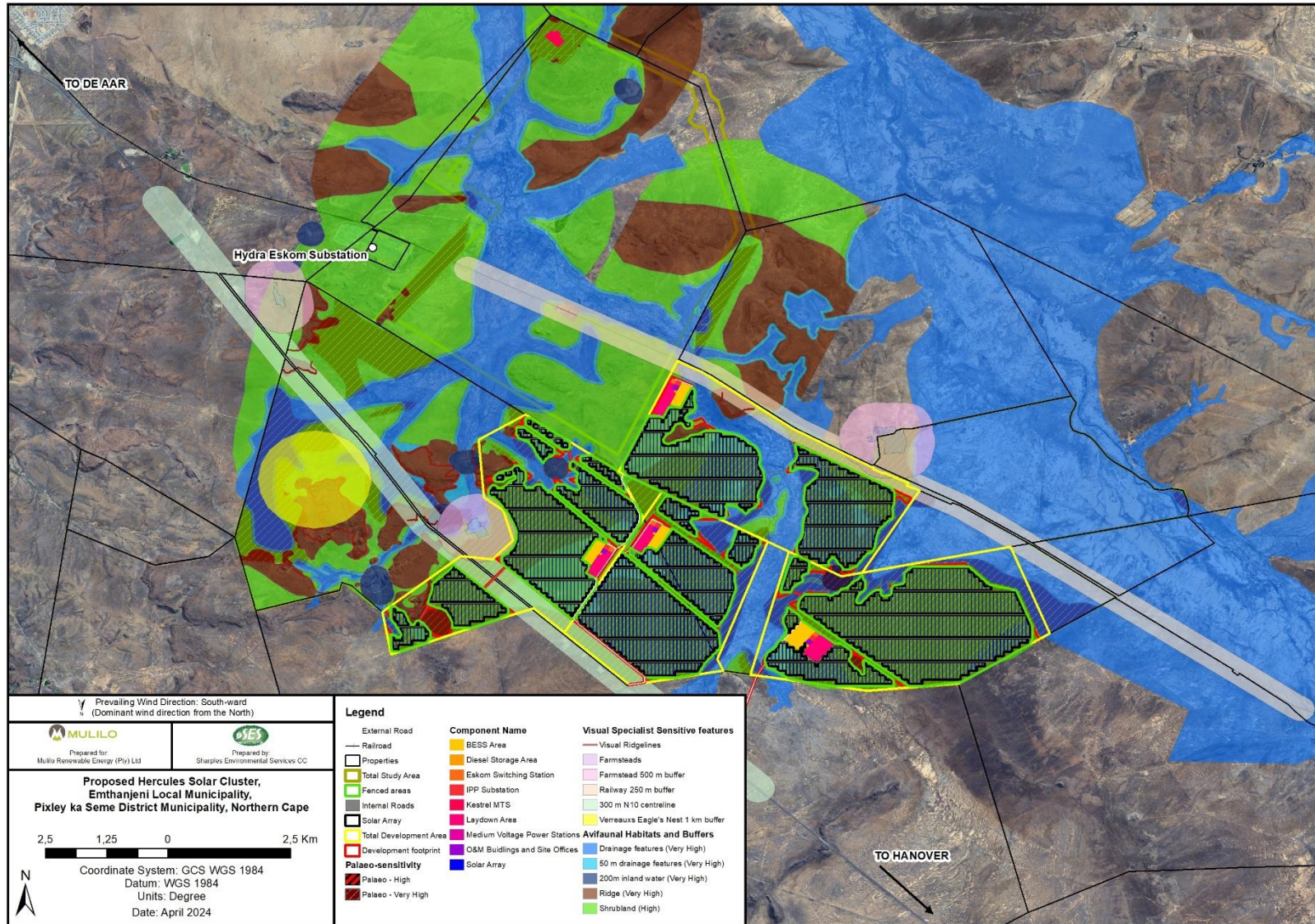


Figure 5-2: Layout of the proposed Hercules Cluster (also included as Appendix C1).

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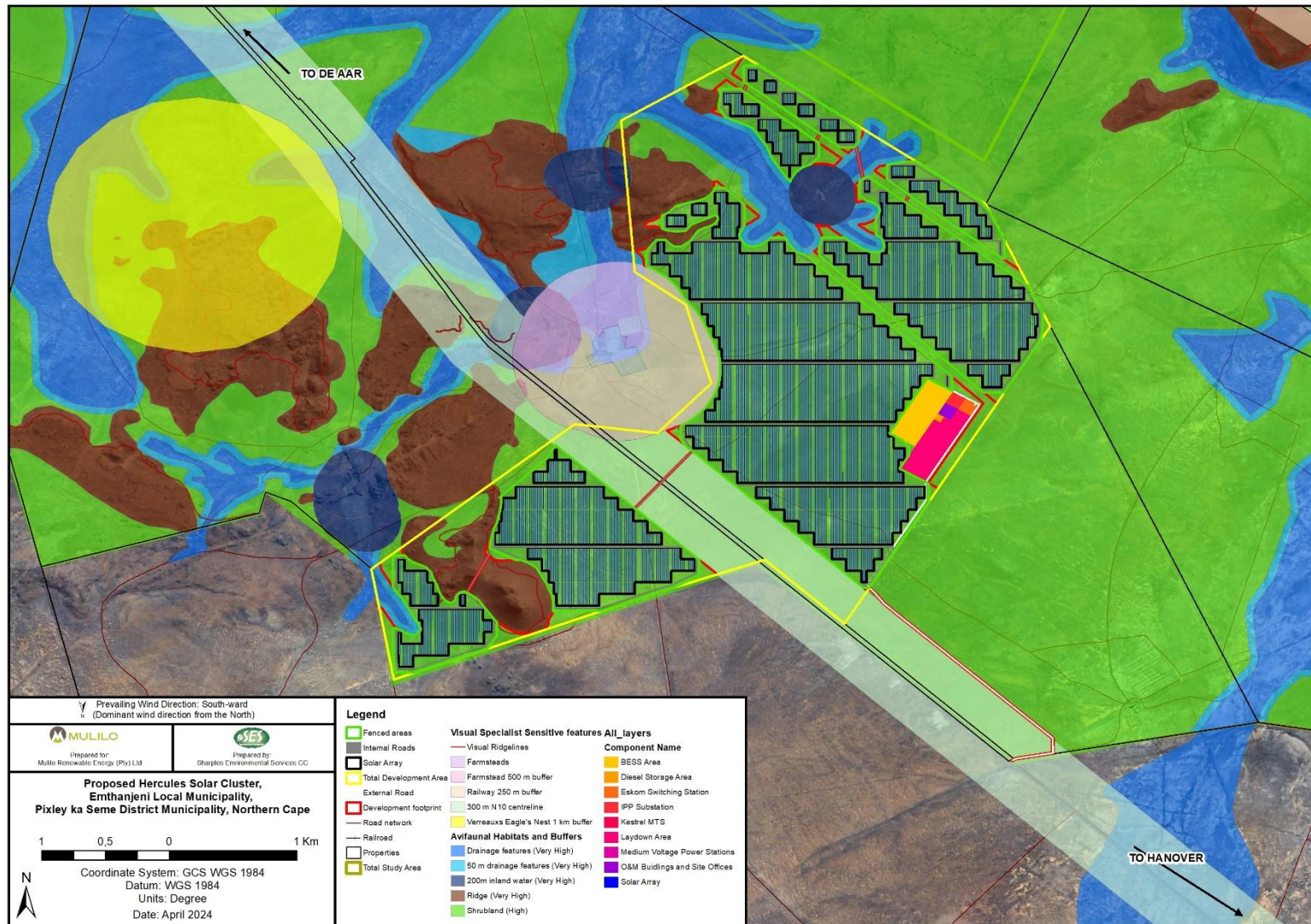


Figure 5-3: Preferred layout alternative of the proposed solar PV development (also included as Appendix C1)

5.2. Alternatives Assessed

5.2.1. Layout Alternatives

The preferred layout discussed in **Section 5.1** will be referred to as “Alternative 1” and will be assessed against the No-Go Alternative (refer to Section 5.2.3.) and “Alternative 2”. Alternative 2 is the development of the project area without the incorporation of the sensitivities identified by the various specialist.

Figure 5-4 below indicates the Preferred layout alternative as discussed in Section 5.1 above. This layout incorporates the findings of the various baseline studies for the respective specialists. The proposed development area for this alternative is approximately 688 ha.

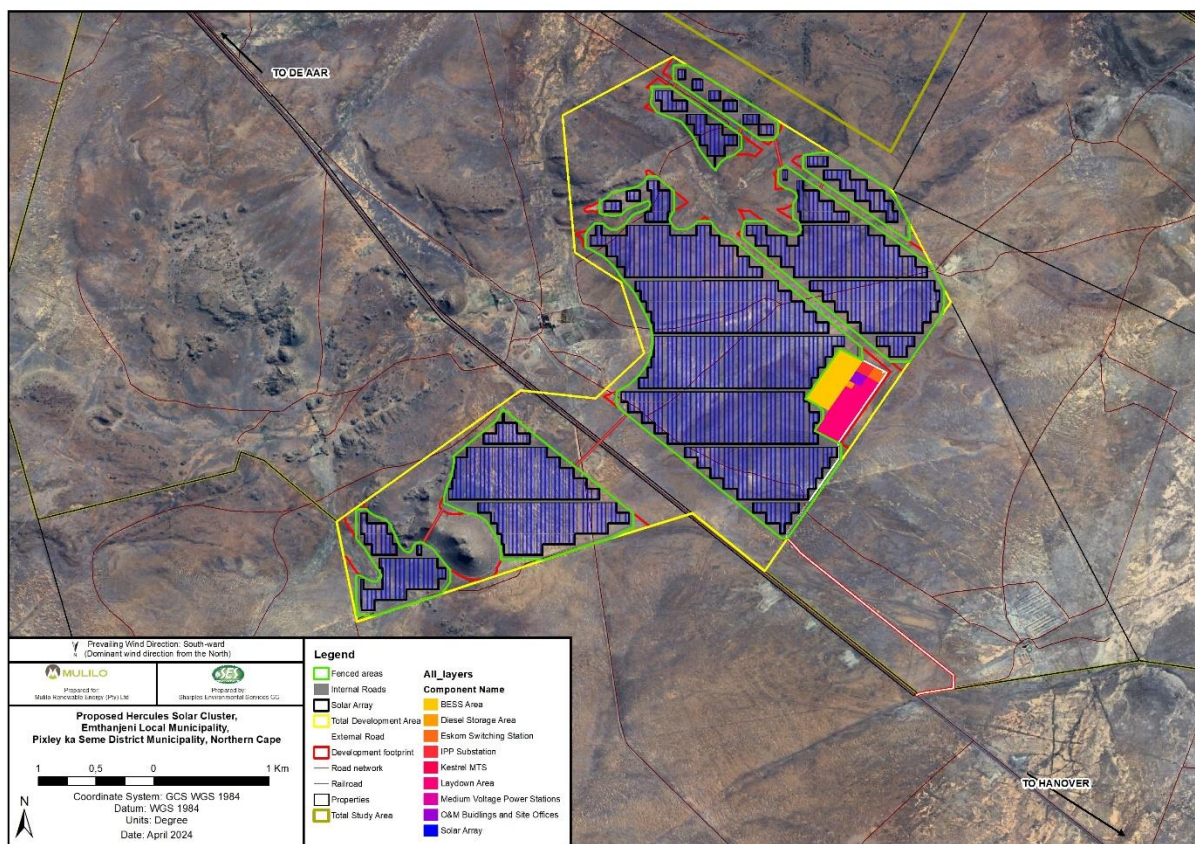


Figure 5-4. Preferred layout alternative for the proposed development.

Figure 5-5 below indicates the layout alternative for the proposed development. This layout does not incorporate the findings of the various baseline studies for the respective specialists. Therefore, the recommendations and buffer areas are not incorporated into the layout. This would allow for a total development area of approximately 668 ha. For the purpose of evaluating the preliminary impacts of this alternative and the main components (all hard surfaces) would be kept in the same location as the original layout, however it was assumed that the solar panel structures and medium voltage stations would cover the remainder of development area.

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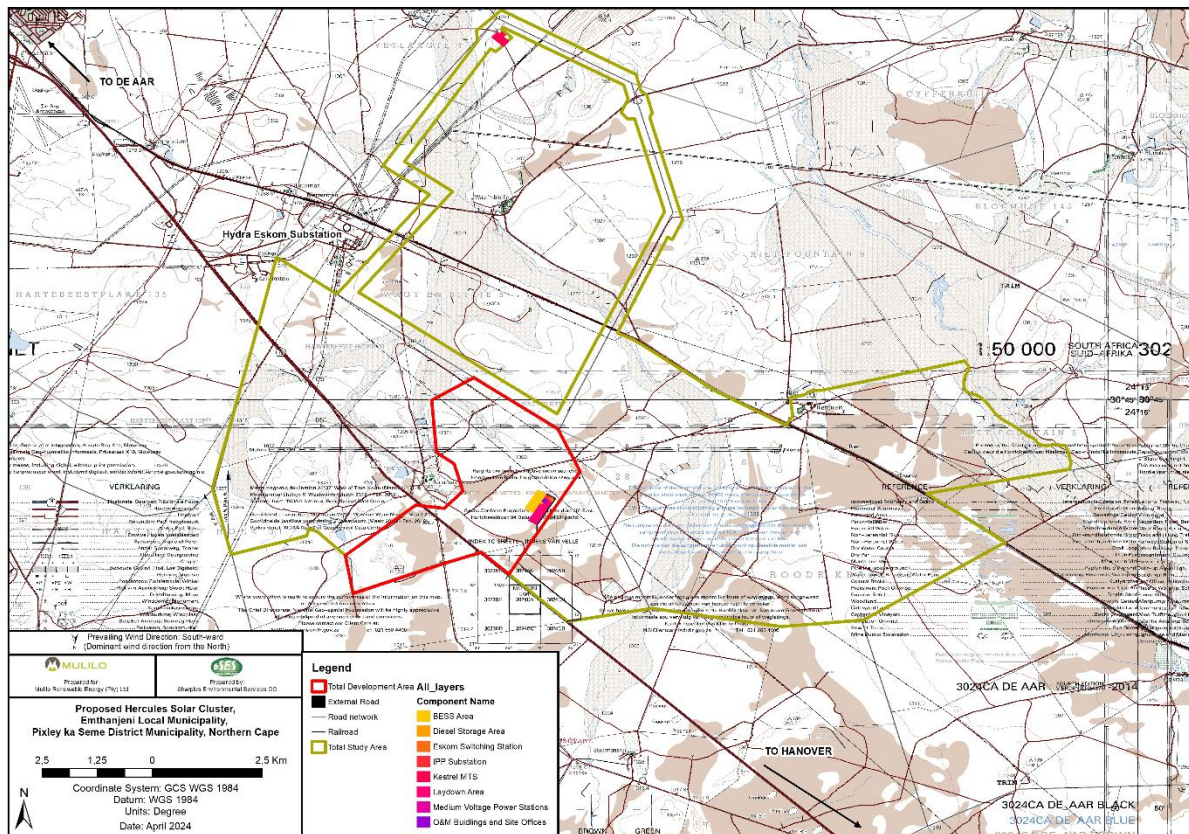


Figure 5-5. Alternative layout for the proposed development.

5.2.2. Technology/Design Alternatives

Technology/Design alternatives provide for the consideration of different designs for either aesthetic purposes or for the purpose of providing materials or technologies in order to optimize the local benefits and sustainability.

Technology	Description
Solar Facility Technology Alternatives	The output capacity of the proposed solar farm will be up to 303 MW, this will contribute to the greater Hercules Solar PV cluster, which will have a total combined output capacity of up to 1 330 MW.
BESS Technology alternatives	At current the preferred BESS Technology to be used by the proposed development has not been specifically chosen, however one of the following proposed technologies will be used: Solid State Battery: Lithium Ion The term "lithium-ion" refers not to a single electrochemical couple but to a wide array of different chemistries, all of which are characterized by the transfer of lithium ions between the electrodes during the charge and discharge reactions. Li-ion cells do not contain metallic lithium; rather, the ions are inserted into the structure of other materials, such as lithiated metal oxides or phosphates in the positive electrode (cathode) and carbon (typically graphite) or lithium titanate in the negative (anode). Li-ion cells may be produced in cylindrical or prismatic (rectangular) format which are typically built into multi-cell modules in series and/or parallel arrays. The modules are connected to form a battery string at the required voltage, with each string being controlled by a battery management system. Battery packs can also be combined with other equipment such as inverters and controls systems and further packaged into BESS at manufacturing facilities.

Technology	Description
	<p>Furthermore, Li-ion BESS can be containerized and placed on pads or simple foundations and electrically connected to switchgear. Electronic subsystems are an important feature for Li-ion batteries, which lack the capability of aqueous technologies (e.g., lead-acid batteries) to dissipate overcharge energy.</p> <p>The expected Li-ion BESS lifetime is related to the cycling Depth of Discharge (DoD) and is generally limited to less than 80% DoD to ensure an adequate life. Most utility scale applications have an approximate 10-year lifetime but supplementary capacity can be added throughout the project term to ensure the useable capacity is guaranteed.</p> <p>Modularized and packed systems offer ease of system removal from site for disposal at end of life. The materials used in Li-ion batteries are typically considered non-hazardous waste.</p> <p>Solid State Battery: Sodium Sulphur Sodium Sulphur (NaS) batteries were first developed in the 1960's and further modified more recently to suit BESS applications. There are two (2) active materials in a NaS battery which are molten sulphur as the positive electrode and molten sodium as the negative electrode. The electrodes are separated by a solid ceramic, sodium alumina, which also serves as the electrolyte. This ceramic allows only positively charged sodium-ions to pass through. During discharge, electrons are stripped off the sodium metal leading to formation of the sodium-ions that then move through the electrolyte to the positive electrode compartment. The electrons that are stripped off the sodium metal move through the circuit and then back into the battery at the positive electrode, where they are taken up by the molten sulphur to form polysulfide. The positively charged sodium-ions moving into the positive electrode compartment balance the electron charge flow. During charge this process is reversed.</p> <p>The battery must be kept hot (typically > 300 °C) to facilitate the process (i.e., independent heaters are part of the battery system). In general Na/S cells are highly efficient (typically 89%).</p> <p>NaS batteries are contained within airtight, double-walled stainless-steel enclosures that are structured as cells. These enclosures are also placed on pads or simple foundations. The batteries are also able to charge and discharge each day from 100% state of charge to 0% providing a full DoD. The expected NaS lifetime is approximately 15 years with an average of 4 500 cycles and 90% DoD.</p> <p>These batteries, furthermore, use hazardous materials, including metallic sodium, which is combustible if exposed to water. However, the sodium, sulphur, beta-alumina ceramic electrolyte, and sulphur polysulfide components of the battery are typically disposed of by routine industrial processes or recycled at the end of the NaS battery life.</p> <p>Flow Battery: Vanadium Redox Flow A flow battery is charged and discharged by a reversible reduction-oxidation reaction between the two liquid vanadium electrolytes of the battery. Unlike conventional batteries, electrolytes are stored in separated storage tanks, not in the power cell of the battery. During operation these electrolytes are pumped through a stack of power cells, in which an electrochemical reaction takes place and electricity is produced. Flow batteries are typically containerized and stored in anolyte and catholyte tanks. The first operational Vanadium Redox Flow (VRF) battery was successfully demonstrated in the late 1980s. The VRF battery offers a relatively high cell voltage which is favourable for higher power and energy density.</p> <p>The electrolytes in the VRF battery are composed of vanadium ions in an aqueous sulphuric acid solution. The acid solution has a low pH between 0.1 and 0.5. The vanadium electrolytes are stored in separate large</p>

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Technology	Description
	<p>electrolyte tanks outside the cell stack. The electrolyte tanks and associated pipes, valves etc. must be composed of materials that are resistant to corrosion in the very low pH environment.</p> <p>The electrodes used in VRF are composed of high-surface area carbon materials. The membrane physically separates the two vanadium-based electrolyte solutions, preventing self-discharge while allowing for the flow of ions to complete the circuit. The ion exchange material could be potentially toxic which is composed of highly acidic (or alkaline) material.</p> <p>The technology to be used for the purpose of this development will be determined at later stages of the process.</p>

Energy generation alternatives in terms of land use

The table (Table 5-1) below describes the energy generation alternatives that are available (apart from the proposed solar technology to be used), with the advantages and disadvantages of the source and the feasibility of the technology on the proposed development site based on local and regional setting.

Table 5-1. Renewable energy alternatives to solar energy for the proposed development area.

Technology	Description	Advantages	Disadvantages	Feasibility relative to the proposed development area
Renewable energies				
Wind Energy	As derived from the numerous On-shore wind Energy applications in process (as per the DFFE Screening Tool data, as accessed on 14 October 2022, indicated in Section 4.1.3 above) and due to the Windy nature of the De Aar area (Figure 6-2) the proposed development area would be ideally situated for On-shore wind facilities. On-shore wind power refers to the generation of energy through the use of wind turbines that are located on land and uses wind to generate energy.	<ul style="list-style-type: none"> • Low production costs; and • Quick installation period (months) 	<ul style="list-style-type: none"> • Visually unappealing; • On-going visual disturbance from light infrastructure positioned on turbines. • Not a constant energy source (reliant on sufficient wind speeds) • Causes noise pollution; • Creates a collision course for flying creatures • The blades can impact meteorological radar (impacting the data quality and loss of data) 	Considering the number of wind farms (planned and existing) within the area, the use of the development area for the purpose of Wind Energy harvesting would be feasible. However, the agreement between the landowners and the applicant was specific to the use of the property for the purpose of solar infrastructure. During consultation, the landowners did raise their concerns relating to the existing wind farms in the surrounding area. of wind farms were raised. The presence of a wind farm on their properties would in effect be deemed undesirable.
Other Renewable Alternatives	Due to the location of the proposed development and the natural resources available to the area, other renewable energies (Geothermal, Hydropower, Ocean Energy and Bioenergy) were not deemed reasonable alternatives.			
Non-renewable energies				

Non-renewable energy sources (such as the usage of oil, natural gas, coal or nuclear energy) were not considered alternatives for this particular project as it would not align with South Africa's Green Economy Sustainable Development growth path.

5.2.3.No-Go Alternative

The “No Go” alternative is the option of not developing the proposed development and associated infrastructure. The no-development option would result in a lost opportunity in terms of the employment opportunities associated with the construction and operation phase as well as a loss of benefits associated with the load-sharing possibilities in terms of electricity generation.

The “no-go” alternative will result in the visual environment staying the same with the natural character of the area contributing to the “sense of place”.

6. THE ENVIRONMENTAL ATTRIBUTES

This section will consider the full extent of the study area (entirety of the future Hercules Solar PV Cluster) as contemplated above.

6.1. Climate

Per the Köppen-Geiger Climate Classification (Kottek, et al., 2006), De Aar has been classified as having a cold arid (BSk) climate. The steppe ecoregion associated with this classification is typified by a temperate climate. According to the climate description of (Weather Spark, 2022), De Aar is defined by hot summers and cold, dry and windy winters. It has a high rainfall, usually occurring in the first quarter of the year.

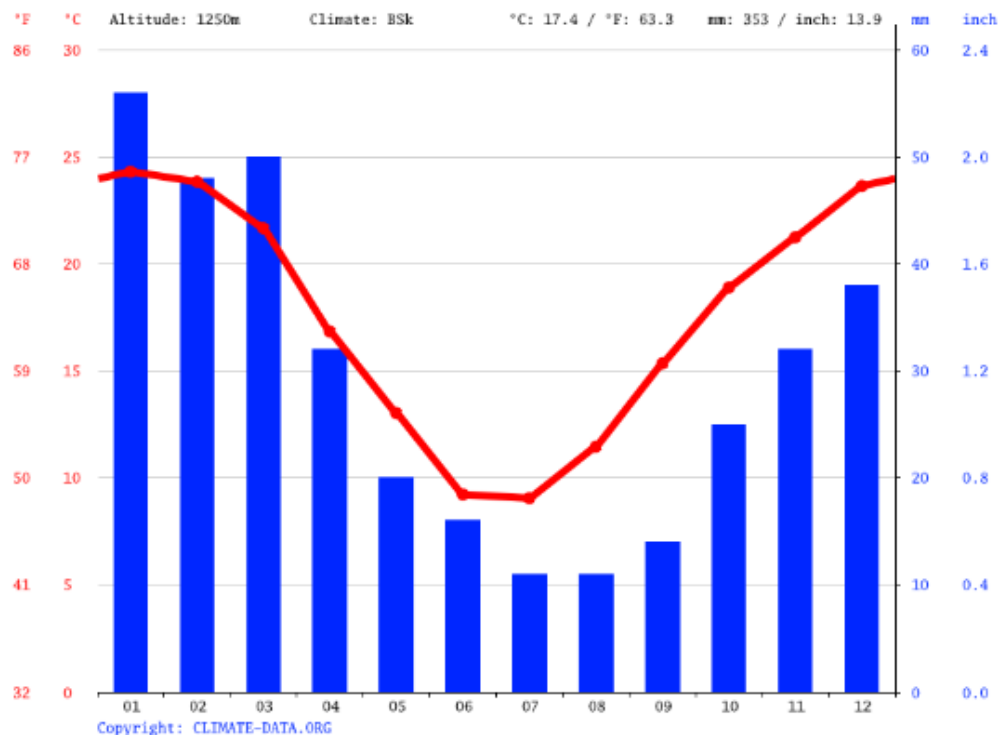


Figure 6-1: Average temperature and average rainfall data for De Aar (ClimateData.org, 2022).

At an average temperature of 24.3 °C, January is the hottest month of the year, while July has the lowest average temperature of the year at 9.1 °C.

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According to Meteoblue (2022), the wind rose (Figure 6-2) for De Aar indicates that the prevailing wind direction is ESE (11 % of the yearly primary wind direction), followed by W (9 % of the secondary wind direction).

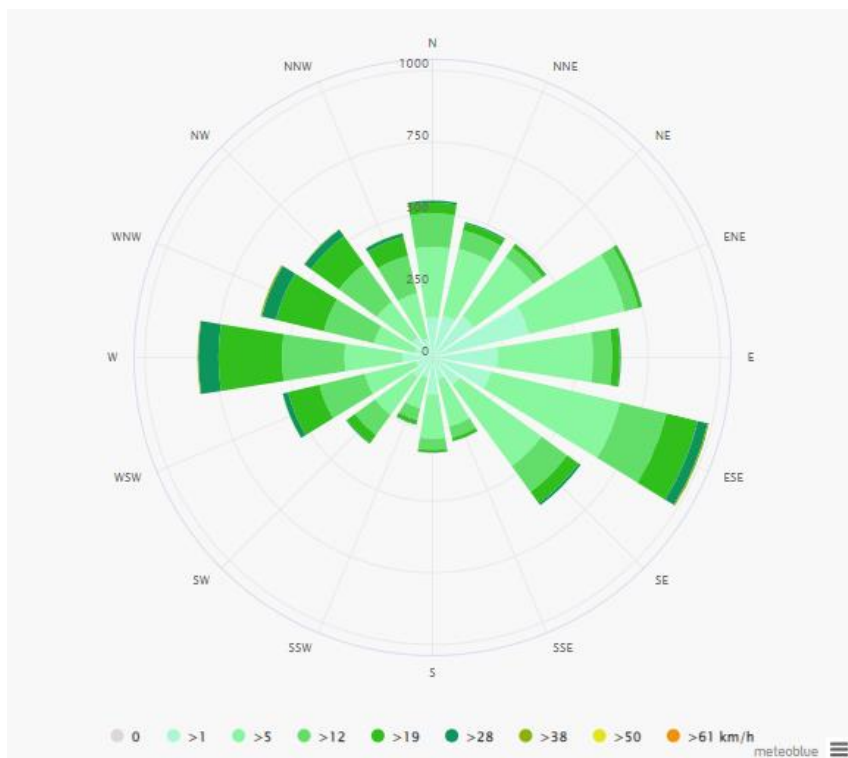


Figure 6-2: Wind Rose for De Aar (Source: ClimateData.org)

6.2. Topography

The topography of the proposed development area can be described as an undulating landscape with several koppies, hills, sills and outcrops. The drainage areas carve their route through the landscape with the network being reliant on the resilience of the underlying geology (Dolerite versus Sedimentary lithologies).

The koppies and ridge areas were identified as areas of high sensitivity by both the appointed terrestrial ecologist (The Biodiversity Company, 2022) and the Visual impact assessment specialist (Gibbs, 2022). Figure 6-3 below contains the slope analysis of the proposed study area indicating the undulating nature of the site, the contour data available (DRDLR, 2016), and the findings of the ecological and visual specialists.

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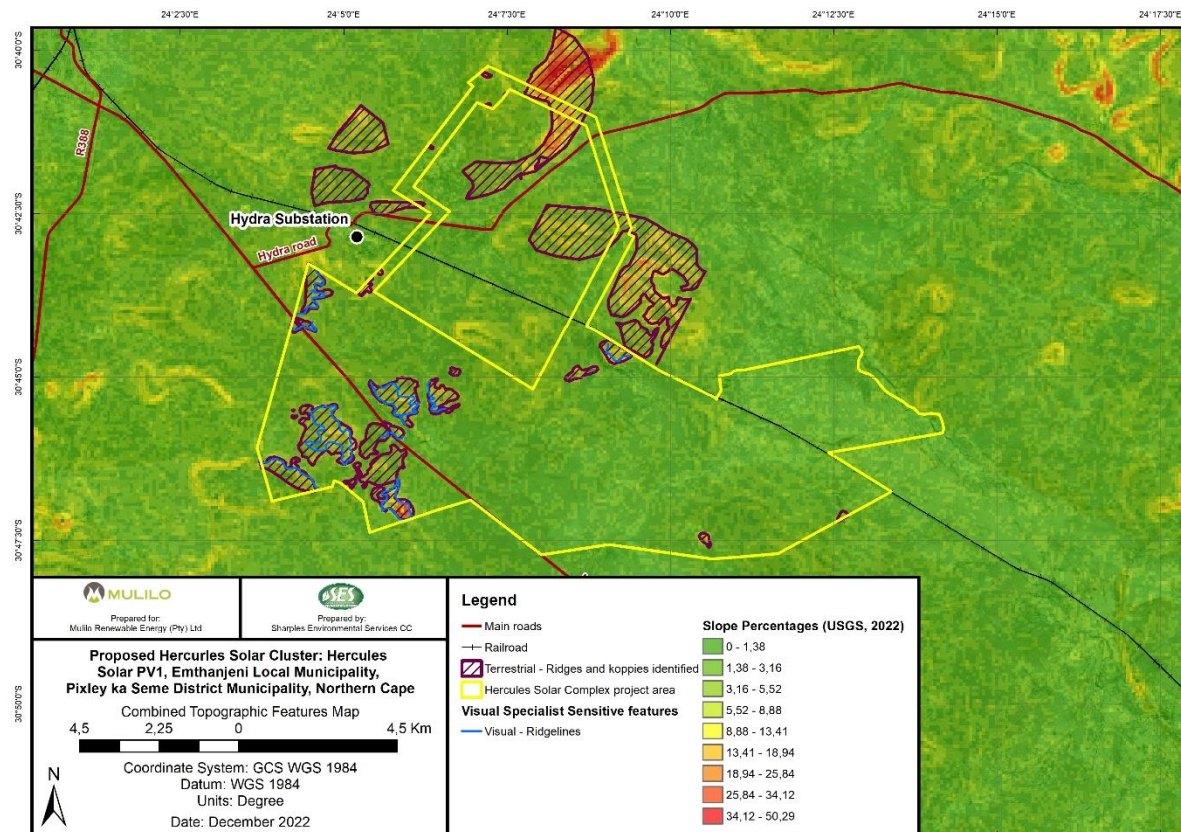


Figure 6-3: Important topographic features of the study area (USGS – DEM [accessed 2023], The Biodiversity Company [2022], David Gibbs [2022] and DRDLR [2016]).

6.3. Freshwater Resources

6.3.1. The Aquatic Environment

According to the DFFE Screening Tool report the site's Aquatic Biodiversity is of **Very High sensitivity**. The Biodiversity Company was appointed to undertake a baseline assessment of the proposed site and potential aquatic features.

The completion of the aquatic biodiversity desktop and field assessments agree with the '**Very High**' sensitivity presented by the screening report due to these areas containing > 50% natural habitat with potential to support species of conservation concern (SCC), > 100 ha of intact area for any conservation status of ecosystem type which have high habitat connectivity serving as functional ecological corridors with limited road network between intact habitat patches. Lastly the habitat is unlikely to be able to recover fully after a relatively long period (> 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality) due to the ephemeral nature of the system

The site is within the D62D Quaternary Catchment located within the Orange (Lower) Water Management Area (according to the water management areas as promulgated through DWS Notice No. 1056 of 2016) and the Nama Karoo Ecoregion.

According to the available databases (as confirmed by the aquatic specialist's baseline assessment as attached to Appendix G), the watercourses traversing the proposed development area is associated with the upper reaches of the Brak River. This encompasses a non-perennial river system with an associated low-density network of non-perennial and ephemeral tributaries falling adjacent to and within the project footprint (Figure 6-4).

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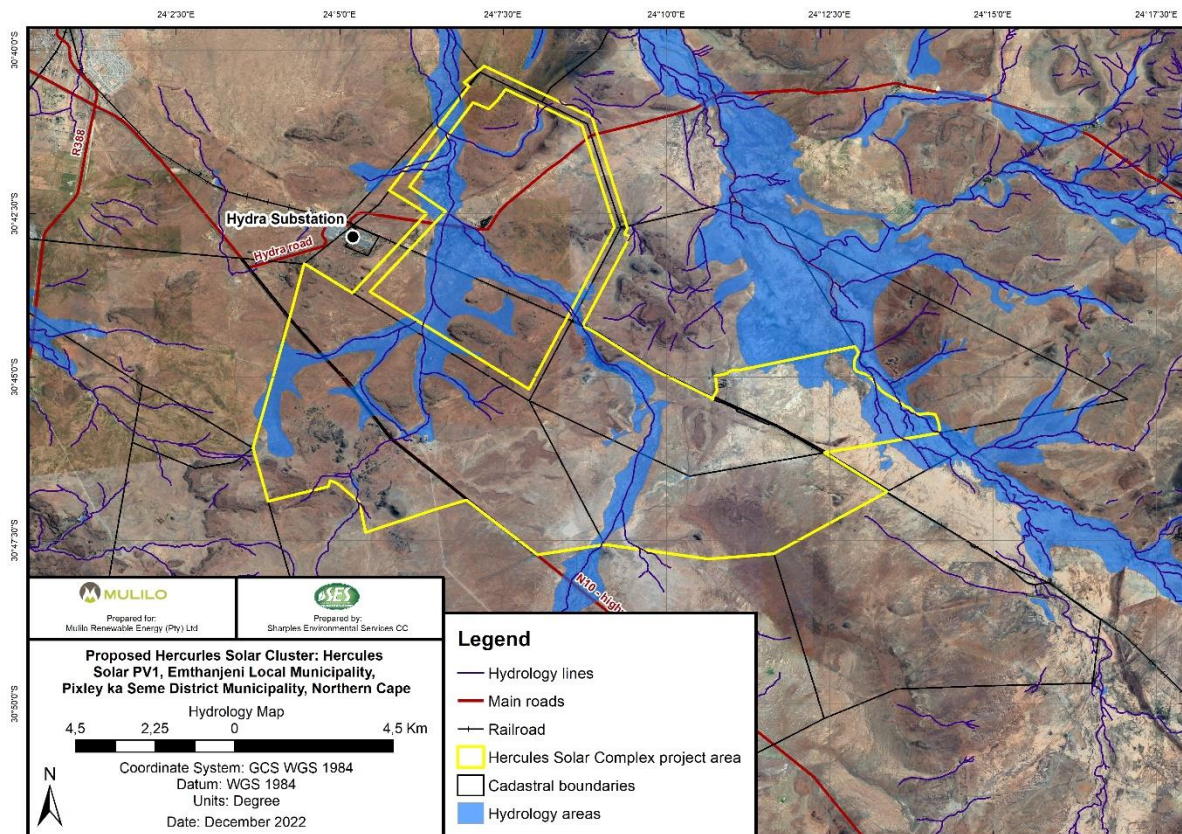


Figure 6-4: A map providing the hydrology of the area surrounding the proposed development.

6.3.1.1. The Brak River

The Brak River forms a part of a non-perennial drainage system with a portion of the upper reaches thereof located within the proposed project site. The portion of the upper reaches of the system located collate north-west of the project site and flow toward the higher orders of the River. The Brak River then flows in a north westerly direction joining the Orange River approximately 174 km (as the crow flies) downstream of the project area.

6.3.1.2. Tributary streams of the Brak River intercepted by the proposed study area.

As per the aquatic delineation conducted by The Biodiversity Company (2022), the portion of the system located within the boundaries of the study area has been characterised as intermittent rivers with sporadic flow and drainage flats/floodplains which are connected to these areas. This network is similar to the watercourse delineation of the 2018 National Wetlands Map 5 (SANBI, 2018) (Figure 6-10). This delineation has been refined by the specialist and the impact on the watercourses within the study area will be evaluated as part of the EIA phase of the proposed development. The watercourse network serves as the headwaters of a minor tributary of the Brak River, located North-West of the study area.

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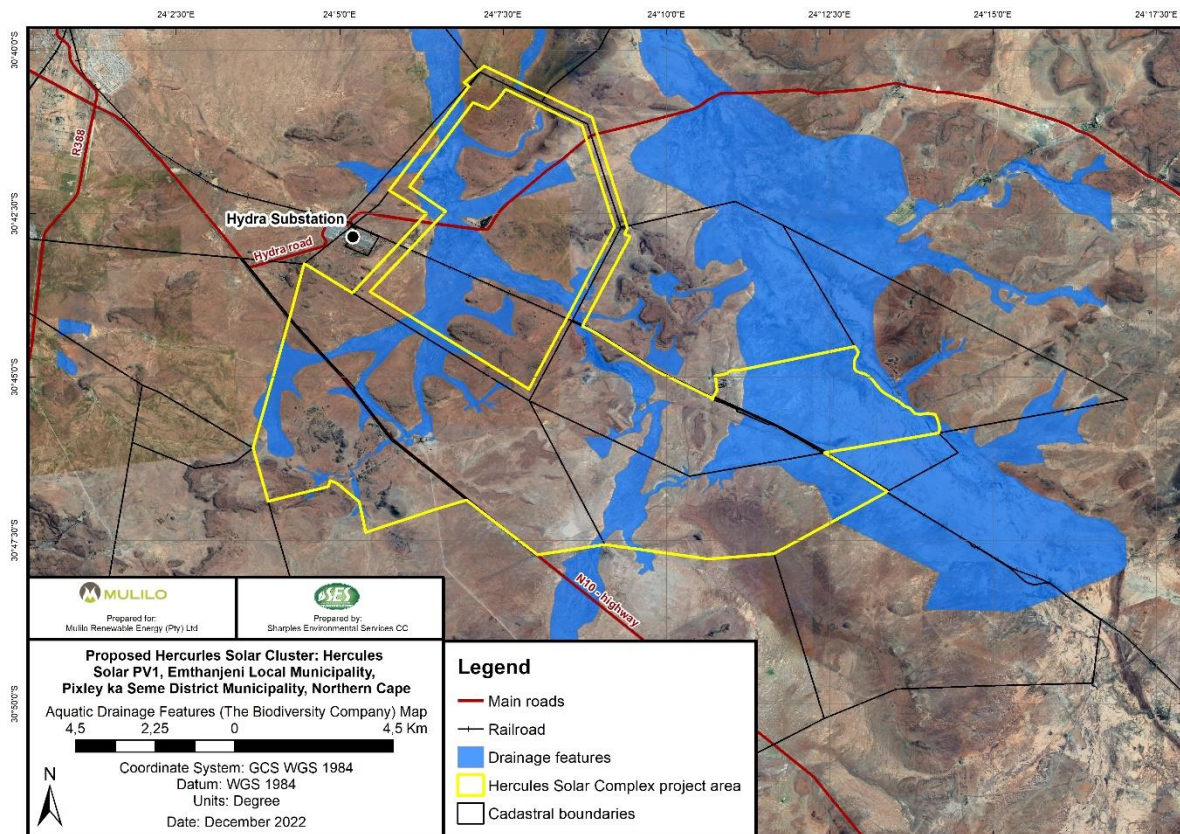


Figure 6-5: Aquatic delineation of the watercourses within the study area (The Biodiversity Company, 2022).

6.3.2. Conservation Context

The Northern Cape Biodiversity Spatial Plan (NCBSP) (2016) is a spatial biodiversity plan recognized by both the Department of Forestry, Fisheries and Environment (DFFE) and South African National Biodiversity Institute (SANBI). It is used to inform land-use planning and development on a provincial scale and aids natural resource management. One of the outputs of the NCBSP (2016) is the Northern Cape Critical Biodiversity Map, which categorises the study receiving environment of the province into various attributes. The categories are:

- *Critical Biodiversity Areas (CBA) 1;*
- *CBA 2;*
- *Ecological Support Areas (ESAs);*
- *Protected Areas (PA)*
- *Other Natural Areas (ONA).*

The categorisation is based on the biodiversity characteristics, spatial configuration, and the requirements for meeting targets of both the biodiversity patterns and ecological processes.

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met.

Ecological Support Areas (ESA's) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in

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delivering ecosystem services (SANBI, 2017). Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

Other Natural Areas (ONAs) consist of the areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan does not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs. These include areas such as Important Bird and Biodiversity Areas (IBAs) (Birdlife, 2017), features identified in terms of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer, et al., 2018) and the land capability sensitivity (DAFF, 2017)

With regards to the study area, it was observed that the proposed development area is located within an area which has been largely identified as ESA, with components of CBA 1 and CBA 2 associated with the coarsely defined watercourses located within the study area (Figure 6-6).

Table 6-1. Biodiversity Area distribution within the study area.

Biodiversity Area Type	Area	Percentage of study area
ESA	7 829.42 ha	96.5 %
CBA 1	74.84 ha	0.9%
CBA 2	165.67 ha	2 %
None present	46.07 ha	0.6%
Total (including transmission corridors)	8116 ha	100 %

Numerous watercourses (as described in Section 6.3 above) have been identified within the study area of the proposed development. The sensitivities of these will be described below

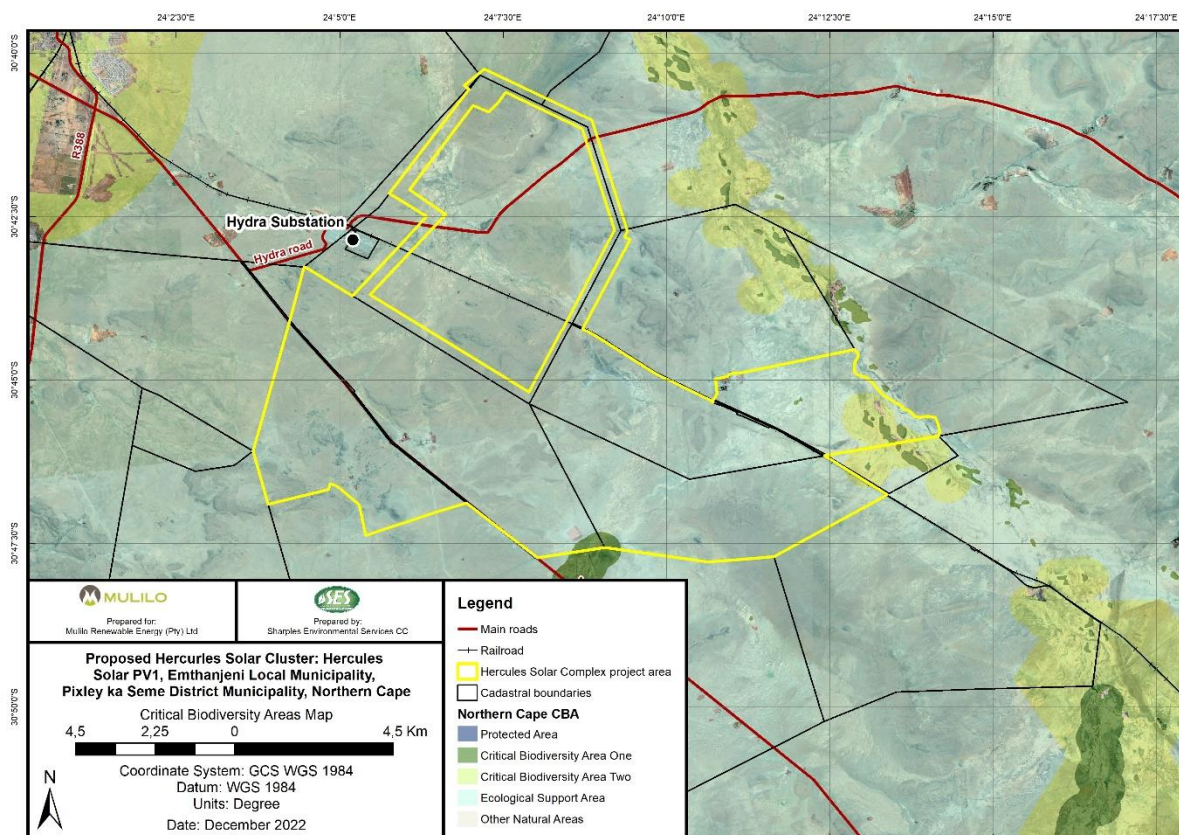


Figure 6-6: The site in relation to Northern Cape Spatial Biodiversity Plan (2016)

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According to the National Biodiversity Assessment (NBA) (SANBI, 2018), the proposed development area in its entirety is located within the Northern Upper Karoo. According to the NBA (SANBI, 2018), the threat status of the impacted vegetation types is both Least Concern (LC). The Northern Upper Karoo is Not Protected and the Besemkaree Koppies Shrubland is Poorly Protected.

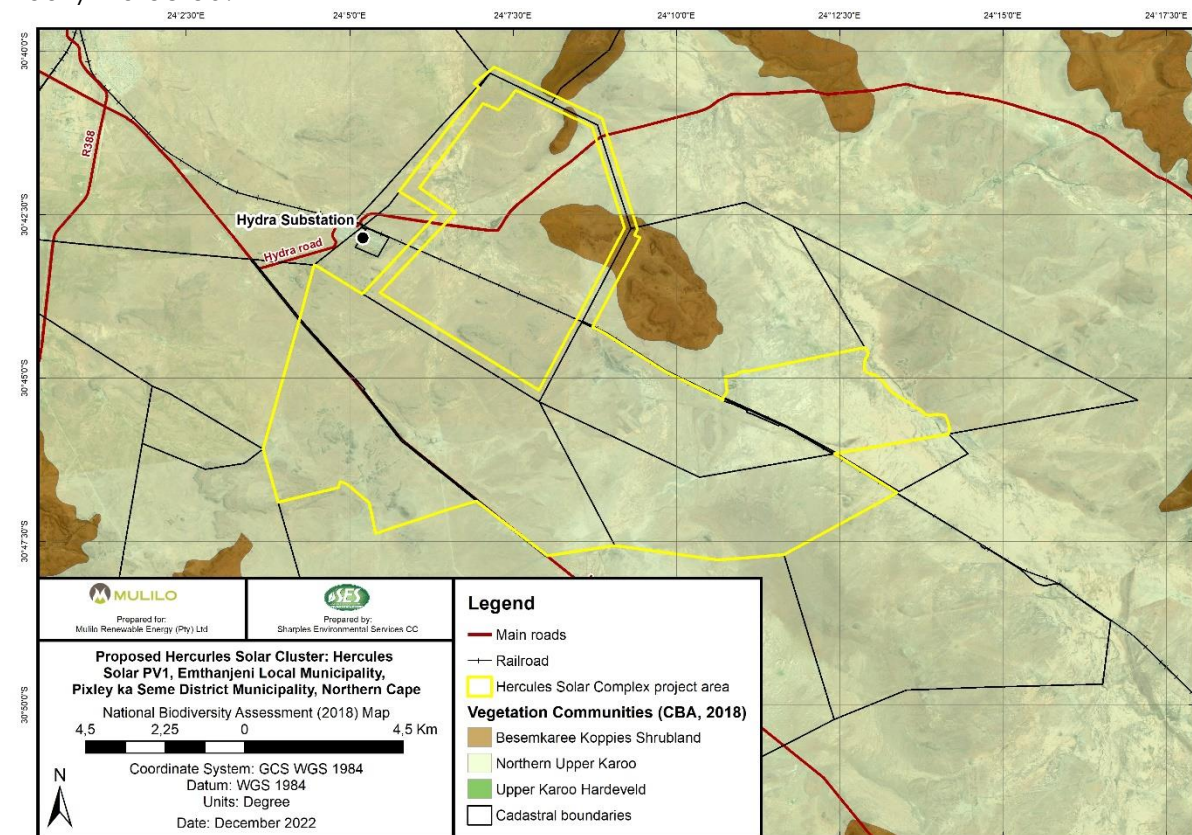


Figure 6-7: The Vegetation Types as per the National Biodiversity Assessment (NBA, 2018).

In 2015, Birdlife South Africa released the conservancies identified for the countries. These areas were identified as Important Bird and Biodiversity Areas (IBA) and serves as one of the organization's most important conservation programmes. These conservancies speak to the species, sites, habitat and people of a region. There are six (6) objectives of the IBAs which include (Birdlife.org.za, accessed in November 2022):

- Strategic, integrated landscape planning;
- Safeguarding the most important sites for birds;
- Improving habitat management in Key Biodiversity Areas (KBAs);
- Managing data to ensure that the networks are defensible and accurate;
- Mainstreaming IBAs, KBAs and bird species and their representation in other spatial planning and assessment products; and
- Increase support from the public, government and corporate systems by increasing awareness and advance sustainable use of IBAs and associated natural resources.

The proposed development is located within the Platberg-Karoo Conservancy. This conservancy was established in July 1990. The area has seen numerous studies conducted within it. This includes the Karoo Large Terrestrial Bird Survey, the Blue Crane Awareness Project and the threat of power-line collisions was also investigated by Eskom/EWT partnership and MD Anderson. The location of the future Hercules Solar PV Cluster in relation to the IBAs have been indicated in Figure 6-8 below.

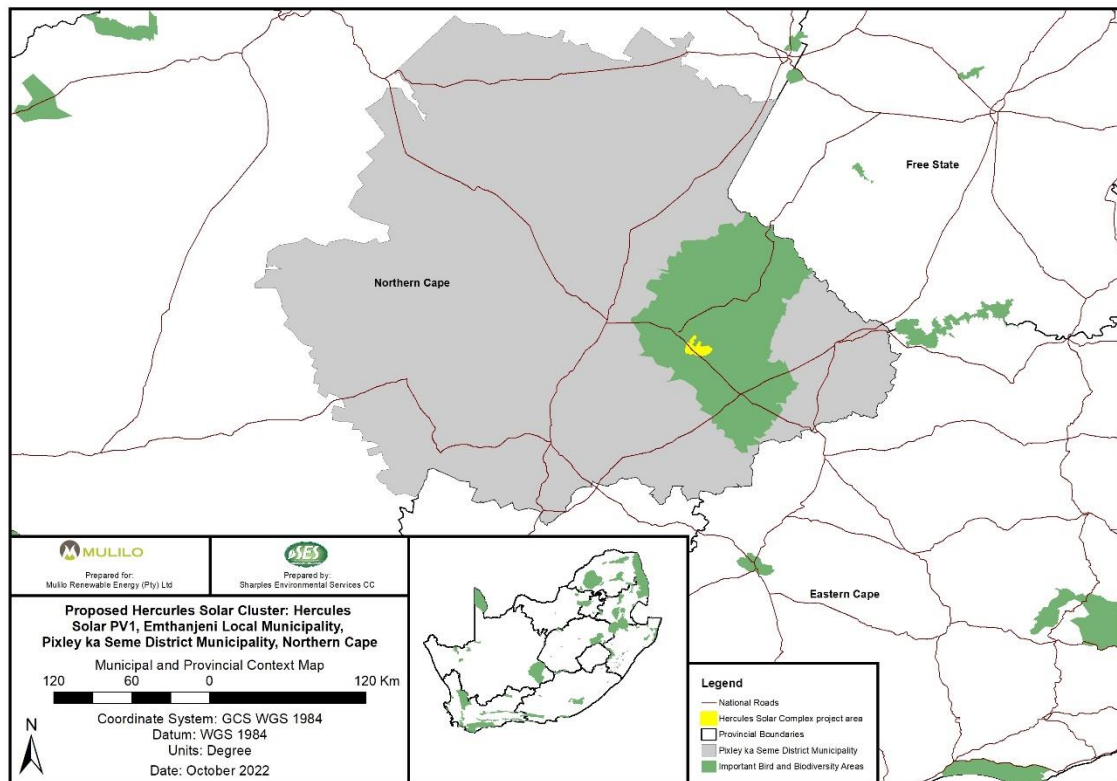


Figure 6-8: The Platberg-Karoo Conservancy (Birdlife, 2017).

6.3.3. National Freshwater Ecosystem Priority Areas (NFEPA's)

The National Aquatic Ecosystem Priority Areas (NFEPA) map provides strategic spatial priorities for conserving South Africa's aquatic ecosystems and supporting sustainable use of water resources.

FEPAs were identified based on a range of criteria dealing with the maintenance of key ecological processes and the conservation of ecosystem types and species associated with rivers, wetlands and estuaries (Driver, et al., 2011). According to the available resources, a NFEPA river intersects the North-Eastern boundary of the study area. Additionally, the headwaters of another drainage line are located towards the Southern boundary of the study area. Numerous isolated wetlands were identified through the NFEPA wetland delineation (2011). The proposed development areas are also located within a River FEPA and has been identified as an Upstream Management Area (Figure 6-9).

In 2018, the National Wetland Map 5 (NWM5) (SANBI, 2018) was released to the public. Through this data, the wetland delineations for the country were redefined and an ecological threat status was allocated to the individual resources, where applicable. Based on the findings of the NWM5 (SANBI, 2018), (Figure 6-10), no watercourses of conservation importance were identified within the study area.

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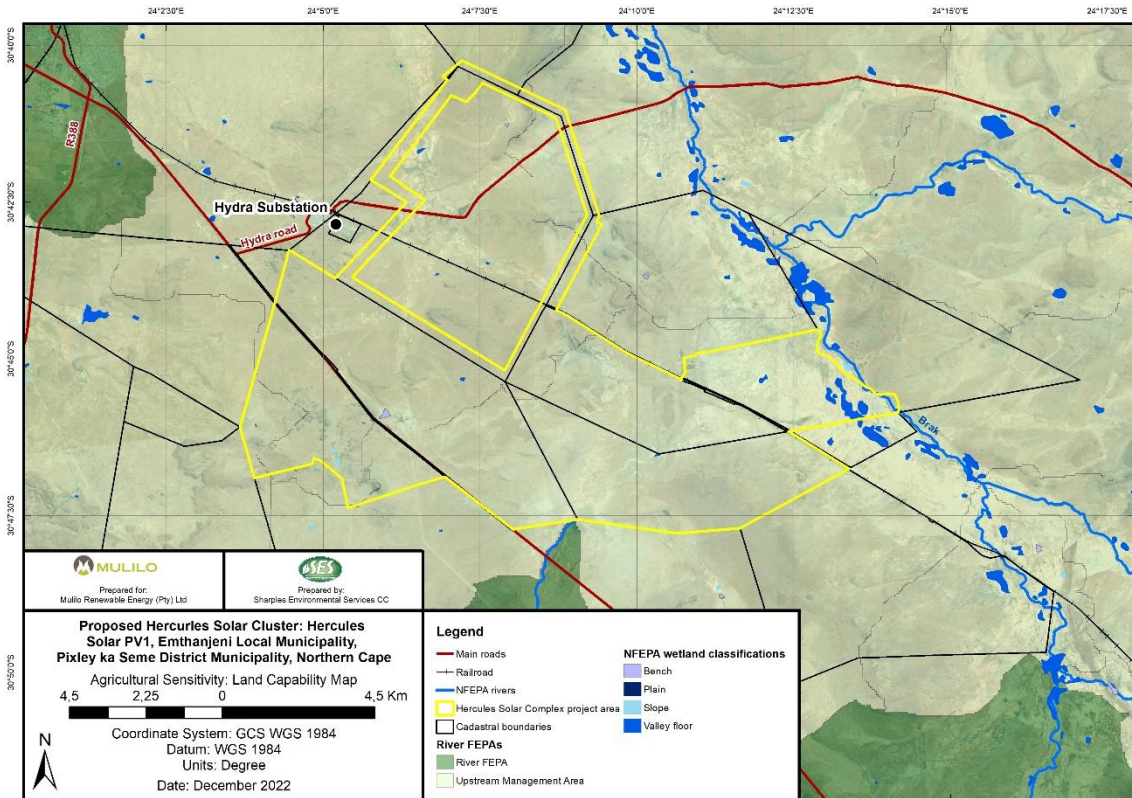


Figure 6-9: The site in relation the NFEPA resources identified

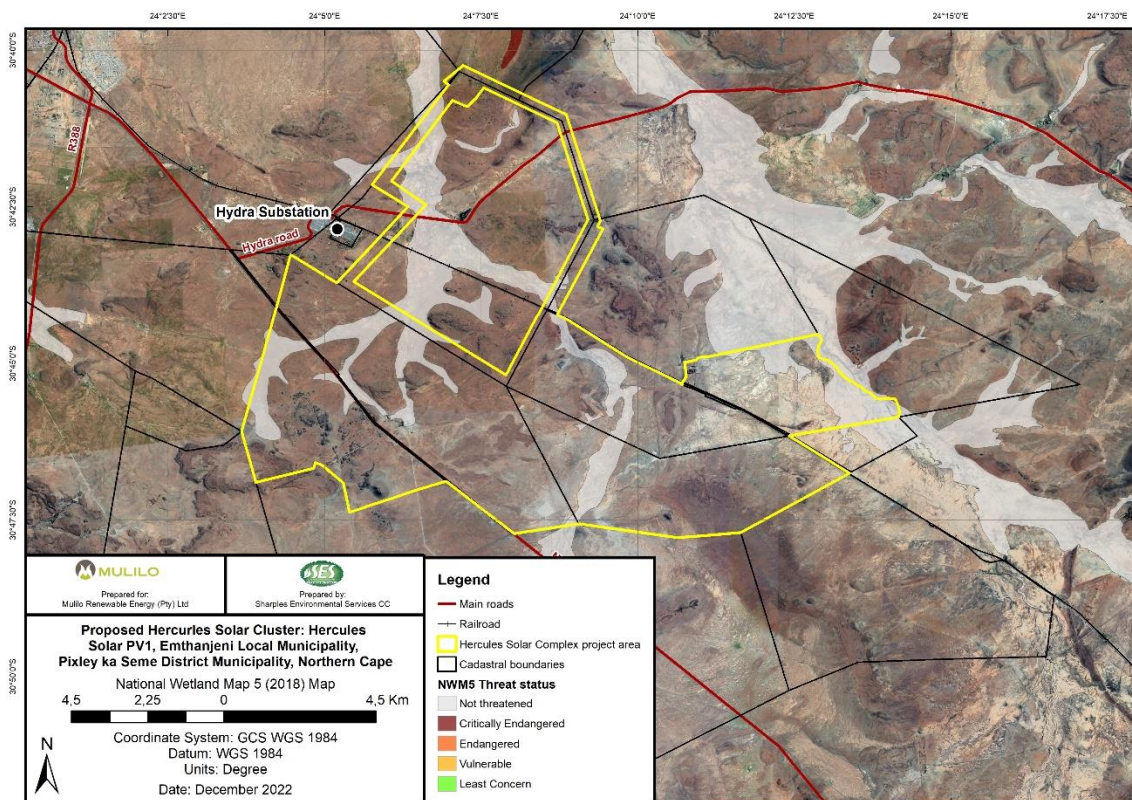


Figure 6-10: The NWM5 (2018) watercourses identified within the study area.

6.4. Soil, Geology & Agricultural Potential

6.4.1. Soil & Geology

Based on the National Geological Classifications obtained from the Council of GeoScience (Figure 6-11), the study area is located within an area with three (3) distinct lithologies:

- Karoo Dolerite Suite: These are the dolerite and minor ultrabasic rocks of the Karoo Dolerite Suite;
- The mudstones and sandstones of the Abrahamskraal formation (known to be a highly fossiliferous formation); and
- River sediment including alluvium, colluvium, eluvium, gravel, scree, sand and soil.

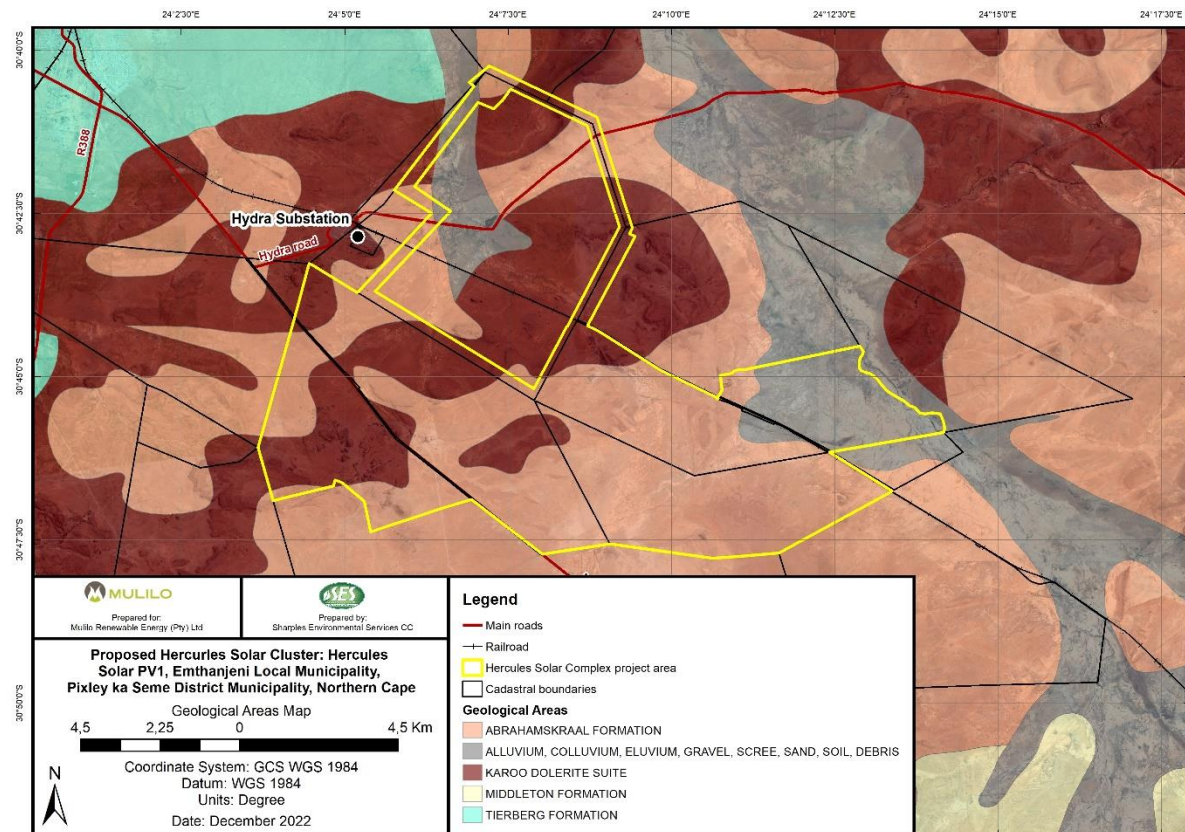


Figure 6-11: The underlying geology of the study area (Council of GeoScience).

According to Munica & Rutherford's (2006), the vegetation types identified within the study area are underlain by the shales of the Volksrust Formation, the Prince Albert Formation (both of the Eccca Group) and the Dwyka Group diamictites. The Jurassic Karoo Dolerite sills and sheets support the vegetation types. The dolerite dykes and sills are igneous intrusions that result from extensive volcanic activity, which accompanied the break-up of Gondwana in the Jurassic period. In places the slopes of mesas and butts carrying this vegetation type have mixed geology where dolerites occurs together with the sandstones and mudstones of the Eccca and Beaufort Groups.

The soils of the area are highly variable where deep, red-yellow, apedal, freely drained soils or very shallow Glenrosa or Mispah soil forms could be present (Mucina & Rutherford, 2006).

Dr Gideon Groenewald was commissioned by ACO Associates to produce an initial, desk-based palaeontological assessment of the development site. This assessment was based on Dr Groenewald 's previous work on projects in the De Aar area, his personal knowledge of the

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geology of the region and on a desktop literature survey of recent palaeontological research in the Karoo Basin.

The project area is underlain by Permian aged sedimentary rocks of the Adelaide Subgroup of the Beaufort Group as well as Jurassic aged dolerite of the Karoo Supergroup (Figure 17).

Limited areas are underlain by Quaternary aged calcrete and Large parts of the study area are covered in relatively thick (2m) colluvial sediments that covers potentially productive fossils horizons.

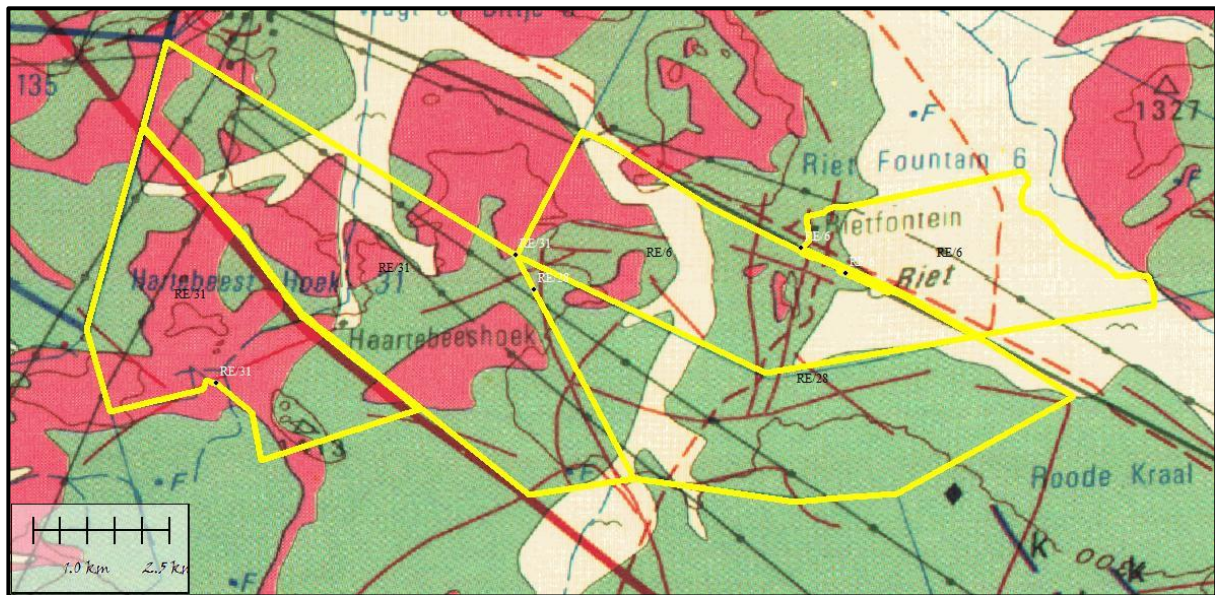


Figure 6-12: Geology of the study area. The farms are underlain by sedimentary rocks of the Adelaide Subgroup, dolerite and alluvium.

The Adelaide Subgroup, which extends across the southern Karoo Basin, is the lowest subgroup of the Beaufort Group and consists of a variety of rock types, including fine-grained sandstone, siltstone and mudstone. Mudstones are generally greenish (or blueish) grey, and greyish-red, interbedded with yellow sandstones and siltstones. In the western part of the basin, the Adelaide Subgroup comprises the Abrahamskraal and Teekloof formations, with the former characterised by the presence of a number of cherty beds and less red mudstone relative to the overlying Teekloof Formation (SACS, 1980). In the eastern areas it comprises the Abrahamskraal, Middleton and Balfour formations (Smith, et al., 2020). The depositional environment of the Adelaide Subgroup formations is interpreted as a high sinuosity meandering river environment controlled by the northward warping of the foreland Karoo Basin.

The Hercules project area straddles the boundary between the two regions, where the transition from the western subdivision of the Adelaide Subgroup to the eastern subdivision is prominent and the consensus is that the dominant lithological unit of the region is the Balfour Formation.

The palaeontological heritage of the Adelaide Subgroup and specifically the Balfour Formation forms part of the extremely highly rated treasures of the South African Karoo. Containing evidence of one of the most significant extinction events (Permian/Triassic extinction).

This initial desktop assessment confirms that:

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- The dolerite on the site contains no fossils because they do not occur in intrusive, volcanic rock. Furthermore, when igneous dykes intrude through the overlying sediments they tend to physically destroy any fossils in their paths and the heat they generate can destroy or alter fossils in the vicinity.
- Elsewhere, however, portions of the proposed development are underlain by very highly sensitive geological formations (Figure 6-12).
- The Quaternary sands that cover much of the development site are young enough to preserve fossils, but having been washed down slopes and streams into rivers, any fossils would have been transported from their sites of origin and their context and associations with other fossil material in the assemblage will have been lost. These sediments are moderately sensitive.

6.4.2. Agricultural Potential

According to the DFFE screening tool, the study is located within an area of varying land capability (DAFF, 2016). The DFFE Screening Tool's agricultural land capability data have been obtained through the DAFF 2016 Draft Land Capability dataset. This dataset categorised the land nationally into 15 different classes, which have been sub-categorized into 4 classes. The dataset was generated through GIS modelling. As per the Departmental description of 'land capability', the value of the land capability is determined by the interaction of climate, soil and the terrain for the purpose of intensive long-term use of land for the purposes of rainfed farming (DAFF, 2017). The land capability of the proposed development area varies between Very Low to Moderate.

During the verification exercise done by the appointed Agricultural Specialist (Lanz, 2022) isolated areas with a High Sensitivity in terms of Agriculture were defined by the areas with Annual Crop Production. These areas have been identified as agricultural no-go areas.

The image below (Figure 6-13) provides an indication towards the agricultural potential of the proposed development area.

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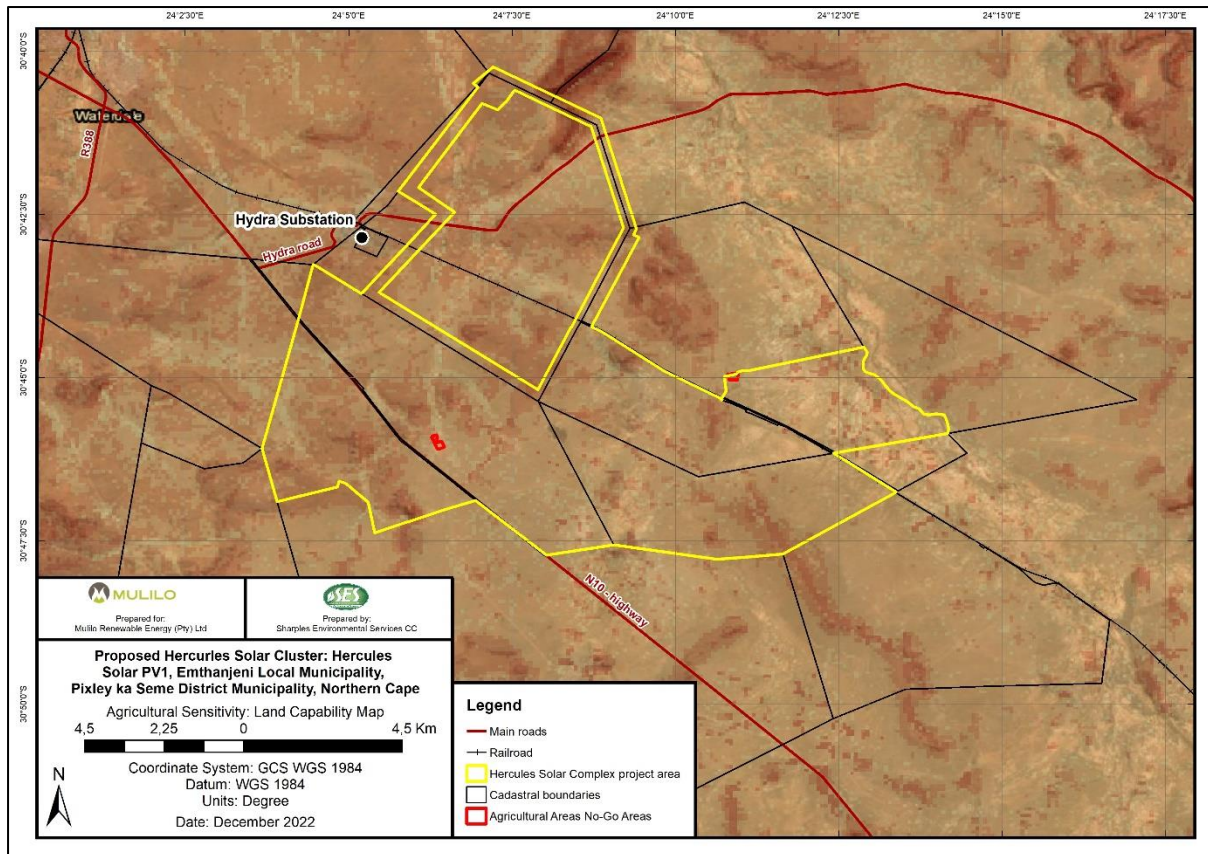


Figure 6-13: Agricultural Potential Map

According to the agricultural baseline assessment, 2022, the arid climate (low rainfall of approximately 270 to 280 mm per annum and high evaporation of approximately 1,458 to 1,513 mm per annum) (Schulze, 2009) is the limiting factor for land capability, regardless of the soil capability and terrain. Moisture availability is very limiting to any kind of agricultural production. The land has a low long-term grazing capacity of 20 hectares per large stock unit. Because climate is the limiting factor that controls production potential, it is the only aspect of the agro-ecosystem description that is required for assessing the agricultural impact of this development. All other agricultural potential parameters become irrelevant under the dominant limitation of aridity.

The specialist has determined that the site has **low agricultural potential**, predominantly because of climate constraints. As a result of the constraints, the land is limited to low-capacity grazing. The entire site was verified in this assessment as being of medium and low sensitivity for impacts on agricultural resources, except for small, isolated patches of cultivation that are associated with farmsteads and are confirmed as high agricultural sensitivity, no-go areas for solar development.

Three potential mechanisms of negative agricultural impact were identified as occupation of land, soil erosion and degradation, and dust generation. Two potential mechanisms of positive agricultural impact were identified as increased financial security for farming operations, and improved security against stock theft and other crime. All of these are likely to have low impact on future agricultural production potential and are therefore assessed as having low significance.

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The conclusion of this assessment is that the agricultural impact of the proposed development is acceptable because it offers a valuable opportunity for renewable energy facilities to be integrated with agricultural production in a way that provides benefits to agriculture and leads to low loss of future agricultural production potential. This is substantiated by the following points:

- The development will occupy land that is of very limited land capability, which is insufficient for crop production. There is not a scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority.
- The amount of agricultural land used by the development is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with low agricultural production potential.
- All renewable energy development in South Africa decreases the need for coal power and thereby contributes to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land throughout the coal mining areas of the country.

From an agricultural impact point of view, it is recommended that the development be approved.

The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions, other than recommended mitigation.

6.5. Vegetation

6.5.1. Vegetation Type

According to the DFFE Screening Tool Report the following sensitivity classifications were gathered:

- Terrestrial Biodiversity Theme sensitivity is **Very High** for the project area, with the possibility of a CBA1, CBA2, ESA and NFEPA Sub-catchments being present;
- Plant Species Theme sensitivity is **Low** for the project area;
- The specialist concluded that based on the desktop assessment it can be said that the project area is sensitive with a moderate to high likelihood of species of conservation concern occurring. This assumption is based on the ESA, CBA1s, CBA2, IBA, and NFEPA wetlands and NFEPA rivers in and around the project area.
- The specialist concluded that the expected post-mitigation risk significance for the project in isolation is expected to be **medium**, but in consideration of other projects in the area, it is considered to be **high**. The expectant anthropogenic activities are likely to drive habitat destruction causing displacement of fauna and flora and possibly even direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and species compositions within the area.

The Terrestrial Scoping Report (which included the faunal, floral and aquatic assessments) was undertaken by The Biodiversity Company (2022).

According to their findings, the study area falls within the Northern Upper Karoo and Besemkaree Koppies Shrublandvegetation units of the Vegetation Map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006).

The study area currently consists of four broad habitat types, namely:

- Hills, Outcrops and Sills;
- Shrubland;
- Drainage Areas and Inland Water.

The transformed areas which included the homesteads and associated infrastructure as well as the prominent roads, were excluded from the habitat delineations as there is no natural habitat remaining in these areas.

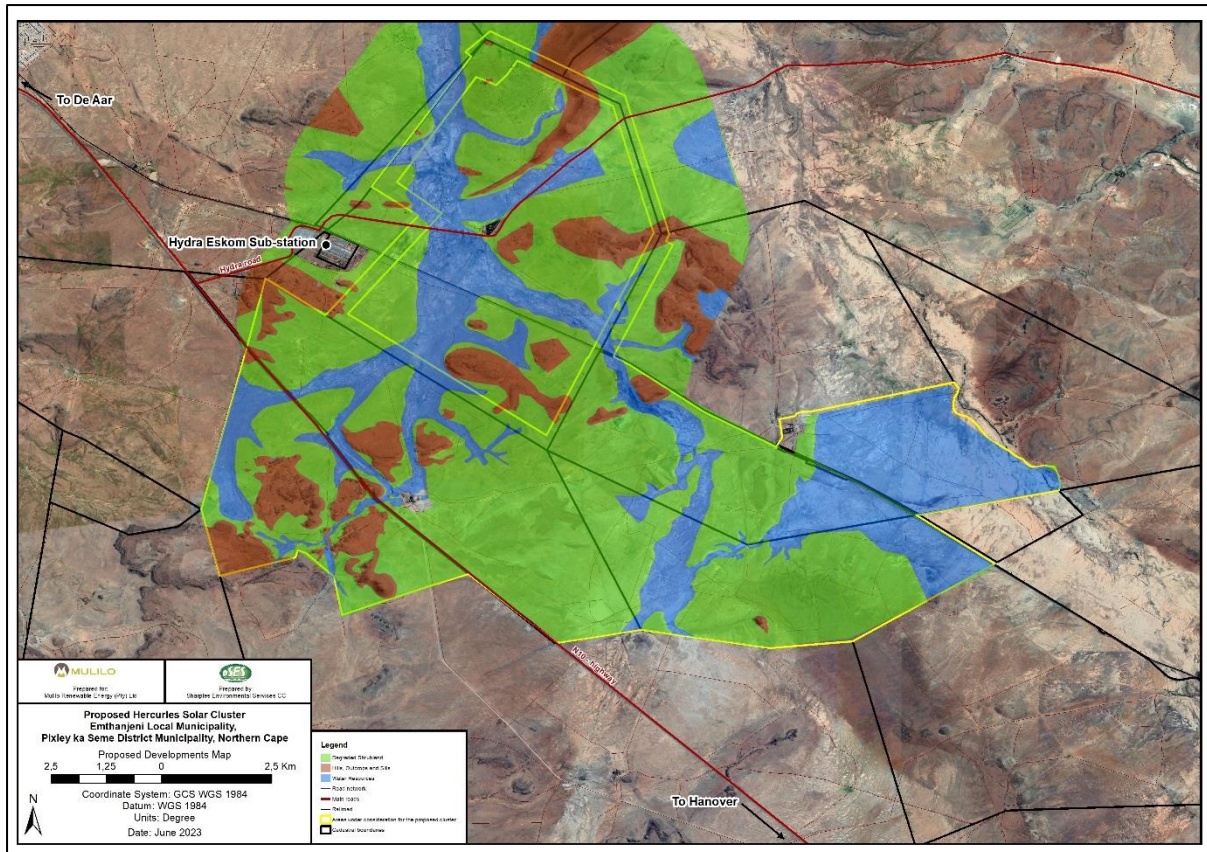


Figure 6-14: Fine scale vegetation and habitat units of the study site (Source: The Biodiversity Company, 2022).

6.5.1.1. Hills, Outcrops and Sills

These areas cover steep to moderately steep slopes with shallow soils. They create distinct and unique habitat features within the relatively homogenous Upper Karoo region.

As indicated by the appointed terrestrial ecological specialist (The Biodiversity Company, 2022), these habitats provide a number of ecosystem services and processes, including, but not limited to the provision of unique habitats for numerous species as well as the provision of greater heterogeneity in the regional habitat and microclimate.



Figure 6-15: Photographic Representation of the Hills, Outcrops and Sills identified within the study area (A panoramic North-facing view, David Gibbs, 2022).

6.5.1.2. Shrubland

The terrain consists of a low to zero slope with deep soils in comparison to the sloped habitats. Variability is observed with regards to the presence or absence of grass species and shrub densities (Figure 6-16).

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As indicated by the appointed terrestrial ecological specialist (The Biodiversity Company, 2022), these habitats provide a number of ecosystem services and processes, including, but not limited to the provision of grazing and foraging resources for indigenous fauna and livestock. Aids in the filtration of water permeating through the soil into the drainage lines (discussed below and in Section 6.3.1). This habitat type also provides important corridors for faunal dispersion within the landscape.



Figure 6-16: Photographic Representation of the Shrublands within the study area (David Gibbs, 2022).

6.5.1.3. Drainage Areas and Inland Water

This habitat type sprawls throughout the landscape within the study area and consists of channels through which surface water naturally collates and flows. Both Perennial and ephemeral systems were considered for this habitat type. All the prominent features were identified, as there are numerous inconspicuous drainage features throughout the landscape.

As indicated by the appointed terrestrial ecological specialist (The Biodiversity Company, 2022), these habitats provide a number of ecosystem services and processes, including, but not limited to the provision of surface water resources within the landscape. It aids in trapping sediment and nutrients carried by surface runoff. It creates a corridor for faunal dispersion within the landscape and is considered an important foraging and nesting habitat.

The drainage areas and inland water delineations can be seen in Figure 6-5 and Figure 6-14.

6.5.2. Biodiversity Sensitivity

6.5.2.1. Vegetation & Habitat

According to Mucina and Rutherford (2006), both the Besemkaree Koppies Shrubland and the Northern Upper Karoo vegetation communities are classified as Least Concern vegetation types. The vegetation of the Northern Upper Karoo is Not Protected, whereas the Besemkaree Koppies Shrubland is currently poorly protected.

According to the observations made by the specialist, the Shrublands observed within the study area are representative of the vegetation description of the Northern Upper Karoo vegetation community. Whereas the Hills, Outcrops and Sills observed on site are representative of the Besemkaree Koppies Shrubland vegetation community.

Table 6-2. Habitat breakdown (approximate) summary of entire study area.

Habitat Type	Sensitivity	Area	Percentage of study area
Hills, Outcrops and Sills	Very High	656 ha	8.08 %
Shrublands	High	5011 ha	61.74%
Drainage lines and inland water	High (Drainage)	2449 ha	30.18 %
Total (including transmission corridors)		8116 ha	100 %

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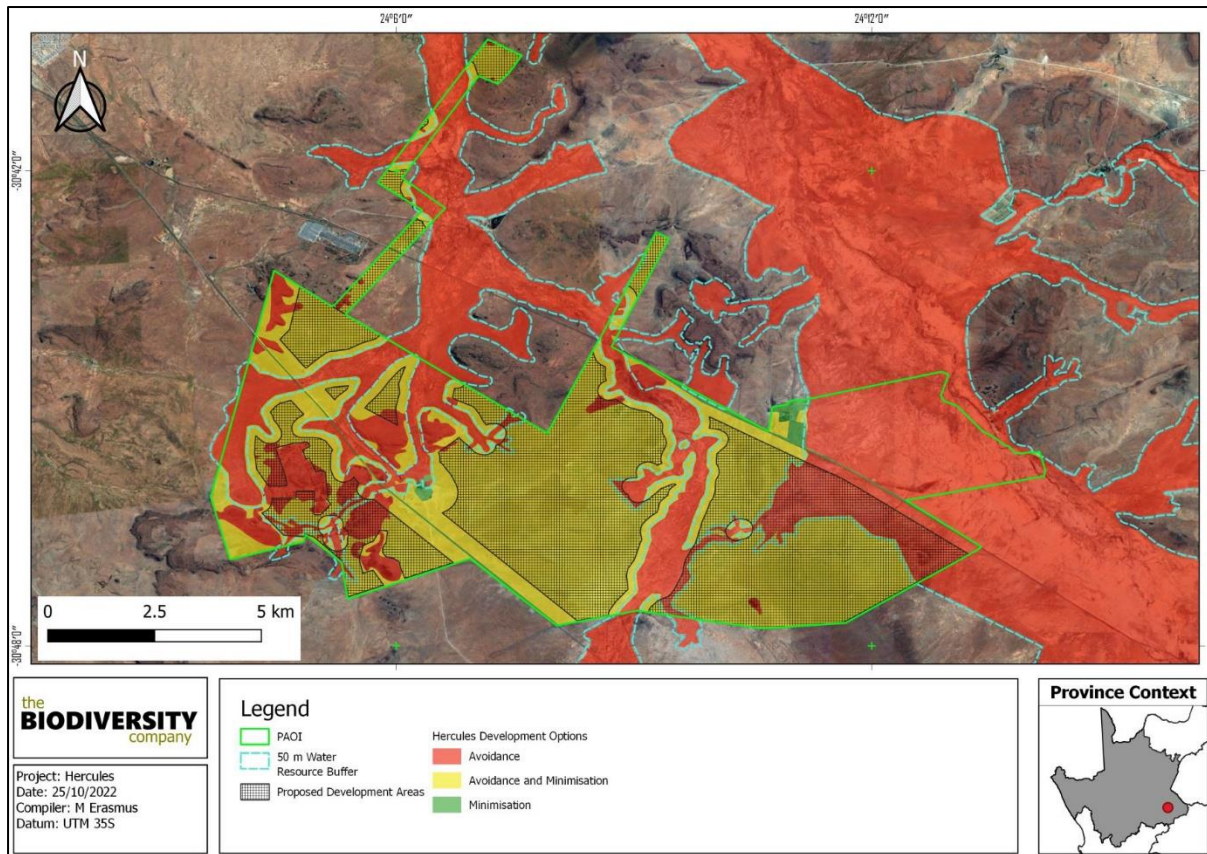


Figure 6-17: Sensitivity of the study area (Source: The Biodiversity Company, 2022)

6.5.2.2. Very Highly Sensitive Hills, Outcrops and Sills (Avoidance)

This habitat type serves numerous ecosystem services and more than 50% of the receptor contains natural habitat with potential to carry SCC. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches.

6.5.2.3. Highly Sensitive Shrubland Habitat (Avoidance and minimization)

As indicated by the specialist's memorandum (Appendix G), more than 50 % of the habitat type contains natural habitat with potential to support species of conservation concern (SCC). This habitat contains a large, intact area for any conservation status of ecosystem type. It also provides good habitat connectivity with potentially functional ecological corridors and a regularly used road network. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.

6.5.2.4. Highly Sensitive Drainage Areas and Inland Water (Avoidance)

This habitat is the surface water resource within the landscape, and serves numerous ecosystem services, with more than 50% of the receptor containing natural habitat with potential to support SCC, with a medium, semi-intact area for any conservation status. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance.

6.5.2.5. Low Sensitivity Transformed Areas (Minimisation)

These are areas that have been completely transformed by the homesteads and existing roads. These are the least sensitive and most transformed areas of the study site.

6.5.3. Conservation Status

With specific reference to the study area, the following biodiversity priority categories can be explained as identified in the Northern Cape Biodiversity Spatial Plan:

➤ Critical Biodiversity Area 1 (CBA 1)

The CBA areas located within the study area are located toward the southern and eastern boundary of the study area. The CBA 1 areas located toward the East of the study area have been identified as drainage line habitat and will be left intact as part of the proposed development. As per the bioregional plan, the CBA1 areas indicate intact natural areas. The CBA 1 area toward the south of the study area is associated with a previously identified watercourse and its buffer. As per The Biodiversity Company's delineation, the CBA1 area is partially considered Ecological Support Area and should be partially protected as a CBA1 area. The CBA1 area will however be largely excluded from the development area due to the applied buffers.

➤ Critical Biodiversity Area 2 (CBA2)

The CBA2 areas located within the study area are located toward the eastern boundary of the study area. The CBA2 areas located toward the East of the study area have been identified as the buffer areas to the water resources. As per the delineation provided by The Biodiversity Company (2022), drainage line habitat will be left intact as part of the proposed development.

➤ Ecological Support Area

The ESA represents the majority of the study area (Table 6-1). Any development in these areas will lead to the direct destruction and loss of portions of functional habitat and their respective conservation plan, Ecological Support Area (ESA) classification, and also the floral and faunal species that are expected to utilise this habitat. Guidelines for development in high sensitivity areas require avoidance mitigation as much as possible. This must include concerted efforts to avoid these sensitive areas where feasible, and disturbances must be kept to an absolute minimum.

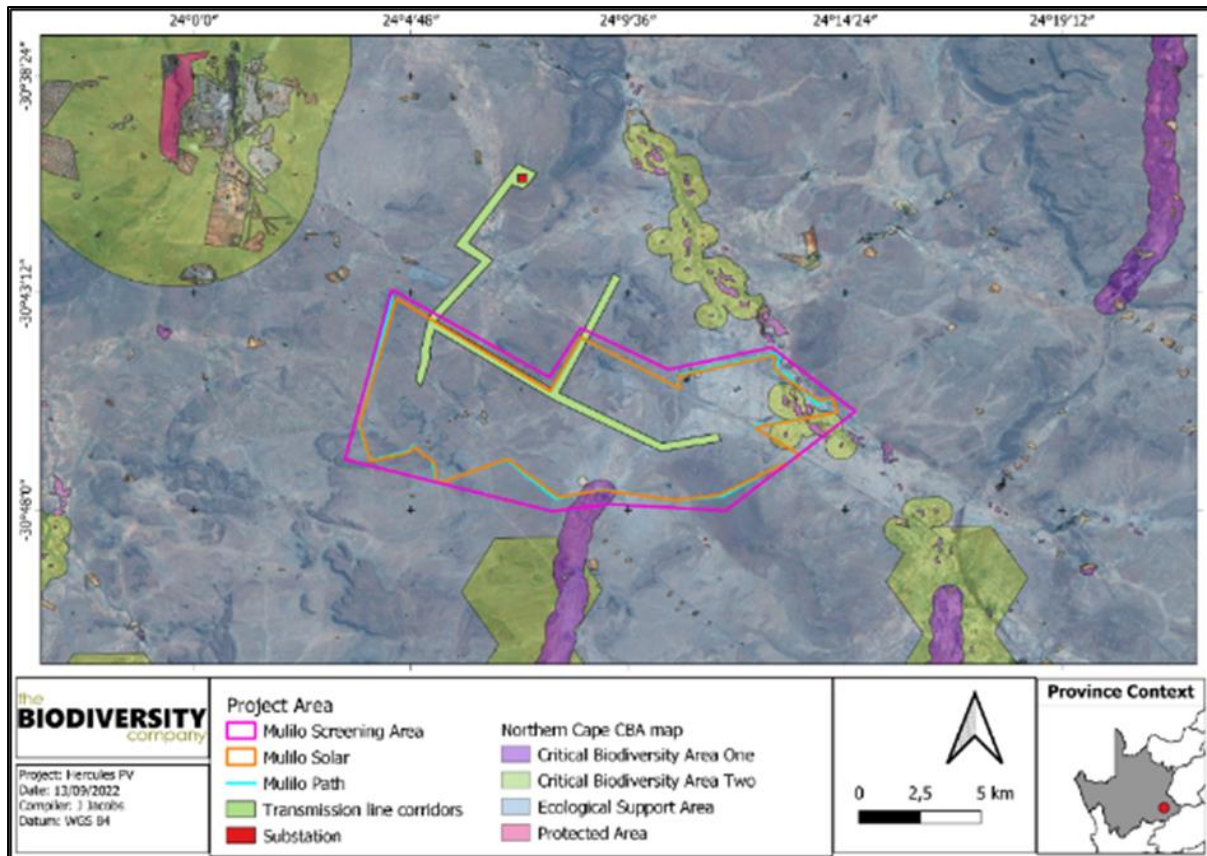


Figure 6-18: Critical Biodiversity Area Map of the study area (Source: The Biodiversity Company, 2022)

6.6. Fauna

The study area lies approximately 15 km South-East of De Aar and is surrounded by Agricultural lands, used for game farming and small-scale livestock grazing practises. The vegetation located within the study area has however seen very little transformation, except for the homesteads, existing kraals and isolated instances of overgrazing.

According to the DFFE Screening Tool Report the following sensitivity classifications were gathered:

- Avian Theme sensitivity is **Low** for the project area;
- Animal Theme sensitivity is **High** for the project area;

The expected post-mitigation risk significance for the project in isolation is expected to be **medium**, but in consideration of other projects in the area, it is considered to be high. The expectant anthropogenic activities are likely to drive habitat destruction causing displacement of fauna and flora and possibly event direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and species compositions within the area.

During the site visits conducted by The Biodiversity Company (2022), numerous animal species were identified. These mammal species included Gemsbok, Wildebeest and Springbok. A Verreaux Eagle's nest, numerous Greater Kestrel nests (one observed in a pylon) and a previously recorded Jackal Buzzard nest has been identified as avifaunal sensitive species. In addition to these species, species such as the Blue Crane were also observed. During the site

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verification survey, four (4) amphibian species of Least Concern were also observed. A full animal impact assessment (listing all observed species) will be provided as part of the EIA phase of the proposed development.

Based on the avifaunal specialist's initial site survey, the following buffers were recommended:

- 1km buffer around the Verreaux Eagle's nests.
- 750m buffer around the Kestrel Nest and Jackal Buzzard – These species were not species identified as species of Conservation Concern (SCCs). However, construction works in these areas should be avoided during the respective species' breeding seasons..

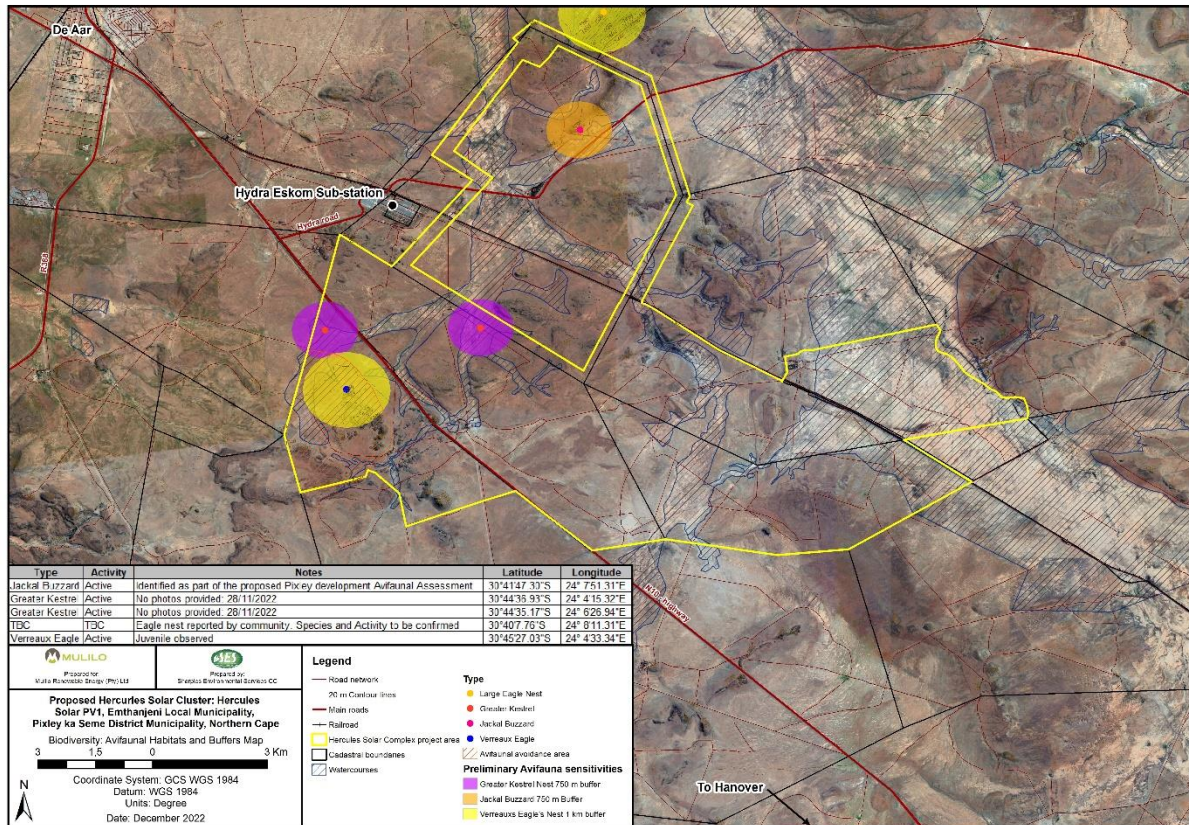


Figure 6-19: Avifaunal sensitivity buffers.

6.6.1. Mammals of Conservation Concern

Table 6-3 below, compiled by The Biodiversity Company (2022) lists the Species of Conservation Concern (SCC) vertebrate faunal species that are likely to occur on the proposed site and surrounding areas.

The species considered to have a high likelihood of occurrence had the following habitat descriptions:

- **Anonyx capensis (Cape Clawless Otter)**
 The most widely distributed otter species in Africa (IUCN, 2017). This species is predominantly aquatic, and it is seldom found far from water (IUCN, 2017). It is mostly threatened by riverine habitat destruction due to bush clearing, deforestation, overgrazing, siltation, draining of wetlands or water extraction or denudation of riparian vegetation (IUCN, 2017). This species has a high likelihood of occurrence based on the presence of rivers in the full extent of the project area (particularly the area North East

of the Railroad which was excluded from the area under consideration for the placement of the proposed Solar PV developments).

Table 6-3: Red Data listed mammals that are predicted to occur on the site (The Biodiversity Company, 2022).

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT	High
<i>Felis nigripes</i>	Black-footed Cat	VU	VU	Moderate
<i>Leptailurus serval</i>	Serval	NT	LC	Low
<i>Panthera pardus</i>	Leopard	VU	VU	Moderate
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT	Moderate
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	LC	Low

During the site survey period, seventeen (17) mammalian species were recorded to have been present on-site. This was either done so based on physical observations or through the presence of visual tracks and signs. Of these species observed on site, only the **Mountain Reedbuck** were of conservation importance. A full animal impact assessment will be provided as part of the EIA phase of the proposed development.



Figure 6-20: Photographic representation of a Mountain Reedbuck (*Redunca fulvorufula*) observed in the region (The Biodiversity Company, 2022).

6.6.2. Birds of Conservation Concern

According to the baseline assessment of the proposed development area conducted by The Biodiversity Company (2022), the SABAP2 Data lists 176 avifauna species that could be expected to occur within the area. Fourteen (14) of these expected species are regarded as threatened (Table 6-4). Three of these (3) SCCs species have a low likelihood of occurrence due to a lack of suitable habitat and food sources in the project area.

The species considered to have a high likelihood of occurrence had the following habitat descriptions:

- **Anthus crenatus (African Rock Pipit)**
Is endemic to southern Africa, occurring in South Africa, Lesotho and possibly eSwatini (IUCN, 2017). The African Rock Pipit is mostly found near steep rocky habitats with scattered shrubs and grassy areas, and in Lesotho it prefers foothills (IUCN, 2017). Possible threats include afforestation and climate change (IUCN, 2017). The presence of suitable habitat (mountainous areas) near the project area has contributed to a high likelihood of occurrence for this species.
- **Aquila rapax (Tawny Eagle)**
Has a widespread distribution in sub-Saharan Africa, with additional scattered populations occurring in North Africa, the Middle East and South Asia (IUCN, 2017). It lives in dry open habitats, woodlands and savannas (IUCN, 2017). Population declines in southern Africa occur on farmlands, most likely due to the consumption of poisonous carcasses and accidental drowning in water reservoirs (IUCN, 2017). Tawny Eagles are also killed by accidental poisoning and collisions with powerlines (IUCN, 2017). The presence of suitably dry open habitat in the project area contributed to a high likelihood of occurrence for this species.
- **Eupodotis caerulescens (Blue Korhaan)**
Near-endemic to South Africa, with its distribution extending only marginally into western Lesotho (IUCN, 2017). It prefers to live in open, fairly short grassland and a mixture of grassland and karoo dwarf-shrubland within 1 km of water, with termite mounds and few to no trees (IUCN, 2017). It forages in agricultural areas such as old and fallow cropland, pastures and winter cultivation (IUCN, 2017). The main threat to Blue Korhaans is habitat loss, mainly driven by agricultural development (IUCN, 2017). The presence of suitable and preferred living habitat in the project area contributed to a high likelihood of occurrence for this species. However, no agricultural areas suitable for foraging are located within proximity to the study area. The presence of this species on site will be confirmed during the Environmental Impact Assessment Reporting phase of this process.
- **Heterotetrax vigorsii (Karoo Korhaan)**
Classified as NT on a regional level and is endemic to southern Africa, occurring in South Africa, Namibia and Lesotho (IUCN, 2017). It mainly occurs in shrubland, but is also found in some modified habitats (IUCN, 2017). Possible threats to this species are climate change and severe weather (IUCN, 2017). The presence of shrubland habitat in the project area contributed to a high likelihood of occurrence for this species.
- **Neotis ludwigii (Ludwig's Bustard)**
Occurs in the Karoo and Nama-Karoo biomes of southern Africa, occurring in the south-west of Angola, western Namibia and in large parts of South Africa (IUCN, 2017). It lives in open lowland and upland plains with grass and light thornbush, sandy open shrub veld and semi-desert in the arid and semi-arid Nama-Karoo and Karoo biomes (IUCN, 2017). The main threat of Ludwig's Bustard is collision with overhead powerlines, and other threats include deliberate hunting, accidental capture in snares set for mammals, poisoning and human disturbance (IUCN, 2017). The presence of suitable Nama-Karoo habitat in the project area contributed to a high likelihood of occurrence for this species.
- **Polemaetus bellicosus (Martial Eagle)**
Listed as EN on a regional scale and on a global scale (IUCN, 2017). This species has an extensive range across much of sub-Saharan Africa, but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (IUCN, 2017). It inhabits open woodland,

wooded savanna, bushy grassland, thorn-bush and, in southern Africa, more open country and even sub-desert (IUCN, 2017). The presence of suitable habitat in the project area contributed to a high likelihood of occurrence for this species.

- ***Sagittarius serpentarius* (Secretarybird)**

Occurs in sub-Saharan Africa and inhabits grasslands, open plains, and lightly wooded savanna (IUCN, 2017). It is also found in agricultural areas and sub-desert (IUCN, 2017). It mainly eats insects (86% of diet) but will also prey on rodents and other mammals, lizards, snakes, eggs, young birds and amphibians (IUCN, 2017). This species has a high likelihood of occurrence in within the study area.

Table 6-4: Endemic and near endemic bird species which are predicted to occur in the area (The biodiversity Company, 2022)

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Anthus crenatus</i>	African Rock Pipit	NT	NT	High
<i>Aquila rapax</i>	Tawny Eagle	VU	LC	High
<i>Aquila verreauxii</i>	Verreaux's Eagle	VU	LC	Moderate
<i>Calidris ferruginea</i>	Curlew Sandpiper	LC	NT	Moderate
<i>Ciconia nigra</i>	Black Stork	VU	LC	Moderate
<i>Eupodotis caerulescens</i>	Blue Korhaan	LC	NT	High
<i>Falco biarmicus</i>	Lanner Falcon	VU	LC	High
<i>Grus paradisea</i>	Blue Crane	NT	VU	Low
<i>Gyps coprotheres</i>	Cape Vulture	EN	EN	Low
<i>Heterotetrax vigorsii</i>	Karoo Korhaan	NT	LC	High
<i>Neotis ludwigii</i>	Ludwig's Bustard	EN	EN	High
<i>Phoenicopterus roseus</i>	Greater Flamingo	NT	LC	Low
<i>Polemaetus bellicosus</i>	Martial Eagle	EN	EN	High
<i>Sagittarius serpentarius</i>	Secretarybird	VU	EN	High

6.6.3. Reptiles of Conservation Concern

According to the baseline assessment of the proposed development area conducted by The Biodiversity Company (2022), based on the IUCN Red List Spatial Data and the ReptileMAP database, 32 reptile species are expected to occur within the area (The full list will be provided in the final assessment). One species is regarded as threatened (Table 4 6).

Table 6-5: Threatened reptile species that are predicted to occur in the area (The biodiversity Company, 2022).

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
<i>Psammobates tentorius</i>	Tent Tortoise	NT	LC	High

Psammobates tentorius (Tent Tortoise) is listed as NT on a regional and global basis. It occurs in the arid regions of South Africa and Namibia (IUCN, 2017). Known threats include road mortality, veld fires, electrocution by livestock/game fences, and overgrazing from domestic

livestock (IUCN, 2017). The presence of arid habitat within the project area contributes to a high likelihood of occurrence for this species.

During the site verification survey done by The Biodiversity Company (2022), ten (10) reptile species were identified within the survey period. No species of conservation importance were observed on-site during this time-period. A full animal impact assessment will be provided as part of the EIA phase of the proposed development.

6.7. Archaeology, Heritage & Palaeontology

6.7.1. Archaeology and Cultural Heritage

The findings of the DFFE screening tool indicated that the Archaeological and Cultural Heritage significance is of Low Sensitivity.

An initial archaeological and heritage survey of the farm portions that make up the proposed development site was undertaken by ACO Associates cc between 21-24 September 2022, the results of the which tally with much of what is known about archaeological and heritage potential of the De Aar area.

According to the initial survey of the development site, it was concluded that the low archaeological and cultural heritage sensitivity rating in the Screening Tool report is not an accurate reflection of the sensitivity of the development site, and that the sensitivity rating would be more appropriately pegged at **moderate**, with some areas (the rock engraving sites) of very high sensitivity. As is often the case with the Screening Tool, the results it provides reflect the fact that relatively small areas of South Africa have been subject to comprehensive archaeological surveys, and that primary site data to populate the Screening Tool is generally very limited. In other words, areas are indicated to be of low sensitivity, not because there is no archaeology there, but because they have not been surveyed and there is thus no data available about their archaeological potential.

6.7.2. Palaeontology

The findings of the DFFE screening tool indicated that the Palaeontological Sensitivity of the proposed development area is of varying sensitivities (ranging between Very High and Medium to none (Figure 6-21).

Dr Gideon Groenewald was commissioned by ACO Associates to produce an initial, desk-based palaeontological assessment of the development site.

Based on the Palaeontological desktop assessment undertaken by Dr Gideon Groenewald for the proposed development the following was concluded:

- The dolerite on the site contains no fossils because they do not occur in intrusive, volcanic rock. Furthermore, when igneous dykes intrude through the overlying sediment they tend to physically destroy any fossils in their paths and the heat they generate can destroy or alter fossils in the vicinity.
- Elsewhere, however, portions of the proposed development are underlain by very highly sensitive geological formations (Figure 6-11).
- The Quaternary sands that cover much of the development site are young enough to preserve fossils but having been washed down slopes and streams into rivers, any fossils would have been transported from their sites of origin and their context and

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associations with other fossil material in the assemblage will have been lost. These sediments are moderately sensitive.

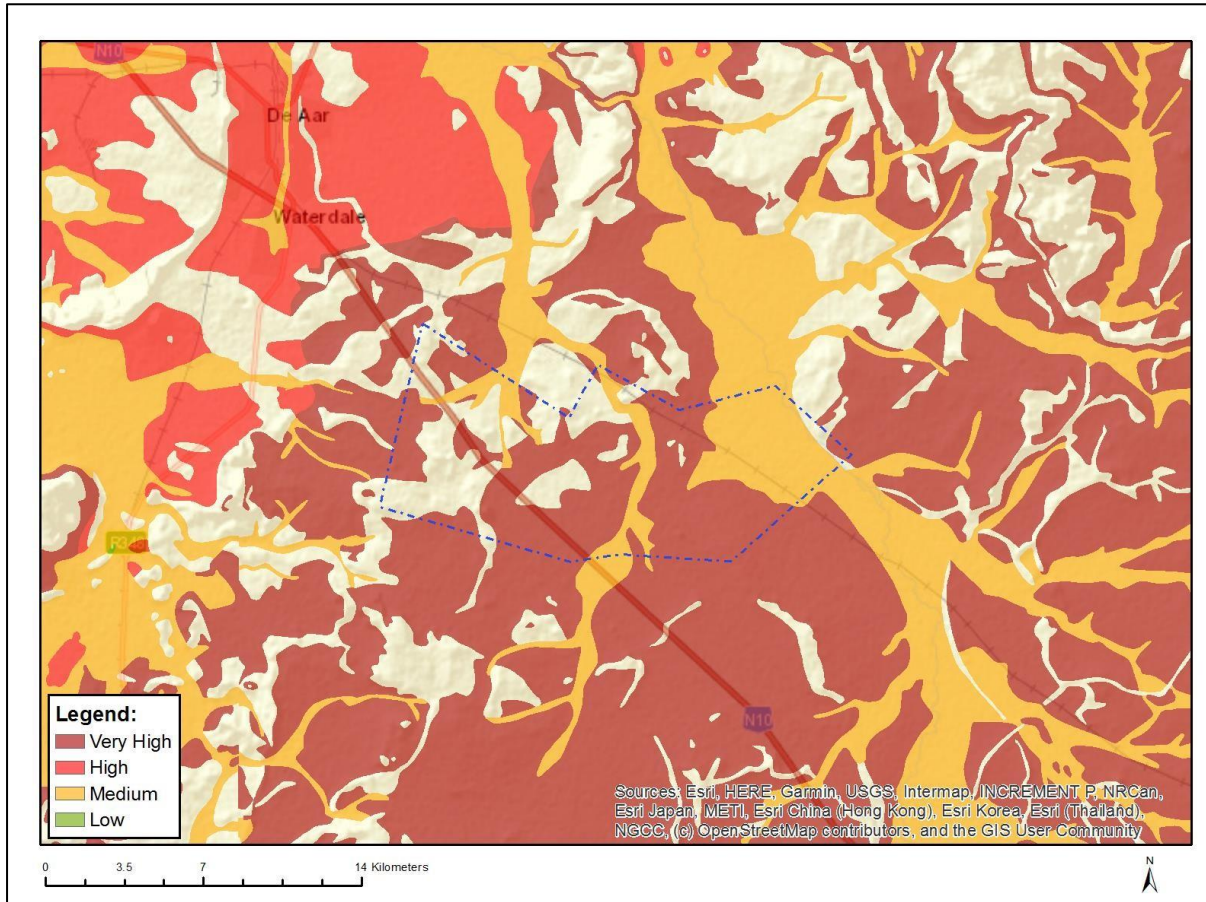


Figure 6-21: Paleontological Sensitivity of the proposed development area (Source: SAHRIS PaleoSensitivity Mapping Tool)

The palaeontological sensitivities have been indicated as follows:

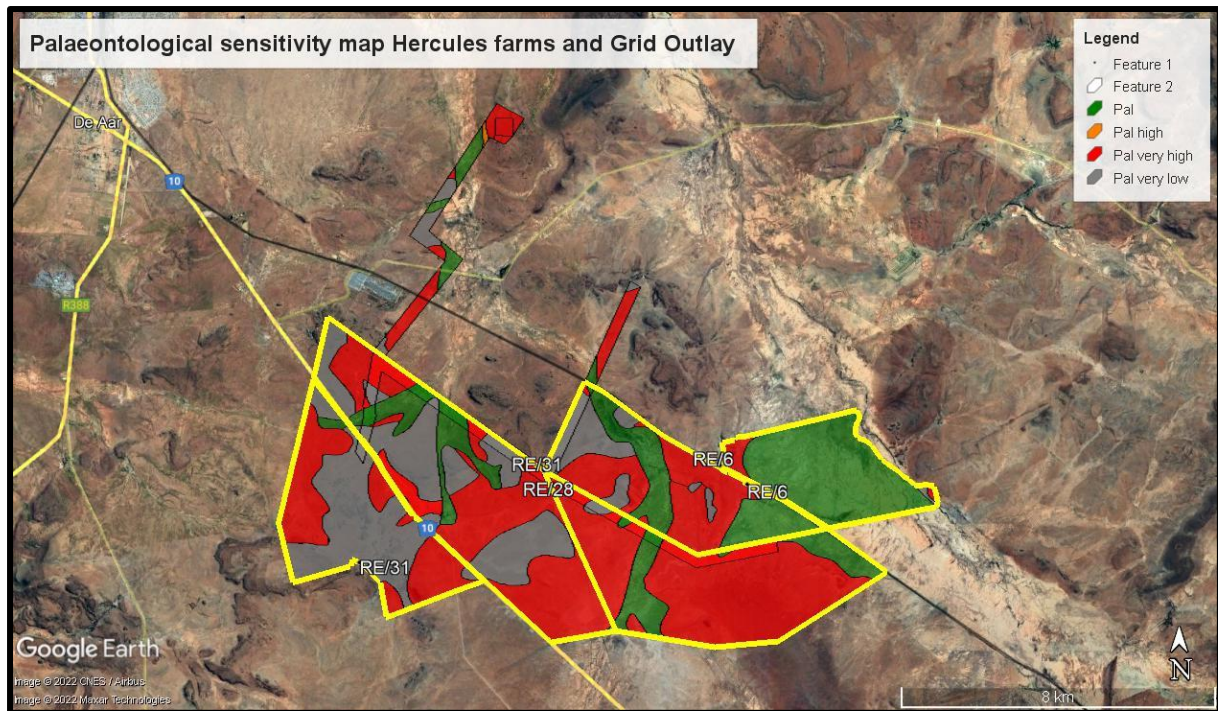


Figure 6-22: Palaeontological sensitivity of formations underlying the Hercules project area and routes of the distribution lines. Palaeontological sensitivity of the study area (red and grey very low) with large areas of very high significance covered in in colluvium. Excavations of more than 1,5m in all the red areas will most probably expose significant fossils.

In the light of the large areas underlain by rocks with a very high sensitivity for palaeontological heritage, it has been recommended that a Phase 1 Palaeontological Field Assessment to inform the Heritage Impact Assessment should be undertaken.

A detailed impact Assessment will be provided as part of the EIA phase of the process and an application will be launched with the South African Heritage Resources Agency (SAHRA), through the South African Heritage Resources Information System (SAHRIS) website.

6.8. Socio Economic Environment of De Aar

6.8.1. Administrative Context

The study area is located in the Emthanjeni Local Municipality (ELM) in the Pixley Ka Seme District Municipality (PKSDM). The ELM (NC073) is a category B-Municipality and is one of eight local municipalities that make up the PKSDM (DC7), which is a category C-Municipality. The ELM is bordered by all its sister municipalities, with the exception of the Siyancuma LM located toward the far North of the PKSDM (Figure 6-23).

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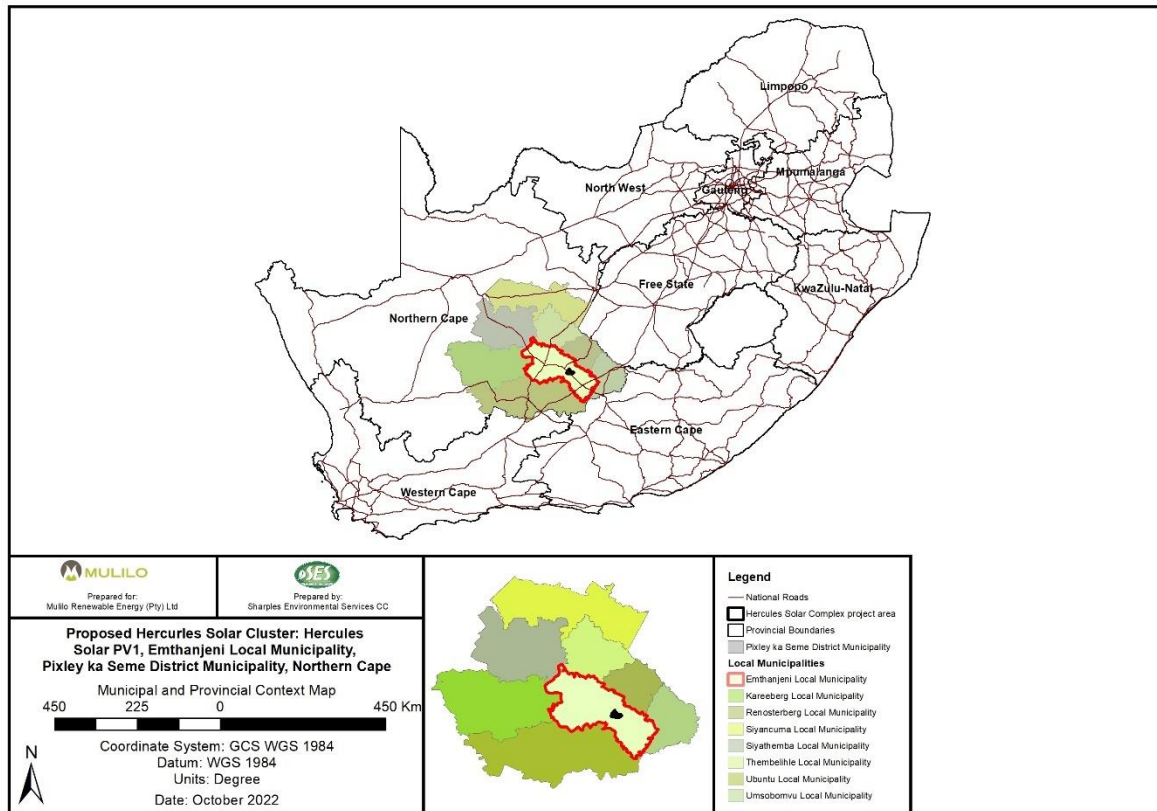


Figure 6-23: Location of PKSDM and ELM within the Northern Cape Province (Data Source: Demarcation, 2022).

In terms of geographic size and gross domestic product (GDP), the PKSDM is the second largest district in the Northern Cape. De Aar is the administrative seat of both the ELM and the PKSDM. The PKSDM is bordered by the Free State Province toward the East, the Eastern-Cape towards the South-East and the Western Cape towards the South-West. De Aar is located along the N10 leading from Britstown to Hanover.

Tony Barbour has been appointed to conduct the Socio-Economic assessment for the proposed development. Appendix G contains the baseline specialist input provided as part of the Scoping phase of the proposed development. The specialist has based his preliminary finding on the information contained in Integrated Development Plans, Environmental Management Frameworks and Spatial Development Plans available for the Local and District Municipality, respectively (Barbour, 2022).

6.8.2. Demographic Profile

The proposed site located in the Northern Cape Province, which is the largest province in South Africa and covers an area of 361 830 km² and, equates to approximately 30% of South Africa. The province is divided into five district municipalities (DM), namely, Frances Baard, Karoo, Namakwa, Pixley Ka Seme and ZF Mgcawu District Municipality (known before 1 July 2013 as Siyanda DM). The site itself is in the Pixley Ka Seme DM.

6.8.2.1. Population

Provincial Context

Barbour (2022) explains that, despite having the largest surface area, the Northern Cape has the smallest population with 1 193 780 (Community Household Survey, 2016) individuals or 2.2%

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of the population of South Africa. Of the five districts, Frances Baard has the largest population (32.5%), followed by ZF Mgcawu District Municipality (21.2%), John Taola Gaetsewe (20.3%), Pixley ka Seme (16.4%) and Namakwa (9.7%). Majority of the population in the Northern Cape Province are Black African (48.1%), followed by Coloureds (43.7%) and Whites (7.7%).

In terms of age, 36.5% of the Northern Cape population is between 15 and 34 years old, which is the highest age distribution, followed by 29.2% of those aged 35–64 years, while only 6.6% comprised those aged 65 years and older. Similarly, this pattern is also seen across all districts in the province. The district profile shows that the highest proportions of persons aged 15–34 years were recorded in Pixley Ka Seme, ZF Mgcawu and John Taolo Gaetsewe districts. The figures for these three districts were also above the provincial average of 36.5%. The proportion of persons aged 65 years and older was higher in Namakwa (9.5%) and Frances Baard (8.2%). In terms of age structure, 33.1% of the population were younger than 18, while 60.6% were between the age of 18 and 64, which typically falls within the economically active age group. The remaining 6.3% were in the 65 and older age group (Census 2016). The figures for 2019 are estimated to be 25% (0-14), 65 % (15-64) and 10% (over 65). The increase in the number of people in the over 65 age group highlights the growing attraction of the area as a retirement destination.

6.8.2.2. Economic Development

Provincial Context

According to Barbour (2022), over the last 8 years there has been little to no variance in the Human Development Index (HDI) figures for the Northern Cape, indicating no increase or decrease in the overall standard of living. This trend is unlikely to change in the foreseeable future, mainly due to the marginal economic base of the poorer areas, and the consolidation of the economic base in the relatively better-off areas. It is important to note that the HDI for the Northern Cape (0.55) is substantially below the South African figure of 0.72. The HDI of 0.55 displays a pattern of semi-development, and there is a definite inequality between the different population groups, with the Whites having a higher development lifestyle than the African or Coloured groups.

The percentage of Northern Cape people living below the poverty line has decreased from 40% in 1995 to 27% in 2011, while the poverty gap has decreased from 11% in 1995 to 8% in 2011 (Figure 3.3). The goal set by the province is to decrease the percentage of people living below the poverty line to 20% by 2015 (NCPSDF, 2012).

The alleviation of poverty is one of the key challenges for economic development. Higher levels of economic growth are a key challenge for poverty eradication. Investment in people is pivotal to the eradication of poverty and inequality. Investment in people is also, to a large

extent, about delivering social and economic infrastructure for education, welfare, health, housing, as well as transport and bulk infrastructure.

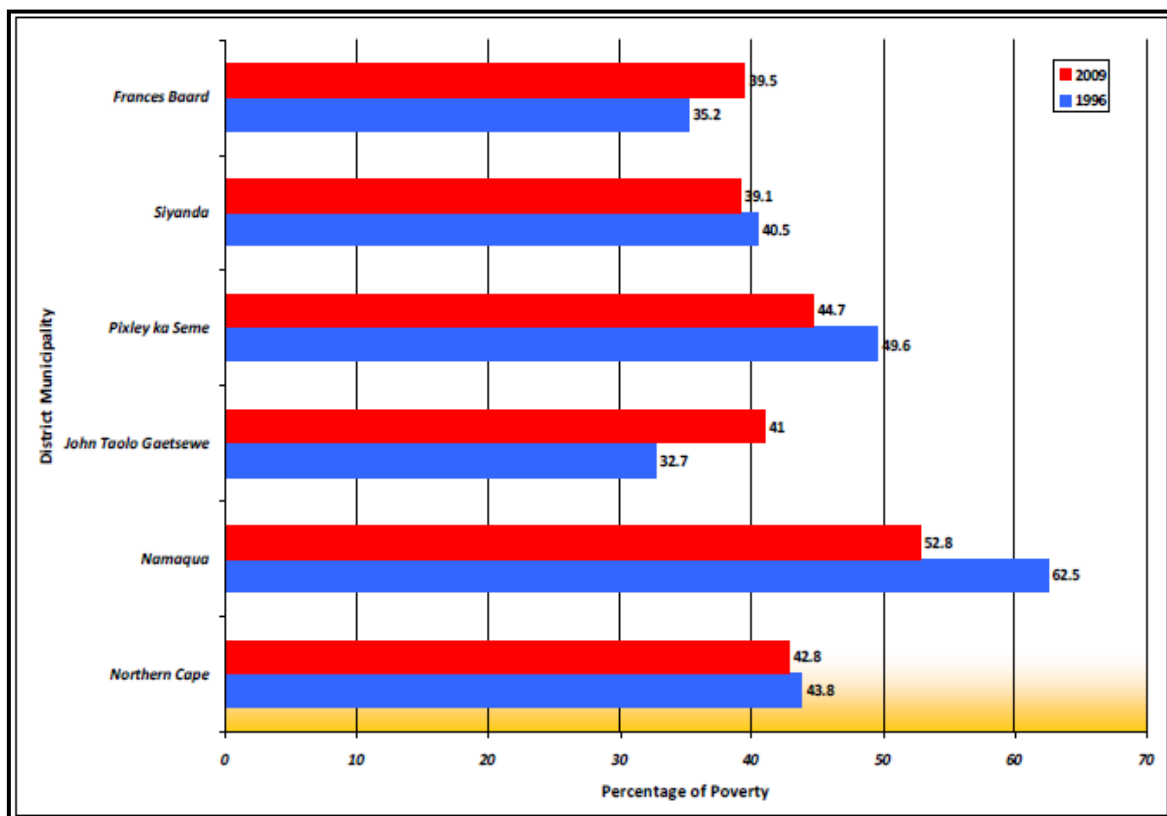


Figure 6-24: Percentage of people living in poverty in the Northern Cape

Source: Global Insight, 2009, as cited in the PGDS, July 2011)

In terms of per capita income, the Northern Cape Province has the third highest per capita income of all nine provinces, however, income distribution is extremely skewed, with a high percentage of the population living in extreme poverty. The measure used in the PGDS document to measure poverty is the percentage of people living below the poverty line or breadline is used.

Municipal Overview

The population of the ELM in 2016 was 45 404. Of this total, 36.4% were under the age of 18, 57.9% were between 18 and 64, and the remaining 5.8% were 65 and older. The ELM therefore has a relatively large young population. This creates challenges in terms of creating employment opportunities. In terms of race groups, Coloureds made up 60.9% of the population, followed by Black Africans (32%) and Whites (6.9%). The main first language spoken in the ELM was Afrikaans (69.6%), followed by IsiXhosa (26.5%) and English (0.9%).

The population of Ward 6 in 2011 was 5 784. Of this total, 36.3% were under the age of 18, 58% were between 18 and 64, and the remaining 5.7% were 65 and older. Like the ELM, Ward 6 also had a relatively large young population. In terms of race groups, Coloureds made up 46.4% of the population, followed by Black Africans (45.2%) and Whites (7.3%). The main first language spoken in the Ward 6 was Afrikaans (56.2%), followed by IsiXhosa (32.3%) and English (2.1%).

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The high percentage of young people in both the ELM and Ward 6 means that a large percentage of the population is dependent on a smaller productive sector. The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15-64). The higher the dependency ratio the larger the percentage of the population dependent on the economically active age group. This in turn translates reduced revenue for local authorities to meet the growing demand for services. The national dependency ratio in 2011 was 52.7%, similar to that of the Northern Cape Province (55.7%). The dependency ratio for the ELM (2011) was 60.4%. The traditional approach is based people younger than 15 or older than 64. The 2016 information provides information for the age group under 18. The total number of people falling within this age group will therefore be higher than the 0-15 age group. However, most people between the age of 15 and 17 are not economically active (i.e., they are likely to be at school).

Using information on people under the age of 18 is therefore likely to represent a more accurate reflection of the dependency ratio. Based on these figures, the dependency ratio for the ELM in 2016 and Ward 6 (2011) was 72.8% and 72.4% respectively. This figure is significantly higher than the national and provincial levels in 2011 (52.7% and 55.7% respectively). The higher dependency ratio reflects the limited employment opportunities in the area and represent a significant risk to the district and local municipality. The high dependency ratio also highlights the importance to maximising local employment opportunities and the key role played by training and skills development programmes.

6.8.2.3. Households and house types

Based on the information from the 2016 Community Survey there were a total of 11 992 households in the ELM and 1 687 in Ward 6. Most of the households reside in formal houses (74.2% ELM and 88.1% Ward 6). The figure for the ELM is similar to the District (78.1%) and Provincial (74.4%) figures. Approximately 17% of the households in the ELM reside in backyard flats and a further 4.2% in informal shacks. For Ward 6 only 1.2% lived in shacks.

Based on the information from the 2016 Community Household Survey 39.8% of the households in the ELM are headed by females compared to 31.1% for Ward 6 (2011). The figure for ELM was similar to the District and Provincial figures of 37% and 39% respectively. The high number of female-headed households at the local municipal and ward level reflects the lack on formal employment and economic opportunities in the ELM. As a result, job seekers from the ELM need to leave the areas to seek work in the larger centres. As indicated above, this highlights the importance to maximising local employment opportunities and the key role played by training and skills development programmes.

The majority of the job seekers are likely to be males. This is due to traditional rural patriarchal societies where the role of the women is usually linked to maintaining the house and raising the children, while the men tend to be the ones that migrate to other areas in search of employment.

6.8.2.4. Household income

Based on the data from the 2011 Census, 9.1% of the population of the ELM had no formal income, 3.3% earned less than R 4 800, 4.9% earned between R 5 000 and R 10 000 per annum, 18.2% between R 10 000 and R 20 000 per annum and 22.4% between R 20 000 and 40 000 per annum (2011). The figures for Ward 6 were 7.7%, 3.3%, 5.2%, 21% and 22.6%. The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the

average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ 40 000 per annum). Based on this measure, in the region of 57.9% of the households in the ELM and 59.8% in Ward 6 live close to or below the poverty line. While this figure is lower than the provincial level of 62.9%, the low-income levels reflect the limited employment opportunities in the area and dependence on the agricultural sector. This is also reflected in the high unemployment rates. As indicated above, this highlights the importance of maximising local employment opportunities and the key role played by training and skills development programmes.

The low-income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the ELM. This in turn impacts on the ability of the ELM to maintain and provide services.

The Integrated Development Plan (ELM, 2021) for the ELM indicates that the total number of indigent households within the municipal area increased from 2 726 households as of 30 June 2014 to 2 874 as at April 2017 and about 3 594 households during January 2016/17. The COVID-19 pandemic is likely to have resulted in an increase in the number of indigent households in 2020 and 2021.

6.8.2.5. Education and educational facilities

Provincial Context

Based on the information contained in the NCPSTDF the average adult education attainment levels in the Northern Cape are lower than the adult education attainment levels of South Africa as a whole. Approximately 19.7% of the Northern Cape adults have no schooling in comparison to South Africa's 18.1%. The Northern Cape has the second lowest percentage of adult individuals (5.5%) that obtained a tertiary education in South Africa. The LED Strategy for the Northern Cape indicates that Pixley ka Seme has the lowest adult education attainment levels in the Northern Cape with 27.3% of the adult population having no form of schooling, whilst John Taolo Gaetsewe is second with 25.4% having no schooling. The highest number of the adult population with tertiary education (6.4%) is located in Frances Baard.

The Northern Cape also has the smallest portion (11.1%) of highly skilled formal employees in South Africa, while Gauteng has the highest (14.3%). Linked to this the Northern Cape has the second largest portion of semi and unskilled formal employees in the country. A lack of skilled people often results in both the public and the private sector being unable to implement planned growth strategies and achieve the desired productivity, service delivery and service quality (NCSTDF, 2012).

Municipal Context

In terms of education levels, the percentage of the population over 20 years of age in the ELM with no schooling was 17.4% in 2011, compared to 7.9% for the Northern Cape Province and 11.9% for the District. The percentage of the population over the age of 20 with matric was 28.3%, compared to 29.1% for the Province and 25.3% for the District. Only 1.5% and 1.4% of the population over the age of 20 years in the ELM had an undergraduate and postgraduate qualification, respectively. The relatively poor education levels in the ELM pose a potential challenge to the implementation of an effective training and skills development programme for local community members. The figures for Ward 6 (2011) were 16.4% with no schooling,

18.6% with matric and 1.9% and 1.3% with an undergraduate and postgraduate degree respectively.

6.8.2.6. Economic Activity

Provincial Context

The mining sector is the largest contributor to the provincial GDP, contributing 28.9% to the GDP in 2002 and 27.6% in 2008. The mining sector is also important at a national level. In this regard, the Northern Cape produces approximately 37% of South Africa's diamond output, 44% of its zinc, 70% of its silver, 84% of its iron-ore, 93% of its lead and 99% if its manganese.

Agriculture and agri-processing sector are also key economic sectors. Approximately 2% of the province is used for crop farming, mainly under irrigation in the Orange River Valley and Vaalharts Irrigation Scheme. Approximately 96% of the land is used for stock farming, including beef cattle and sheep or goats, as well as game farming. The agricultural sector contributed 5.8% to the Northern Cape GDP per region in 2007 which was approximately R1.3 billion, and it employs approximately 19.5% of the total formally employed individuals (NCPSDF, 2012). The sector is experiencing significant growth in value-added activities, including game-farming. Food production and processing for the local and export market is also growing significantly.

The main agricultural produce of the Northern Cape include:

- High-value horticultural products such as table grapes, sultanas and wine grapes, dates, nuts, cotton, fodder, and cereal crops are grown along the Orange River.
- Wheat, fruit, groundnuts, maize and cotton in the Vaalharts irrigation scheme in the vicinity of Hartswater and Jan Kempdorp.
- Vegetables and cereal crops at the confluence of the Vaal River and the Orange Rivers in the vicinity of Douglas.
- Wool, mohair, karakul, Karoo lamb, ostrich meat and leather, and venison throughout most of the province.

Economic development in the Northern Cape is hampered by the vastness of the area and the remoteness of its communities in rural areas. Development is also hampered by the low education and skills levels in the province. As a result, unemployment in the Northern Cape presents a major challenge.

According to Statistics South Africa Labour (2012) the community and social services sector is the largest employer in the province at 29%, followed by the agricultural sector (16%), wholesale and retail trade (14%), finance (8%) manufacturing (6%) and mining (6%), etc.

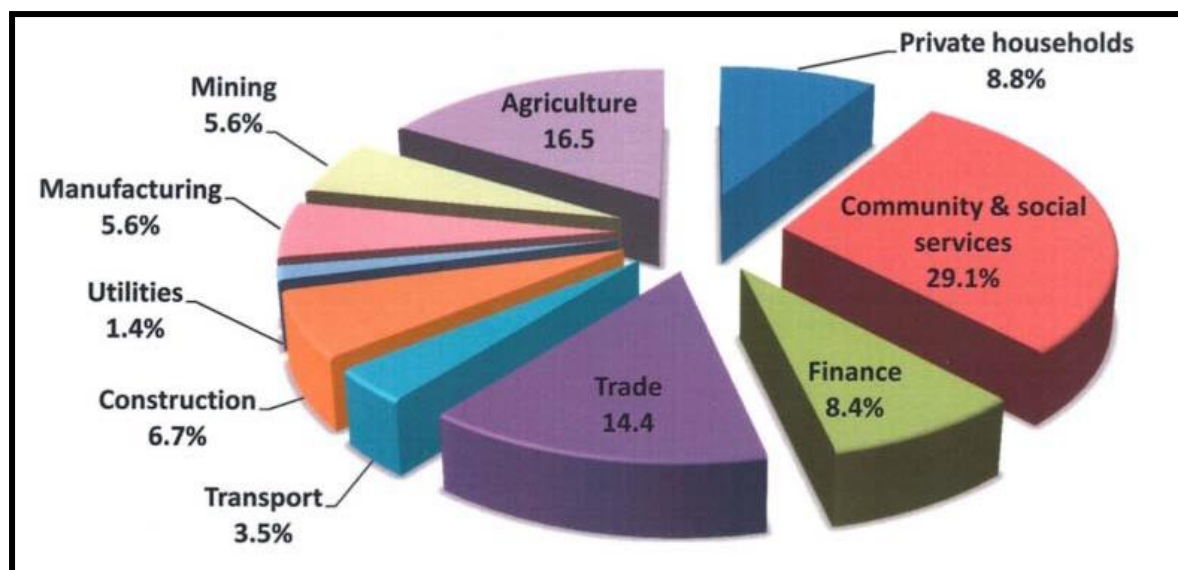


Figure 6-25: Employment by the Economic Sector and Industry.

Source: Statistics South Africa, 2012

Municipal Context

The official unemployment figure in 2011 for the ELM was 14.5%. The figures also indicate that the majority of the population are not economically active, namely 43.7%. These figures are similar to the official unemployment rate for the Northern Cape Province (14.5%) and Pixley ka Seme District (14.8%). This reflects the limited employment opportunities in the area, which in turn are reflected in the low income and high poverty levels. Given the impact of COVID-19 pandemic, the unemployment levels are likely to be higher in 2021. The figures for Ward 6 were 11.7% (unemployed) and 44% of the economically active population being employed.

7. PROJECT NEED AND DESIRABILITY

The following section deals with the need and desirability of the proposed development as required in terms of Appendix 2 of the Environmental Impact Assessment Regulations of 2014, as amended (GNR 326 of 2017). In 2017, the Guideline on the assessment of Need and Desirability (DEA, 2017) was published. This Guideline document aims to align the EIA Regulations (and its requirement for the assessment of the need and desirability of a proposed activity and location of an activity), the Constitution of South Africa (Act No. 108 of 1996), the National Environmental Management Act, 1998 (Act No 107 of 1998) and any derivative plans, including the National Development Plan 2030 (NPC, 2013). This is done in such a way to evaluate the sustainability of a proposed development.

According to an Infographic compiled by CSIR (CSIR, 2021) pertaining to the National load-shedding statistics, there was a 37% increase in energy shed between the 2020 and 2021. In 2022 the country experienced 3776 hours of load-shedding in 2022 (recorded by the EskomSePush mobile application, based on data accumulated from *poweralert.co.za*, as accessed in February 2023), in comparison to the 1 136 hours recorded in 2021 (January – November time period) (CSIR, 2021). At the time of compiling this report, the national loadshedding statistics indicated that the country saw 1 106 hours of loadshedding by 16 February 2023.

As indicated by Energyst.com (accessed in November 2022), the immediate causes of loadshedding could be attributed to a number of factors, including but not limited to,

stagnated supplies of energy, peak in demand during extreme weather conditions, structurally insufficient production of electricity, and sudden power failures. Additional to the insufficient supply of electricity, a net loss of the generated electricity is also experienced during distribution of the electricity. This also contributes to the lack of sufficient electricity supply. The loss of generated electricity during distribution varies between 4 and 13% of the total electricity generated (Diaz, et al., 2021). This is determined by several contributing factors including theft by sector, fraud by sector, type of network, network conditions, damaged meters, the number of homes with access to the network, the type of population and the socio-economic level of the areas.

South Africa's energy sector is highly reliant on charcoal as the primary energy resource, where the combustion thereof leads to the emission of CO₂, N₂O, and CH₄ GHG (DEA, 2022). CO₂ is universally considered the most significant GHG emitted. As a result of the reliance on charcoal for electricity generation, South Africa has become the 13th biggest contributor to Greenhouse Gases (GHG) in the world (UNEP, 2022). According to the draft GHG National Inventory Report (DFFE, 2022), the electricity and heat production sector is South Africa's largest contributor of GHG by 41.47 %, whereas other emissions from Energy Production is the sixth largest contribution to the GHG (4.56 %). According to the Low Emissions Development Strategy 2050 (UNFCCC, 2020), the total emission contributions of the energy industries sector equate to 48 % of South Africa's GHG emissions (Figure 7-1).

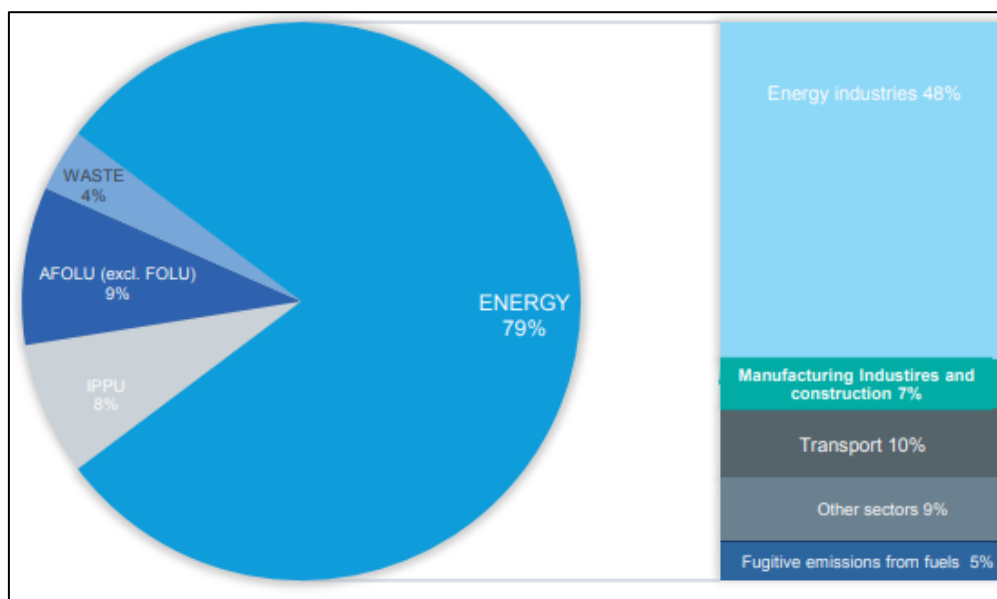


Figure 7-1. Extracted figure indicating the main contributing sectors (UNFCCC, 2020).

In 2012, The US National Renewable Energy Laboratory (NREL, 2012) conducted a study evaluating the total GHG Emissions released due the manufacturing, installation and operational phases of PV farms. The findings of the study aimed to inform the GHG Emissions for Solar PV projects in comparison to Coal-fired facilities. As indicated in Figure 7-2 below, the CO₂ emission intensity (g CO₂eq/kWh) as a result of the use of coal during its lifetime, is significantly higher (1 000 g CO₂eq/kWh) than that emitted during the lifetime of PV panels (40 g CO₂eq/kWh).

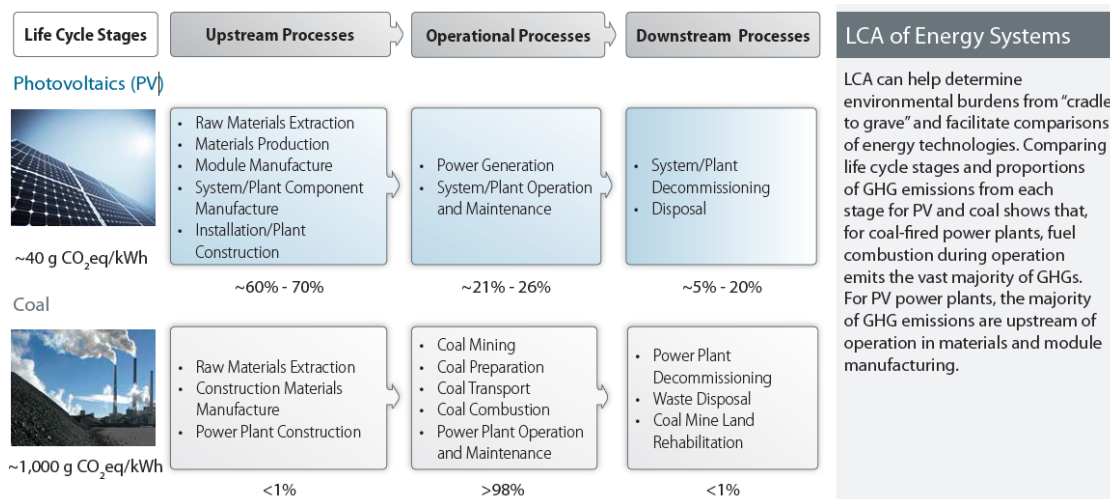


Figure 7-2. Extracted Life-Cycle Analysis of Energy Systems (NREL, 2012)

7.1. Regional Need & Desirability

The proposed development is in line with the national IRP 2010-2030 (DMRE, 2019) which was instated with the aim of providing a long-term, cost-effective strategy to meet the electricity demand in South Africa. The IRP 2010-2030 (DMRE, 2019) objectives align with that of the Government in terms of increased electricity supply sourced from renewable sources, as well as broader environmental and social responsibilities. Furthermore, the proposed renewable energy development is in line with the national REIPPPP strategy which was instated in 2019.

At a regional scale, the Northern Cape Provincial Spatial Development Framework (NCPSDF) (NCPSDF, 2012) lists a number of sectoral strategies and plans that are to be read and treated as key components of the PSDF. Of these there are a number that are relevant to the proposed STPs. These include:

- Sectoral Strategy 1: Provincial Growth and Development Strategy of the Provincial Government.
- Sectoral Strategy 2: Comprehensive Growth and Development Programme of the Department of Agriculture, Land Reform and Rural Development.
- Sectoral Strategy 5: Local Economic Development (LED) Strategy of the Department of Economic Development and Tourism.
- Sectoral Strategy 11: Small Micro Medium Enterprises (SMME) Development Strategy of the Department of Economic Development and Tourism.
- Sectoral Strategy 12: Tourism Strategy of the Department of Economic Development and Tourism.
- Sectoral Strategy 19: Provincial renewable energy strategy (to be facilitated by the Department of Economic Development and Tourism).

Section C8.2.3 of the PSDF, Energy Objectives, sets out the energy objectives for the Northern Cape Province.

The section makes specific reference to renewable energy. Of relevance the objectives include:

- Promote the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the

diversity of domestic energy supplies and avoiding energy imports while minimizing detrimental environmental impacts.

- In order to reinforce the existing transmission network and to ensure a reliable electricity supply in the Northern Cape, construct a 400 kV transmission power line from Ferrum Substation (near Kathu/Sishen) to Garona Substation (near Groblershoop). There is a national electricity supply shortage, and the country is now in a position where it needs to commission additional plants urgently. Consequently, renewable energy projects are a high priority.
- Develop and institute innovative new energy technologies to improve access to reliable, sustainable, and affordable energy services with the objective to realize sustainable economic growth and development. The goals of securing supply, providing energy services, tackling climate change, avoiding air pollution, and reaching sustainable development in the province offer both opportunities and synergies which require joint planning between local and provincial government as well as the private sector.
- Develop and institute energy supply schemes with the aim to contribute to the achievement of the targets set by the White Paper on Renewable Energy (2003). This target relates to the delivery of 10 000 GWh of energy from renewable energy sources (mainly biomass, wind, solar, and small-scale hydro) by 2013.

Section C8.3.3 of the PSDF, Energy Policy, sets out the policy guidelines for the development of the energy sector, with specific reference to the renewable energy sector.

- The construction of infrastructure must be strictly regulated in terms of the spatial plans and guidelines put forward in the PSDF. They must be carefully placed to avoid visual impacts on landscapes of significant symbolic, aesthetic, cultural or historic value and should blend in with the surrounding environment to the extent possible.
- Renewable energy sources such as wind, solar, thermal, biomass and domestic hydroelectricity are to constitute 25% of the province's energy generation capacity by 2020.

The following key policy principles for renewable energy apply.

- Full cost accounting: Pricing policies will be based on an assessment of the full economic, social and environmental costs and benefits of energy production and utilisation.
- Equity: There should be equitable access to basic services to meet human needs and ensure human well-being. Each generation has a duty to avoid impairing the ability of future generations to ensure their own well-being.
- Global and international cooperation and responsibilities: Government recognises its shared responsibility for global and regional issues and act with due regard to the principles contained in relevant policies and applicable regional and international agreements.
- Allocation of functions: Government will allocate functions within the framework of the Constitution to competent institutions and spheres of government that can most effectively achieve the objectives of the energy policy.
- The implementation of sustainable renewable energy is to be promoted through appropriate financial and fiscal instruments.
- An effective legislative system to promote the implementation of renewable energy is to be developed, implemented, and continuously improved.

- Public awareness of the benefits and opportunities of renewable energy must be promoted.
- The development of renewable energy systems is to be harnessed as a mechanism for economic development throughout the province in accordance with the Sustainable Development Initiative (SDI) approach or any comparable approach.
- Renewable energy must, first, and foremost, be used to address the needs of the province before being exported.

7.2. Desirability of the Site Location

The proposed development site is located approximately 15 km South-East from De Aar in the Pixley Da Seme District Municipality, Northern Cape. The site is located between De Aar and the next over town of Hanover. The site is also located adjacent to a major Transnet infrastructure corridor. The proposed development is further located within Central Strategic Transmission Corridor (STC) as evaluated and promulgated in 2016 following the receipt of an Strategic Environmental Assessment (SEA) (CSIR, 2016).

Due to the proposed project being located within an STC, numerous applications for the construction and installation of renewable energy projects (as indicated in Section 4.1.3) have been approved and are currently in process. Although the proposed development site is zoned and currently used as low impact agriculture, the proximity of the site to a number of these approved solar and wind facilities allow for optimal positioning in terms of accessibility to the existing infrastructure (such as substations).

In addition, due to the preservation of the Western and far Eastern portions of study area, the character of the landscape will be greatly preserved. Apart from the shrubland vegetation/habitat type, the proposed Solar PV array will have negligible impacts on the sensitive areas. Additional services infrastructure (sanitation and access roads) will intercept the highly sensitive area. However, the infrastructure will align as far as possible with the existing tracks and impacted areas, so as to limit the impact on the highly sensitive areas.

7.3. Human Needs & Resource Efficiency

7.3.1. Provision of additional energy resources

As discussed in Section 1, at current, South Africa's energy resources are under immense pressure, with the amount of the load-shedding increasing at least two-fold annually over the course of the last five (5) years.

As indicated by Energyst.com (accessed in November 2022), the immediate causes of loadshedding could be attributed to a number of factors, including but not limited to, stagnated supplies of energy, peak in demand during extreme weather conditions, structurally insufficient production of electricity, and sudden power failures.

Though solar infrastructure projects do have their short-comings (such as lower energy generation during low sunshine events), through proper maintenance and care during the operational phase, the net positive impact of the project would be significantly better than its fossil fuel (coal) counterpart.

7.3.2.Safety, Health and Well-Being of the Surrounding Community

Even though the site is currently zoned as Agriculture, the proposed land use is compatible with the surrounding proposed land uses. Additionally, due to the distance of the proposed development from the nearest town (De Aar), which lies approximately 15 km North-West from the development, no direct negative impacts on safety, health and well-being of the surrounding community is anticipated. Indirect negative impacts have been evaluated as part of the Scoping phase impacts. These impacts will be refined during the EIA phase of the proposed development.

No excessive pollution would be generated on site and the nature of the proposed activities would not have any negative effects on the health of the surrounding community.

7.3.3.Construction Materials

As far as reasonably possible, products and materials will be sourced and manufactured in the vicinity of a development. This would reduce the resources required during transporting materials over long distances to the site, which in turn could lower development costs and reduce the overall carbon footprint of the development.

In addition, all new buildings, and extensions to existing buildings, need to comply with the energy efficiency regulations, as set out in SANS 10400 XA.

7.3.4.Resource Efficiency

In order to address water efficiency during the operational phase of the proposed development, all sanitation infrastructures (located within the offices) will have water use reducing measures installed, which would include aerators to reduce water flow and cistern weights to interrupt flush flow.

In addition, green building principles as part of the design of the overall development will be investigated. These initiatives will include rainwater harvesting tanks and energy efficient lighting amongst others.

7.1. Sustainable Development Goals

In 2015, the United Nations released a set of 17 (seventeen) sustainability goals aimed toward achieving a sustainable future on a global scale. These goals aim to address the global challenges faced including, but not limited to poverty, climate change, environmental degradation, peace and justice.



Figure 7-3. Sustainable Development Goals (UN, 2015)

As a result of the current energy crisis faced in South Africa, the state has implemented a National Load-shedding strategy. The of load-shedding can be seen in the impact on the gross domestic product, small businesses, mobile networks (loss of connectivity), food security and other areas as well, leading to loss of income, unstable food production schedules and the loss of sense of place of the citizens of the country (therefore leading to emigrations). Therefore, it is eminent that sustainable solutions toward the energy supply crisis is implemented. These solutions should align with some or all of the goals of the SDGs.

In light of this project, the following goals (as indicated in Figure 7-3 above), will be applicable:

1 - No Poverty: The proposed development will provide a number of temporary and permanent employment opportunities within the construction and operational phases. Once connected to the national grid, the overarching goal of the project and the REIPPPP aims to lessen the strain of load-shedding, whilst ensuring community upliftment. Load-shedding has a direct (loss of employment) and indirect (loss of business opportunities as a result of limited power supply) impact on the livelihoods of the residents of the country.

2 – Zero Hunger: Due to the current unreliability of the National grid, out of necessity, farmers have resolved to adapting their planting regimes. Thus, leading to lessened food supply. With more reliable electricity sources, food security would improve once more.

7 – Affordable and clean energy: The proposed development will provide clean energy (in the form of solar energy) to the National Grid.

8 – Decent work and Economic Growth: Similarly to the impact of the National Load-shedding Strategy on the poverty rates in South Africa, there is an impact on the Economic Growth of the country. Load-shedding has a direct (loss of employment) and indirect (loss of business opportunities as a result of limited power supply) impact on the livelihoods of the residents of the country. The proposed development will provide a number of temporary and permanent employment opportunities within the construction and operational phases. Once connected to the national grid, the overarching goal of the project and the REIPPPP aims to lessen the strain of load-shedding, whilst ensuring community upliftment.

9 – Industry, innovation and infrastructure: As part of the proposed development, the most energy efficient and sustainably sourced materials available to the development team, within the required cost margin, will be used to equip the development. Furthermore, the proposed development will form part of the REIPPPP. The socio-economic development (SED)

contributions are an important focus of the REIPPPP and are aimed at ensuring that local communities benefit directly from the investments attracted into the area. These contributions are linked to Community Trusts and accrue over the project operation life and, in so doing, create an opportunity to generate a steady revenue stream over an extended period.

13 – Climate action: the proposed development will take cognacy of the impact on the climate through the protection of the sensitive features (including migration corridors and watercourses and associated water features) across the landscape. This will facilitate the regulation of the micro-climate of the area. The impact and comprehensive discussions regarding the impact of the proposed development on Climate Change will be included in the Environmental Impact Assessment Reporting phase.

Table 7-1. Need description in terms of the Need and Desirability Guidelines (DEA, 2017).

Reference	Need description as per the Guideline	Description
“Securing ecological sustainable development and use of natural resource”		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
1.1	How were the following ecological integrity considerations taken into account?:	
	1.1.1. Threatened Ecosystems,	The proposed Hartebeest Hoek Solar PV1 development is located within the Northern Upper Karoo vegetation type. This vegetation type is of Least Concern and is therefore not listed in terms of the <i>List of threatened ecosystems in terms of the NEMBA</i> (Act No. 10 of 2004). Please refer to Section 6.3.2 for a detailed description of the freshwater resources located within the area.
	1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure,	The study area is located in an area identified as the headwaters of the Brak River (North-West from the proposed development area). The appointed aquatic specialist (The Biodiversity Company, 2022) identified the portion of the system located within the boundaries of the study area as intermittent rivers with sporadic flow and drainage flats/floodplains which are connected to these areas. Please refer to Section 6.3 for a detailed description of the freshwater resources located within the area.
	1.1.3. Critical Biodiversity Areas (“CBAs”) and Ecological Support Areas (“ESAs”),	The proposed development is within an Ecological Support Area (ESA) in terms of the Northern Cape Bioregional Spatial Plan (2016) – Northern Cape Critical Biodiversity Areas Map (2016). Please refer to Section 6.3.2 for an elaborate description of the CBA and ESA demarcations.
	1.1.4. Conservation targets,	The Northern Upper Karoo vegetation type is Not Protected and has a conservation target of 18%.
	1.1.5. Ecological drivers of the ecosystem,	The study area is located in an area characterised by its geological and, advertently, its palaeontological richness. The ecological drivers of the ecosystem are predominantly the climatic conditions (semi-arid conditions) and the geological variations of the area. As indicated in Section 6.4, the geology of the study area is a key driver of the vegetation types that occur within the landscape as well as the topographic features of the landscapes (i.e. where the drainage lines and rocky areas that have formed).
	1.1.6. Environmental Management Framework,	At the time of compilation of this report, the Municipal EMF was not available to the public. Please refer to Section 6.8 for a description of the Socio-Economic Environment of the De Aar region.

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Reference	Need description as per the Guideline	Description
“Securing ecological sustainable development and use of natural resource”		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
	1.1.7. Spatial Development Framework, and	The feasibility of the proposed development in relation to the Provincial SDF has been discussed in both Section 6.8 and Section 7.1.
	1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	<p>The nearest Protected Area (the De Aar Municipal Nature Reserve) is located approximately 9.5 km North-West from the proposed development (As indicated in Section 6.3.2.). The study area, in its entirety, is located within Platberg-Karoo Conservancy (An Important Bird and Biodiversity Area) as identified by Birdlife (2015).</p> <p>The proposed development is located within the Central Transmission Corridor, as promulgated in 2019 and therefore the proposed development aligns with the strategic management of the country. Additionally, the corridor and need for renewable infrastructure is recognised by the ELM Municipal IDP. The regional context of the proposed development has been detailed in Section 6.8.</p> <p>The proposed development also aligns with the with the National Climate Change Response White Paper (2011), the objectives of the Low Emissions Development Strategy 2050 (DEA, 2020), the Climate Change Bill (B9-2022) and the National Climate Change Adaptation Strategy (DEA, 2019). The policies toward which the proposed development will be aligned to have been detailed above.</p>
1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity?	The proposed Solar PV development will have an extent 1 041 ha and will be located within the Shrubland Vegetation Community as identified by the terrestrial biodiversity specialist (The Biodiversity Company, 2022). This said, however, the development areas of the future Hercules Solar cluster took extreme cognizance of the ecological sensitivities of the area. Great extents Western and Eastern portions of the Hercules Solar Cluster’s study area will be excluded from the solar array. These areas, only where required, will be used for the transmission corridors and access roads exclusively. In such event, the infrastructure will be aligned as far as possible to correspond with the existing impacts (Eskom transmission lines and existing tracks).
	What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts?	A part of the plan of study of the Environmental Impact Assessment phase of the process, it is proposed that a number of specialists be approached in order to identify the sensitivity of the study area. As part of the Scoping phase, the baseline reports (including the findings of the field verifications, where applicable, has been included. These findings have been used to inform the developable areas of the proposed

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Reference	Need description as per the Guideline	Description
“Securing ecological sustainable development and use of natural resource”		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
		<p>development. The following studies were key contributors toward identifying the developable areas of the proposed development:</p> <ul style="list-style-type: none"> • Visual Impact Assessment; • Terrestrial Impact Assessment; • Aquatic Impact Assessment; • Palaeontological Impact Assessment; and • Avifaunal Impact Assessment. <p>The full list of specialist studies to be conducted has been included in Section 10.1.3 of this Scoping Report.</p> <p>These baseline studies provided context to the sensitivities and developability of the study area. The findings of their reports have been taken cognizance of throughout this Scoping Report. The developable areas identified provides the best practice approach to the integration of the proposed development and the receiving environment.</p> <p>The baseline studies conducted can be found in Appendix G of this Report.</p> <p>Additionally, the impacts on the receiving environment and mitigation measures proposed therefore have been provided in Section 9. These impacts will be refined as part of the EIA phase of the process.</p>
	What measures were explored to enhance positive impacts?	<p>The positive impacts of the proposed development are rooted in the socio-economic and in turn infrastructural requirements of the regional and national environment. These will be seen in the amount of employment opportunities created during the construction phase and the electricity contribution to be made to the National Grid (and in turn allow for economic growth – due to the provision of an additional reliable energy resource).</p> <p>The impacts on the receiving environment and mitigation measures proposed therefore have been provided in Section 9. These impacts will be refined as part of the EIA phase of the process.</p>
1.3	How will this development pollute and/or degrade the biophysical environment?	<p>The proposed utility scale Solar PV development boundaries will have an extent of 1 041 ha and will be located within a Shrubland Vegetation Community as identified by the terrestrial biodiversity specialist (The Biodiversity Company, 2022). The watercourses will only be impacted upon during the formalisation of the access roads (pre-identified</p>

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Reference	Need description as per the Guideline	Description
“Securing ecological sustainable development and use of natural resource”		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
		tracks) and the installation of the overhead powerlines (to be installed within the servitudes or within proximity thereto of the existing powerlines).
	What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts?	In order to preserve as much as the study area as possible, various specialist assessment were taken into consideration for the purpose of identifying feasible development areas which will have limited impacts on the sensitivities of the site.
	What measures were explored to enhance positive impacts?	The impacts on the receiving environment and mitigation measures proposed have been provided in Section 9. These impacts will be refined as part of the EIA phase of the process.
1.4	What waste will be generated by this development?	The anticipated waste to be generated during the various phases of the proposed development has been detailed in Section 4.2.1 of this Report.
	What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste?	The triple-R waste management method as described in Section 1 above will be applied as far as possible to limit the amount of waste generated throughout the life of the project.
	What measures have been explored to safely treat and/or dispose of unavoidable waste?	No dumping of waste generated will be allowed on-site. All waste and expired components must be contained within impermeable structures (waste bins or skips) and be removed by a registered waste removal company. Where appropriate, retired infrastructure will be disassembled and the components will be repaired, reused or recycled. The impacts of the proposed development and mitigation measures proposed have been provided in Section 1. These impacts will be refined as part of the EIA phase of the process.

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Reference	Need description as per the Guideline	Description
“Securing ecological sustainable development and use of natural resource”		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage?	The DFFE Screening Tool report extracted for the proposed development indicated that the proposed development is located in an area of low heritage concern. The baseline assessment conducted by the appointed Archaeological and cultural specialist (Appendix G) indicated that the findings of the Screening Tool would likely be considered incorrect as the sensitivities for this theme is highly reliant on the availability of data. It was indicated that the site sensitivity would probably be considered moderate with the rocky-ridges would be considered as very-high sensitivity.
	What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts?	As part of the proposed development, all hills, outcrops and sills have been excluded from the developable areas. Therefore, it is not anticipated that the proposed development will have a significant impact on these resources. The impact on the Heritage resources located within the study area will be evaluated as part of the EIA phase of the process. The findings of the baseline palaeontological assessment indicated that there are numerous areas of high and very high sensitivity throughout the landscape. The impact on these resources would be minimised should the excavations associated with the proposed development not exceed 1.5 m in depth.
	What measures were explored to enhance positive impacts?	The impacts on the receiving environment and mitigation measures proposed have been provided in Section 9. These impacts will be refined as part of the EIA phase of the process.
1.6	How will this development use and/or impact on non-renewable natural resources?	The proposed utility scale Solar PV development will not make use of non-renewable natural resources as part of any phases of the proposed development. Limited quantities of the products thereof (specifically diesel from crude oil) would however be required for the fuelling of generators (during the construction phase) and plant/equipment (during all phases as required).
	What measures were explored to ensure responsible and equitable use of the resources?	The proposed development will not lead to the usage or exploitation of non-renewable natural resources.
	How have the consequences of the depletion of the non-renewable natural resources been considered?	The proposed development will not lead to the depletion of the non-renewable natural resources.

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Reference	Need description as per the Guideline	Description
“Securing ecological sustainable development and use of natural resource”		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
	What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts?	The proposed development will not lead to the direct usage or exploitation of non-renewable natural resources. The products of the non-renewable natural resources (as detailed above) will be acquired as and when required. Material Data Safety Sheets for imported resources, will be kept on site during all phases of the proposed development.
	What measures were explored to enhance positive impacts?	The impacts on the receiving environment and mitigation measures proposed have been provided in Section 9. These impacts will be refined as part of the EIA phase of the process.
1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part?	<p>The study area is located in an area identified as the headwater of the Brak River (located North-West from the proposed development area). The appointed aquatic specialist (The Biodiversity Company, 2022) identified the portion of the system located within the boundaries of the study area as intermittent rivers with sporadic flow and drainage flats/floodplains which are connected to these areas. These areas have been excluded from the developable areas of the study area and will henceforth only be impacted upon through the construction and installation of linear activities, including formalisation of the access roads, installation of services and overhead transmission lines (the latter will form part of separate application processes).</p> <p>The proposed Hartebeest Hoek Solar PV1 development is located within the Northern Upper Karoo vegetation type. This vegetation type is not listed in terms of the List of Threatened Ecosystems promulgated in terms of the NEMBA (Act No. 10 of 2004). The threatened status is Least Concern.</p> <p>Other than the renewable resource described above, the proposed development will rely on solar energy harvesting (a freely available natural resource), the availability and reliability of which is greatly dependent on the climatic conditions and topography of the area.</p>
	Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds?	The proposed activity will have limited impacts on the water resources. However, approximately 12 ha of the Northern Upper Karoo Vegetation Type will be impacted upon for the purpose of the solar infrastructure (Substations, warehouses and the placement of the solar array). The proposed development has the potential to impact the micro-climate of the regional area. The impact thereof has been included in the Impact Assessment Section (Section 9) of this report. The anticipated impacts of the

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1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
		<p>proposed development and mitigation for the impacts will be refined as part of the EIR phase of the EIA process.</p> <p>The proposed development is not expected to have a detrimental impact on the affected watercourses within the study area. This will depend on the use of existing corridors and tracks for the purpose of linkage infrastructure, access roads and services provision corridors. Section 9 of the Scoping Report includes the anticipated ‘Scoping’ Impacts of the proposed development. These impacts will be refined as part of the EIR phase of the EIA process.</p>
	<p>What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources?</p>	<p>As part of the Scoping phase, the baseline reports (including the findings of the field verifications, where applicable, has been included. These findings have been used to inform the developable areas of the proposed development. The following studies were key contributors toward identifying the developable areas of the proposed development:</p> <ul style="list-style-type: none"> • Visual Impact Assessment; • Terrestrial Impact Assessment; • Aquatic Impact Assessment; • Palaeontological Impact Assessment; and • Avifaunal Impact Assessment. <p>These baseline studies provided context to the sensitivities and developability of the study area. The findings of their reports have been taken cognizance of throughout this Scoping Report. The developable areas identified provides the best practice approach to the integration of the proposed development and the receiving environment.</p> <p>The proposed development is not expected to have a detrimental impact on the affected watercourses within the study area. This will depend on the use of existing corridors and tracks for the purpose of linkage infrastructure, access roads and services provision corridors. Section 9 of the Scoping Report includes the anticipated ‘Scoping’ Impacts of the proposed development. These impacts will be refined as part of the EIR phase of the EIA process.</p>
	<p>What measures were taken to ensure responsible and equitable use of the resources?</p>	<p>The development proposes to generate electricity through the conversion of solar energy (AC) to usable electricity (DC) and will form part of the REIPPPP and will therefor</p>

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Reference	Need description as per the Guideline	Description
“Securing ecological sustainable development and use of natural resource”		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
		feed into the National Grid. Once connected to the National Grid, the electricity will be distributed equitably across the Grid. Therefore, ensuring equitable use of the resource.
	What measures were explored to enhance positive impacts?	
	1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)	The positive impacts of the proposed development are rooted in the socio-economic and in turn infrastructural requirements of the regional and national environment. The impacts will be seen in the amount of employment opportunities created during the construction phase and the electricity contribution to be made to the National Grid (and in turn allow for economic growth – due to the provision of an additional reliable energy resource). As described in Section 9, the country's primary electricity provider's infrastructure is currently under immense pressure as the supply fails to keep up with the demand. Additionally, the construction and installation of the proposed development will support the country's Green Economy and Net Zero Carbon Emissions 2050 movement.
	1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)	For the purpose of the proposed development, the water resources will only be incorporated into the proposed layout where such layout requires the intersection of the natural systems as a result of the formalisation of access roads (using existing tracks) or the installation of the overhead powerline network (does not form part of this application). As described in Section 9, the country's primary electricity provider's infrastructure is currently under immense pressure as the supply fails to keep up with the demand. Additionally, the construction and installation of the proposed development will support the country's Green Economy and Net Zero Carbon Emissions 2050 movement. This will also reduce the country's dependency on fossil fuels for electricity generation, as described in Section 1 above.
	1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	As part of the proposed development, the water resources within the study area will not be depended on as a service level agreement will be signed into with the De Aar Local Municipality for both the construction and operational phases of the proposed development. The location, scale and type of development has a high reliance on the accessibility to solar energy. The proposed development will lead to a lessened reliance on coal resources by the energy sector. According to the LEDS 2050, the Government aims to phase out numerous coal-fired power stations in South Africa between 2030 and 2050. According to Worldometer (as accessed in February 2023), South Africa exports approximately 30 % of the produced coal.

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1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts?	
	1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The Gaps in the Knowledge, Uncertainties and Assumptions made during this study have been identified and described in Section 3 of this report. In summary, the limitations to the findings of this Scoping report rests in the accuracy of the risks identified in Section 9.
	1.8.2. What is the level of risk associated with the limits of current knowledge?	The risk lies with providing an accurate representation of the impacts of the proposed development. To mitigate this risk, where needed, specialists were appointed to provide anticipated impacts relative to the themes (As extracted from the DFFE Screening Tool Report, 2022) they were appointed to address.
	1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	The Alternatives and the rationale followed toward identifying the alternatives and the feasibility thereof have been discussed in Section 5. This describes the approach followed toward obtaining the preferred layout alternative for the proposed development. As part of the Scoping Report, the impacts assessed provide an indication of the anticipated aspects that would be associated impacts. These impacts and mitigation measures will be refined during the EIR phase of the EIA process. Section 1 below indicates all the impacts evaluated, and mitigation measures proposed, as part of the Scoping phase of the proposed development.
1.9	How will the ecological impacts resulting from this development impact on people's environmental right in terms following.	
	1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	As the proposed development will be located on properties that are currently excluded from public use, it will not contribute to the loss of an amenity in this regard. During the pre-application process, all superficial areas of sensitivity, where agreed upon by the appointed specialists, were excluded from the developable areas (development no-go areas). This provides increased connectivity of the natural resources within the study area. The impacts on the receiving environment and mitigation measures proposed have been provided in Section 1. These impacts will be refined as part of the EIR phase of the EIA process.

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1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
	1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	<p>The positive impacts of the proposed development are rooted in the socio-economic impacts and in turn infrastructural requirements of the regional and national environment. These will be seen in the amount of employment opportunities created during the construction phase and the electricity contribution to be made to the National Grid during the operational phase (and in turn allow for economic growth – due to the provision of an additional reliable energy resource).</p> <p>The impacts on the receiving environment and mitigation measures proposed have been provided in Section 9. These impacts will be refined as part of the EIR phase of the EIA process.</p>
1.10	<i>Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?</i>	<p>Due to the approach followed to obtain the developable areas, approximately 353 ha of the study area will be excluded from the areas under consideration for developable areas used for the future Hercules Solar PV Cluster. These areas will be left largely untouched and will lessen to the visual impacts of the proposed development. The proposed development allows for optimum land use by the proposed development, whilst taking cognizance of the integrity of the landscape, the socio-economic sensitivity of the proposed development area and the optimum design for the feasibility of the proposed development. Through this approach more than the 18% conservation target of the Northern Upper Karoo located within the study area will be conserved.</p> <p>As part of the proposed development, all hills, outcrops and sills have been excluded from the developable areas. Therefore, it is not anticipated that the proposed development will have a significant impact on these resources. The impact on the Heritage resources located within the study area will be evaluated as part of the EIA phase of the process.</p> <p>The findings of the baseline palaeontological assessment indicated that there are numerous areas of high and very high sensitivities throughout the landscape. The impact on these resources would be minimised should the excavations associated with the proposed development not exceed 1.5 m in depth.</p> <p>The positive impacts of the proposed development are rooted in the socio-economic and in turn infrastructural requirements of the regional and national environment. These will be seen in the amount of employment opportunities created during the construction phase and the electricity contribution to be made to the National Grid during the</p>

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“Securing ecological sustainable development and use of natural resource”		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
		operational phase (and in turn allow for economic growth – due to the provision of an additional reliable energy resource). The cumulative impacts of the proposed development have been provided in Section 9. These impacts will be refined as part of the EIR phase of the EIA process.
1.11	<i>Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?</i>	<p>As part of the plan of study of the Environmental Impact Assessment phase of the process, it is proposed that several specialists be approached in order to identify the sensitivity of the study area. As part of the Scoping phase, the baseline reports (including the findings of the field verifications, where applicable) has been included. These findings have been used to inform the developable areas of the proposed development. The following studies were key contributors toward identifying the developable areas of the future Hercules Solar PV Cluster:</p> <ul style="list-style-type: none"> • Visual Impact Assessment; • Terrestrial Impact Assessment; • Aquatic Impact Assessment; • Palaeontological Impact Assessment; and • Avifaunal Impact Assessment. <p>These baseline studies provided context to the sensitivities and developability of the study area. The findings of their reports have been taken into consideration of throughout this Scoping Report. The developable areas identified provides the best practice approach to the integration of the proposed development and the receiving environment.</p> <p>Through this approach approximately 353 ha of the study area will be excluded from the areas under consideration for developable areas of the Future Hercules Solar PV Cluster. The proposed development allows for optimum land use by the proposed development, whilst taking cognizance of the integrity of the landscape, the socio-economic sensitivity of the proposed development area and the optimum design for the feasibility of the proposed development. Through the application of this approach more than the 18% conservation target of the Northern Upper Karoo located within the study area will be conserved.</p>
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different	A part of the plan of study of the Environmental Impact Assessment phase of the process, it is proposed that several specialists be approached in order to identify the sensitivity of the study area. As part of the Scoping phase, the baseline reports (including

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1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
	<p>elements of the development and all the different impacts being proposed), resulted in the selection of the “best practicable environmental option” in terms of ecological considerations?</p>	<p>the findings of the field verifications, where applicable) has been included. These findings have been used to inform the developable areas of the future Hercules Solar PV Cluster. The following studies were key contributors toward identifying the developable areas of the proposed development:</p> <ul style="list-style-type: none"> • Visual Impact Assessment; • Terrestrial Impact Assessment; • Aquatic Impact Assessment; • Palaeontological Impact Assessment; and • Avifaunal Impact Assessment. <p>These baseline studies provided context to the sensitivities and developability of the study area. The findings of their reports have been taken cognizance of throughout this Scoping Report. The developable areas identified provides the best practice approach to the integration of the proposed development and the receiving environment.</p> <p>The full list of specialist studies to be conducted has been included in Section 10.2 of this Scoping Report. The approach followed toward identifying the Alternatives for the proposed development has been detailed in Section 5.</p>
<p>1.13</p>	<p><i>Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?</i></p>	<p>The proposed development has been designed as such, in order to minimize the impact on the natural resources located within the proposed development area, while, simultaneously allowing for the most feasible extent for a utility scale energy generation facility.</p> <p>The positive impacts of the proposed development are rooted in the socio-economic and in turn infrastructural requirements of the regional and national environment. These will be seen in the amount of employment opportunities created during the construction phase and the electricity contribution to be made to the National Grid during the operational phase (and in turn allow for economic growth – due to the provision of an additional reliable energy resource). The cumulative impacts of the proposed development have been provided in Section 9. These impacts will be refined as part of the EIR phase of the EIA process.</p> <p>The proposed development is located within the Central Transmission Corridor, as promulgated in 2018 and therefore the proposed development aligns with the strategic management of the country. Additionally, the corridor and need for renewable</p>

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Reference	Need description as per the Guideline	Description
“Securing ecological sustainable development and use of natural resource”		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		
		infrastructure is recognised by the ELM Municipal IDP. The regional context of the proposed development has been detailed in Section 6.8. Additionally, all approved renewable energy generation projects and the locations thereof, has been included in Section 4.1.3. The impacts on the receiving environment and mitigation measures proposed have been provided in Section 9. These impacts will be refined as part of the EIR phase of the EIA process.

Table 7-2. Desirability descriptions as per the requirements of the Need and Desirability Guideline (DEA, 2017).

Reference	Desirability description as per the Guideline	Description
"Promoting justifiable economic and social development"		
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
	2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,	The proposed development is in line with the national objectives for the area as the project is located within the Central STC. Furthermore, the Central STC and the movement toward renewable energy resources is recognised by the ELM IDP.
	2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	<p>As described in Section 1, the country's primary electricity provider's infrastructure is currently under immense pressure as the supply fails to keep up with the demand. Additionally, the construction and installation of the proposed development will support the country's Green Economy and Net Zero Carbon Emissions 2050 movement. This will also reduce the country's dependency on fossil fuels for electricity generation, as described in Section 1 above.</p> <p>The proposed development is located within the Central Transmission Corridor, as promulgated in 2018 and therefore the proposed development aligns with the strategic management of the country. Additionally, the corridor and need for renewable infrastructure is recognised by the ELM Municipal IDP. The regional context of the proposed development has been detailed in Section 6.8. Additionally, all approved renewable energy generation projects and the locations thereof, have been included in Section 4.1.3. The impacts on the receiving environment and mitigation measures proposed have been provided in Section 9. These impacts will be refined as part of the EIR phase of the EIA process.</p>
	2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	The current land use of the proposed development footprint, as well as the surrounding properties is Agricultural. However, due to the proximity of the proposed development to the Hydra sub-station, there are numerous distribution corridors within proximity of the proposed development site. Beyond the proposed development's positioning within the Central STC, the proposed development is located within proximity to numerous precious approved renewable energy resources (including On-shore Wind, Solar PV and Solar CSP) developments.
	2.1.4. Municipal Economic Development Strategy ("LED Strategy"),	The proposed development is located within the Central Transmission Corridor, as promulgated in 2018 and therefore the proposed development aligns with the strategic management of the country. Additionally, the corridor and need for renewable infrastructure is recognised by the ELM Municipal IDP. The proposed development will

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"Promoting justifiable economic and social development"		
		<p>form part of the REIPPPP tendering process. Socio-economic development (SED) contributions are an important focus of the REIPPPP and are aimed at ensuring that local communities benefit directly from the investments attracted into the area. These contributions are linked to Community Trusts and accrue over the project operation life and, in so doing, create an opportunity to generate a steady revenue stream over an extended period.</p>
<p>2.2</p>	<p>Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?</p>	<p>Based on the information obtained from the socio-economic baseline study (Tony Barbour, 2022) (Appendix G), the positive impacts associated with the proposed development will be the creation of employment, business, and skills development opportunities during the construction phase of the proposed development. The potential negative impacts will associate with the proposed development will be the impacts associated with the presence of construction workers on the local community, the impacts related to the potential influx of jobseekers, increased risks to livestock and farming infrastructure associated with the construction related activities, increased fire grass fire risk, nuisance impacts and the impact on productive farmland.</p> <p>A significant impact of the current electricity capacity challenges faced by the country is the implementation of load-shedding. As indicated by Energyst.com (accessed in November 2022), the immediate causes of loadshedding could be attributed to several factors, including but not limited to, stagnated supplies of energy, peak in demand during extreme weather conditions, structurally insufficient production of electricity, and sudden power failures. The socio-economic impacts of load-shedding can be seen in the impact on the gross domestic product, small businesses, mobile networks, food security and other areas as well, leading to loss of income, unstable food production schedules and the loss of sense of place of the citizens of the country.</p> <p>The potential positive impacts associated with the operational phase of the proposed development will include, the establishment of infrastructure aimed at improving energy security in other words and support the renewable sector, the creation of employment opportunities and community development through socio-economic contributions. The potential negative impacts include the visual impacts and associated sense of place, the impact on property values and the impact on tourism.</p>

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"Promoting justifiable economic and social development"		
	2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	Socio-economic development (SED) contributions are an important focus of the REIPPPP and are aimed at ensuring that local communities benefit directly from the investments attracted into the area. These contributions are linked to Community Trusts and accrue over the project operation life and, in so doing, create an opportunity to generate a steady revenue stream over an extended period.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	<p>The proposed development will contribute to the creation of temporary job opportunities of various skill-set requirements throughout the construction phase. The construction phase of the proposed development will be between 18 and 24 months. The number of envisaged job opportunities created have been indicated in Section 4.2. As part of the employment opportunities created, the proposed development will see to the development of the individuals' skills which can be transferred to future employment opportunities. The proposed development aims to contribute to providing relieve considering the current energy crisis faced in South Africa.</p> <p>As a result of the before-mentioned crisis, the state has implemented a National Load-shedding strategy. The socio-economic impacts of load-shedding can be seen in the impact on the gross domestic product, small businesses, mobile networks (loss of connectivity), food security and other areas as well, leading to loss of income, unstable food production schedules and the loss of sense of place of the citizens of the country (therefore leading to emigrations).</p>
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	The proposed development will see to the creation of numerous employment opportunities within the De Aar region. These opportunities will require a workforce of various skillsets and levels of expertise. This will lead to a temporary boost in the local economy of De Aar. The proposed development will also contribute marginally to the national economy as it will add to the country's energy supply. The proposed development will have a lifespan of at least 20 years (which is the approximate lifespan of renewable energy into the grid) after which the infrastructure will be decommissioned and redistributed according to the measures identified in the lifecycle assessment (Section 1.2).
2.5	In terms of location, describe how the placement of the proposed development will:	
	2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	It is envisaged that during the construction phase of the proposed development will provide 350 new job opportunities, whereas the operational phase of the proposed development will see to the creation of 20 new permanent opportunities. The

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"Promoting justifiable economic and social development"		
		opportunities created during the construction phase will be temporary (for the duration of the construction phase) and will be between 18 and 24 months in extent.
	2.5.2. reduce the need for transport of people and goods,	As part of the management measures, the developer will be encouraged to make use of the local skills (individuals within the Ward and within De Aar) and as far as practically possible all infrastructure and components will be locally sourced.
	2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	The proposed development is located adjacent to the N10 National Highway. This road serves as a major transport corridor and is a proficient transportation route in the province. Where applicable, workers will be encouraged to make use of recognised public transport services during all phases of the proposed development.
	2.5.4. compliment other uses in the area,	Beyond the proposed development's positioning within the Central STC, the proposed development is located within proximity to numerous preciously approved renewable energy resources (including On-shore Wind, Solar PV and Solar CSP) developments.
	2.5.5. be in line with the planning for the area,	<p>The proposed development is located within the Central Transmission Corridor, as promulgated in 2018 and therefore the proposed development aligns with the strategic management of the country. Additionally, the corridor and need for renewable infrastructure is recognised by the De Aar Municipal IDP. The regional context of the proposed development has been detailed in Section 6.8. Additionally, all approved renewable energy generation projects and the locations thereof, has been included in Section 4.1.3.</p> <p>The proposed development also aligns with the with the National Climate Change Response White Paper (2011), the objectives of the Low Emissions Development Strategy 2050 (DEA, 2020), the Climate Change Bill (B9-2022) and the National Climate Change Adaptation Strategy (DEA, 2019). The policies toward which the proposed development will be aligned with have been detailed above.</p>
	2.5.6. for urban related development, make use of underutilised land available with the urban edge,	This is not applicable to the proposed development.
	2.5.7. optimise the use of existing resources and infrastructure,	As far as practically possible, the proposed development will make use of the existing tracks and services corridors for the purpose of access into the site.

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"Promoting justifiable economic and social development"		
	2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	This is not applicable to the proposed development.
	2.5.9. discourage "urban sprawl" and contribute to compaction/densification,	This question is not applicable to the proposed development of a utility scale solar farm.
	2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	Section 1 for a detailed description of the anticipated socio-economic impacts of the proposed development. These impacts will be refined as part of the EIR phase of the EIA process. However, based on the preservation and the mitigation measures set in place, it is not anticipated that the proposed development will have an impact on these aspects.
	2.5.11. encourage environmentally sustainable land development practices and processes,	<p>The proposed development is located within the Central Transmission Corridor, as promulgated in 2018 and therefore the proposed development aligns with the strategic management of the country. Additionally, the corridor and need for renewable infrastructure is recognised by the De Aar Municipal IDP. The regional context of the proposed development has been detailed in Section 6.8. Additionally, all approved renewable energy generation projects and the locations thereof, has been included in Section 4.1.3.</p> <p>The proposed development also aligns with the with the National Climate Change Response White Paper (2011), the objectives of the Low Emissions Development Strategy 2050 (DEA, 2020), the Climate Change Bill (B9-2022) and the National Climate Change Adaptation Strategy (DEA, 2019). The policies toward which the proposed development will be aligned with have been detailed above.</p>
	2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	Due to the optimal weather conditions of De Aar, the identified area is optimally located to absorb sufficient amounts of solar energy to be considered feasible for generation of a utility scale solar farm.
	2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	It is envisaged that during the construction phase of the proposed development will provide 350 new job opportunities, whereas the operational phase of the proposed development will see to the creation of 20 new permanent opportunities. The

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		opportunities created during the construction phase will be temporary (for the duration of the construction phase). As part of the management measures, the developer will be encouraged to make use of the local skills (individuals within the Ward and within De Aar). This will mitigate the Socio-economic impacts what are envisioned as part of the construction and operational phase.
	2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	Section 9 for a detailed description of the anticipated socio-economic impacts of the proposed development. These impacts will be refined as part of the EIR phase of the EIA process. However, based on the preservation and the mitigation measures set in place, it is not anticipated that the proposed development will have an impact on these aspects.
	2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	As part of the management measures, the developer will be encouraged to make use of the local skills (individuals within the Ward and within De Aar). This will mitigate the Socio-economic impacts what are envisioned as part of the construction and operational phase. See Section 9 for a detailed description of the anticipated socio-economic impacts of the proposed development. These impacts will be refined as part of the EIR phase of the EIA process.
2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts?:	
	2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The Gaps in the Knowledge, Uncertainties and Assumptions made during this study have been identified and described in Section 3 of this report. In summary, the limitations to the findings of this Scoping report rests in the accuracy of the risks identified in Section 1.
	2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The risk lies with providing an accurate representation of the impacts of the proposed development. To mitigate this risk, where needed, specialists were appointed to provide anticipated impacts relative to the themes (As extract from the DFFE Screening Tool Report, 2022) they were appointed to address.
	2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	The Alternatives and the rationale followed toward identifying the alternatives and the feasibility thereof have been discussed in Section 5. This describes the approach followed toward obtaining the preferred layout alternative for the proposed development.

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"Promoting justifiable economic and social development"		
		As of the Scoping Report, the impacts assessed provide an indication of the anticipated aspects that would be associated impacts. These impacts and mitigation measures will be refined during the EIA phase of the proposed development. Section 9 below indicates all the impacts evaluated, and mitigation measures proposed, as part of the Scoping phase of the proposed development.
2.7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
	2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	All negative anticipated socio-economic impacts have been evaluated in Section 1 of this report. These impacts are 'Scoping' impacts and will be refined during the EIA phase of the proposed development. In addition to the impacts, Section 1 includes mitigation measures aimed toward lessening the negative impacts of the proposed development on the receiving environment.
	2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	All positive anticipated socio-economic impacts have been evaluated in Section 1 of this report. These impacts are 'Scoping' impacts and will be refined during the EIA phase of the proposed development. In addition to the impacts, Section 1 includes mitigation measures aimed toward increasing the positive impacts of the proposed development on the receiving environment.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	As the proposed development is located within the Central STC as promulgated in terms of the NEMA (Act No. 107 of 1998), the proposed development aligns with the objectives of the NDP 2030. The STC is also recognised in terms of the ELM's IDP. The anticipated impacts on the receiving environment have been evaluated in Section 1 of this Report. It should be noted that these impacts and their associated ratings are 'Scoping' impacts and will be refined during the EIA phase of the process.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	The Alternatives have been discussed in Section 5 of this report. This section details all of the considerations made towards designing the best practicable environmental option, whilst allowing for the proposed development to be feasible (in terms of energy output, extent and job creation potential).
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and	The proposed development is located within the Central STC promulgated in terms of the NEMA (Act No. 107 of 1998). The positioning of the proposed development is in line with the NDP 2030 and the ELM Municipal IDP. The proposed development will contribute not only to the economy of the local area of De Aar, but also to the National economy as a whole.

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"Promoting justifiable economic and social development"		
	disadvantaged persons (who are the beneficiaries and is the development located appropriately)?	The discussions of the Socio-Economic Baseline Assessment can be found in Appendix G.
	Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	The Alternatives of the proposed development have been discussed in Section 5 of this report. The preferred alternatives of both land use, locality and layout, allows for the most efficient use of the proposed property in line with the activities being applied for.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	The proposed development generate electricity through the conversion of solar energy (AC) to usable electricity (DC) and will form part of the REIPPPP and will therefor feed into the National Grid. Once connected to the National Grid, The electricity is distributed equitably across the Grid. Therefore, ensuring equitable use of the resource.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Environmental Awareness Training forms an integral part of the construction and operational phases of any development. This training details the responsibility of all members of the workforce of the proposed development.
2.13	What measures were taken to:	
	2.13.1. ensure the participation of all interested and affected parties,	<p>All State Departments and Organisations with a vested interest in the project has been included as part of the planned. The relevant Ward councillor of the affected area has been approached to spread the word of the proposed development. Additionally, a copy of the Draft Scoping Report has been made available at the De Aar Public Library. All Interested and/or Affected Parties (I&APs) will be given equal opportunity to register and provide comments on the proposed development. The PPP will be run over a period of 30 days as per the legislated timeframes. The public review period of the documents is 13 May 2024 – 13 June 2024.</p> <p>The Executive Summary of this document has also been provided in Afrikaans in order to reach a greater audience.</p> <p>The PPP process has been detailed in Section 8 below.</p>

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		<p>All comments received during the public review period of the documents will be captured into the Comments and Responses Report (CRR) and be incorporated into the Final Scoping Report prior to submission thereof.</p> <p>Additionally, where possible the local community of De Aar will be provided with the opportunity to fill the positions made available throughout the various phases of the proposed development. The skills these individuals acquire, will be transferable to future employment opportunities.</p>
	2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	<p>A copy of the Draft Scoping Report has been made available at the De Aar Public Library for perusal by individuals not recognised as interested or affected parties prior to the commencement of the proposed development's PPP.</p> <p>The contact details of the EAP have been made available (captured in the Scoping Report and has been included in all public documents), to allow the public to contact the EAP when additional or clarity is required regarding the proposed development.</p> <p>The PPP process has been detailed in Section 8 below.</p>
	2.13.3. ensure participation by vulnerable and disadvantaged persons,	<p>A copy of the Draft Scoping Report has been made available at the De Aar Public Library for perusal by individuals not recognised as interested or affected parties prior to the commencement of the proposed development's PPP.</p> <p>The contact details of the EAP have been made available (captured in the Scoping Report and has been included in all public documents), to allow the public to contact the EAP when additional or clarity is required regarding the proposed development.</p> <p>The PPP process has been detailed in Section 8 below.</p>
	2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	<p>A copy of the Draft Scoping Report has been made available at the De Aar Public Library for perusal by individuals not recognised as interested or affected parties prior to the commencement of the proposed development's PPP.</p> <p>As part of the Environmental Management Programme (EMPr) to be compiled for the proposed development, Environmental Awareness Training would be a requirement for</p>

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		all workers accessing the premises to undertake. This Training informs the workers of their rights and responsibilities from a legislative environmental perspective.
	2.13.5. ensure openness and transparency, and access to information in terms of the process,	The PPP always requires utmost transparency and openness. To keep an open line of communication between the EAP and the public, the contact details of the EAP have been included in all public documents. The documents will be available for download on the EAP's public website, and a hard copy of the information will be made available at the De Aar Public Library.
	2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and	<p>All Interested and/or Affected Parties (I&APs) will be given equal opportunity to register and provide comments on the proposed development. The PPP will be run over a period of 30 days as per the legislated timeframes. The public review period of the documents is 13 May 2024 – 13 June 2024.</p> <p>All comments received during the public review period of the documents will be captured into the Comments and Responses Report (CRR) and be incorporated into the Final Scoping Report prior to submission thereof.</p>
	2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?	<p>All Interested and/or Affected Parties (I&APs) will be given equal opportunity to register and provide comments on the proposed development. The PPP will be run over a period of 30 days as per the legislated timeframes. The public review period of the documents is 13 May 2024 – 13 June 2024. The documents will be available for download on the EAP's public website, and a hard copy of the information will be made available at the De Aar Public Library.</p> <p>All comments received during the public review period of the documents will be captured into the Comments and Responses Report (CRR) and be incorporated into the Final Scoping Report prior to submission thereof.</p> <p>Additionally, the appointed socio-economic consultant appointed to evaluate the project, will be conducting interviews with members local community in order to gain a deeper understanding of the impact the farm will have on the community.</p>
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g.. a mixture of low-	The proposed development aims to ascertain up to 303 MW of electricity to the National Grid. The proposed development will form part of the REIPPPP bidding programme. The objectives of the initiative is to relieve the pressures of the current electricity supply-demand chain and to meet the current short term electricity supply gap in South Africa.

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	middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	As discussed in Section 1, the current need for additional electricity suppliers would be evident through the increased amounts of load shedding experienced in 2022 when compared to the same timeline in 2021.
2.15	What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	As part of the Environmental Management Programme (EMPr) to be compiled for the proposed development, Environmental Awareness Training would be a requirement for all workers accessing the premises to undertake. This Training informs the workers of their rights and responsibilities from a legislative environmental perspective.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
	2.16.1. the number of temporary versus permanent jobs that will be created,	It is envisaged that during the construction phase of the proposed development will provide 350 new job opportunities, whereas the operational phase of the proposed development will see the creation of 20 new permanent opportunities. The opportunities created during the construction phase will be temporary (for the duration of the construction phase) and will be between 18 and 24 months in extent.
	2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	As part of the proposed development 70% of the workers would be unskilled labourers, 25% would be semi-skilled and 5% of the job opportunities created would be awarded to skilled individuals. Where practically possible, local labourers would be approached (in liaison with the ward councillor of the area), to undertake the required activities.
	2.16.3. the distance from where labourers will have to travel,	The proposed development is located approximately 15 km South-East from the De Aar. The site is located along the N10 National Road, with good existing public transport services available.
	2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and	The proposed development is located approximately 15 km South-East from the De Aar. The indirect socio-economic results could be seen in the creation of jobs, due to the influx of specialists (engineers, ecological specialists, etc) and the resulting increase in tourism and need for services within the town of De Aar.
	2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	The proposed development's construction phase will create 350 temporary employment opportunities and the operational phase will create 20 permanent employment opportunities. At current, the properties are used for game farming with

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		very little labourer intensive practises and would therefore be beneficial for short-, medium-, and long-term outlooks. It should be noted that it is not anticipated that the existing employees of these farms would lose their employment.
2.17	What measures were taken to ensure:	
	2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and	As required by the EIA Regulations of 2014, as amended (GNR 326 of 2017), all Government Departments that enforces legislation relevant to the proposed development must be provided an opportunity to comment and provide input as part of the Public Participation Process (PPP). Section 8 of this report details the PPP to be followed as well as provide the state departments included as Stakeholders.
	2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	No conflicts of interest were recorded for the proposed development.
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	An Environmental Management Programme (EMPr) will be compiled for the purpose of the proposed development which will ensure the fair and just use of the receiving environment. The EMPr will provide measures toward managing the proposed development in such a way as to minimise the impact thereof on the sensitive features within the landscape (whether it be ecologically sensitive areas, or culturally sensitive areas).
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	As of the Scoping Report, the impacts assessed provide an indication of the anticipated aspects that would be associated impacts. These impacts and mitigation measures will be refined during the EIA phase of the proposed development. Section 1 below indicates all the impacts evaluated, and mitigation measures proposed, as part of the Scoping phase of the proposed development. These mitigation measures aim to be realistic and implementable in the context of the proposed development. The proposed development will be a source of renewable energy supply which will be fed into the National Electricity Grid.
2.20	What measures were taken to ensure that he costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental	As of the Scoping Report, the impacts assessed provide an indication of the anticipated aspects that would be associated impacts. These impacts and mitigation measures will be refined during the EIA phase of the proposed development. Section 1 below indicates all the impacts evaluated, and mitigation measures proposed, as part of the Scoping phase of the proposed development.

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Reference	Desirability description as per the Guideline	Description
"Promoting justifiable economic and social development"		
	damage or adverse health effects will be paid for by those responsible for harming the environment?	
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The Alternatives and the rationale followed toward identifying the alternatives and the feasibility thereof have been discussed in Section 5. This describes the approach followed toward obtaining the preferred layout alternative for the proposed development.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	<p>The proposed development is located within the Central Transmission Corridor, as promulgated in 2018 and therefore the proposed development aligns with the strategic management of the country. Additionally, the corridor and need for renewable infrastructure is recognised by the De Aar Municipal IDP. The regional context of the proposed development has been detailed in Section 6.8. Additionally, all approved renewable energy generation projects and the locations thereof, has been included in Section 4.1.3.</p> <p>The proposed development also aligns with the with the National Climate Change Response White Paper (2011), the objectives of the Low Emissions Development Strategy 2050 (DEA, 2020), the Climate Change Bill (B9-2022) and the National Climate Change Adaptation Strategy (DEA, 2019). The policies toward which the proposed development will be aligned to have been detailed above.</p> <p>The positive impacts of the proposed development are rooted in the socio-economic and in turn infrastructural requirements of the regional and national environment. These will be seen in the amount of employment opportunities created during the construction phase and the electricity contribution to be made to the National Grid (and in turn allow for economic growth – due to the provision of an additional reliable energy resource). The cumulative impacts of the proposed development have been provided in Section 1. These impacts will be refined as part of the EIR phase of the EIA process.</p>

8. PUBLIC PARTICIPATION PROCESS

8.1. Opportunity to Comment

It is a requirement according to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, as amended (GNR 326 of 2017), that once an application is submitted to obtain an Environmental Authorisation in terms of the NEMA EIA Regulations, that potential or registered Interested and / or Affected Parties (I&AP's) (interested in the proposed development or affected by the proposed development) are subjected to a consultation period (at least 30 days) on the Draft Scoping Report before their comments are taken into account and responded to in a Final Scoping Report which is then submitted for decision making.

The **Draft Scoping Report** will be made available to identified Potential I&AP's from **13 May 2024 – 13 June 2024 (30+ days)**. An electronic version of the report will be placed on the SES website to be accessed by the public.

An application form has been completed and submitted to the Department of Forestry, Fisheries and Environment (DFFE).

Please note that all comments submitted to SES in writing on the Draft Scoping Report will be responded to in the Comments & Response Report. All those that submit comment will be automatically registered on the database and will be notified for the remainder of the EIA process of all reports available for review and comment.

Following the conclusion of the public participation process, the Scoping Report will be finalised and submitted to DFFE for consideration (Acceptance/Rejection).

8.2. Interested & Affected Party Register

A desktop assessment was undertaken in order to ascertain the erven and farm numbers of the adjacent affected landowners & occupiers. In addition, the list of I&AP's from the previous similar processes within close proximity to the proposed development area was consulted and relevant contacts included onto the register.

Key Authorities (must automatically be registered) and other key stakeholders have also been identified and placed on the Register. In addition, all those that provided comment during the public participation phase of the Scoping Report have been included onto the register.

The following Stakeholders and identified Interested and Affected Parties have been included as part of the PPP process of the proposed development:

- The Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform;
- Department of Water and Sanitation;
- Department of Energy Resources;
- South African Heritage Resources Agency;
- Northern Cape Heritage Resources Authority (NCHRA);
- Northern Cape Department of Agriculture;
- Northern Cape Department of Transport, Safety and Liaison;

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- South African National Roads Agency SOC Ltd (SANRAL)
- Northern Cape Department of Roads and Public Works;
- Surrounding and directly affected landowners;
- Eskom Holdings;
- Transnet;
- Civil Aviation Authority;
- South African Radio Astronomy Observatory;
- Emthanjeni Local Municipality;
- Pixley Ka Seme District Municipality; and
- Ward Councillor – Ward 6.

8.3. Landowner Consent

It is a requirement in terms of the NEMA EIA Regulations of 2014, as amended, to obtain Landowner Consent for non-linear developments.

The table on page 55 indicates the properties upon which the development is proposed, including the details of each. Landowner consent for each property has been obtained and has been submitted as part of the Application form.

8.4. Site Notice

In compliance with regulation 41 (2) (a) and (b) of the EIA Regulation 2014 (as amended 2017) an appropriately sized on-site notice, in English and Afrikaans, will be placed on site. Other site notices, have been placed in strategic locations on the boundaries of the proposed development site, notifying potential Interested and Affected Parties (I&AP's) of the availability of the Draft Scoping Report and inviting I&AP's to register on the database as Registered I&AP's.

8.5. Newspaper Advertisement

A newspaper advertisement, in English and Afrikaans, has been placed in the local newspaper (De Aar Echo) distributed on 10 May 2024 notifying potential Interested and Affected Parties (I&AP's) of the availability of the Draft Scoping Report and inviting I&AP's to register on the database as Registered I&AP's.

9. DESCRIPTION OF THE IMPACTS & RISKS IDENTIFIED

The impact tables in the section below include the identified potential environmental impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of impact, the degree to which the impact can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated.

These impact tables are based on “scoping” stage information. The findings of the impact tables therefore at this stage are largely only based on initial baseline specialist input and the professional opinion of the EAP may change considerably once more detailed specialist impact assessments occur and once we have received input for the public and the Authorities.

9.1. Screening Tool Results

The Department of Environmental Affairs (DEA) (Now referred to as the Department of Forestry, Fisheries and Environment (DFFE)) has developed a screening tool for an Environmental Authorization which identifies potential environmental sensitivities on the proposed site. The results of the tool can be found in **Appendix D5**. Table 9-1 provides a brief summary of what environmental themes were recommended by the screening tool, which themes will be further investigated, and which specialists were appointed to address the applicable themes.

Table 9-1: Summary of recommended specialist themes.

Impact Assessment	Protocol	Sensitivity	Conducted	Appointed Specialist	Findings of screening Tool	Comments and findings
Agriculture	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf	Medium	Yes	Johann Lanz	<ul style="list-style-type: none"> Low – Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low Medium - Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate 	The Baseline assessment undertaken for the proposed development has been included as part of Annexure H of the Scoping Report.
Archeological & Cultural Heritage	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Require	Low	Yes	ACO Associates cc	Low Sensitivity	Kindly see Annexure H of the Draft Scoping Report for a summary of ACO Associates' findings.
Paleontology		Very High		ACO Associates cc	<ul style="list-style-type: none"> Medium – Features with a medium paleontological sensitivity 	

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Impact Assessment	Protocol	Sensitivity	Conducted	Appointed Specialist	Findings of screening Tool	Comments and findings
	ment_Assessment_Protocols.pdf				<ul style="list-style-type: none"> Very High – Features with a Very High paleontological sensitivity 	
Geotechnical	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf	Not provided	No	N/A	Not Provided	<p>The applicant has site-specific geotechnical investigations which they undertake during the design phase of the project. This will be used to determine the foundation requirements of the proposed development. Furthermore, the final design of the foundations is done by engineers strictly according to generally acceptable as well as Eskom-specific engineering standards and norms, taking the site-specific geotechnical constraints and recommendations into account.</p> <p>The geotechnical assessment will not be undertaken for the purpose of the EIA process as the findings thereof will not have an impact on the viability of the proposed development.</p>
Socio-Economic	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf	Not Provided	Yes	Tony Barbour	Not Provided	The Baseline assessment undertaken for the proposed development has been included as part of Annexure H of the Scoping Report.
Landscape/ Visual	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf	Very High	Yes	David Gibbs	<ul style="list-style-type: none"> High – Slope between 1:4 and 1:10 Low - Slope less than 1:10 Very High – Mountain tops and high ridges Very High – Slope more than 1:4 	The Baseline assessment undertaken for the proposed development has been included as part of Annexure H of the Scoping Report.
RFI Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentP	Very High	No	N/A	<ul style="list-style-type: none"> Very High - Less than 18 km form a Weather Radar installation 	During the site verification done by the EAP, no weather radar installations were seen from the site. The desktop assessment undertaken by the EAP indicated that the De Aar Weather station is located

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Impact Assessment	Protocol	Sensitivity	Conducted	Appointed Specialist	Findings of screening Tool	Comments and findings
	rotocols/Gazetted_General_Requirement_Assessment_Protocols.pdf				<ul style="list-style-type: none"> High - Between 18 and 30 km from a Weather Radar installation and within the radar's line of sight 	along Smouspoort Road, approximately 16.5 km north-west from the development (in the far western reaches of De Aar). Additionally, based on the topography of the landscape, the site is located within a separate micro-topographic catchment and is therefore not located within the radar's line of sight. Therefore, the EAP is of the opinion that an RFI assessment would not be required for the proposed development.
Civil Aviation	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Civil_Aviation_Installations_Assessment_Protocols.pdf	Low		N/A	<ul style="list-style-type: none"> Low – No major or other types of civil aviation aerodromes. 	No airport or civil aviation aerodrome was seen from site or within the immediate area. The protocols have not identified specific requirements for areas of low sensitivity. As such, no further action will be undertaken.
Defense Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Defence_Installations_Assessment_Protocols.pdf	Low		N/A	<ul style="list-style-type: none"> Low – Low Sensitivity 	No impacts on existing Defence areas were noted on the site during the EAP's site verification visit. The protocols have not identified specific requirements for areas of low sensitivity. As such, no further action will be undertaken.
Aquatic Biodiversity	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf	Very High	Yes	The Biodiversity Company	<ul style="list-style-type: none"> Very High Wetlands_(River) – 	The Baseline assessment undertaken for the proposed development has been included as part of Annexure H of the Scoping Report.
Terrestrial Animal Species	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted	High		The Biodiversity Company	<ul style="list-style-type: none"> Medium – Aves - Aquila rapax Medium - Aves - Neotis ludwigii High – Aves - Neotis ludwigii 	The Baseline assessment undertaken for the proposed development has been included as part of Annexure H of the Scoping Report.

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Impact Assessment	Protocol	Sensitivity	Conducted	Appointed Specialist	Findings of screening Tool	Comments and findings
	_Animal_Species_Assessment_Protocols.pdf				<ul style="list-style-type: none"> • Low – Subject to confirmation 	
Terrestrial Plant Species	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf	Low		The Biodiversity Company	<ul style="list-style-type: none"> • Low – Low Sensitivity 	The Baseline assessment undertaken for the proposed development has been included as part of Annexure H of the Scoping Report.
Terrestrial Biodiversity	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf	Very High		The Biodiversity Company	<ul style="list-style-type: none"> • Very High – Ecological Support Area 	The Baseline assessment undertaken for the proposed development has been included as part of Annexure H of the Scoping Report.

9.2. Potential Environmental Impacts Identified

9.2.1. Pre-Construction/Planning

The following potential environmental impacts have been identified by the EAP and by initial input from the various specialists as impacts that may impact upon the undertaking of the construction phase that needs to be addressed.

- **Legislative Compliance and Sustainability Impacts:** Failure to secure applicable legislative permits/licenses/authorizations/agreements, or failure to or plan for the incorporation of their relevant conditions, can lead to delays in terms of timeframes, as well as cost implications. Where legal non-compliance/s are observed, this can have legal penalties for the applicant.

9.2.2. Construction Phase

The following potential environmental impacts have been identified by the EAP and by initial input from the various specialists as impacts that may occur during the construction phase that need to firstly be avoided and if unavoidable, mitigated to an acceptable level of impact significance.

- **Agricultural Potential Impact - Loss of agricultural land** that has the potential to be used for cultivation of crops or other agricultural purposes (opportunity cost) is not relevant for this property because it would require an environmental process to be undertaken to establish crops on this property. Currently, the site is utilised for game farming and small-scale livestock grazing practices. As per the outcome of the assessment done by the appointed Agricultural specialist (Johann Lanz, 2022), it is hereby confirmed that the agricultural impact of the proposed development was assessed and found to be very low as the areas of High significance will be completely avoided.
- **Botanical Impact - Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species:** Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint. A number of Species of Conservation Concern, have been identified within the study area. A majority of the vegetation on site could be considered as Ecological Corridors for migrating fauna. These areas are also considered important foraging and nesting habitats. Three distinct vegetation communities were identified within the study area, with the Shrubland vegetation being the largest contributor to the natural landscape (in terms of extent).
- **Botanical Impact – Spread and/or establishment of alien and/or invasive species (especially plants):** The establishment of these species could potentially lead to the loss of vegetation and habitat. Indirectly, alien and/or invasive species could cause the spread of potentially dangerous diseases due to invasive and pest species.
- **Faunal Impact – Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching):** Activities associated with vegetation clearing and killing of perceived dangerous or tradable fauna, may lead to increased mortalities among faunal species.
- **Freshwater Resources Impact – Loss or degradation of watercourse:** The proposed development will see to the use and formalisation of existing tracks and servitudes that leads through the watercourses. Existing infrastructural corridors will be used as far as possible.
- **Freshwater Resources Impact – Increased bare surfaces, flood peaks and potential for erosion:** Vegetation clearing and exposure of bare soils within and upslope of the aquatic

habitat during construction will decrease the soil binding capacity and cohesion of the upslope soils and thus increase the risk of erosion and sedimentation downslope.

- **Freshwater Resources Impact – Introduction and spread of alien and invasive vegetation:** Sources of modification that result from livestock within the game farms include where livestock trample watercourse banks removing vegetation and causing erosion. These disturbed areas create habitat availability for alien invasives to inhabit.
- **Freshwater Resources Impact – Decreased flow inputs:** During the construction and installation phase of the proposed development, excavation of the soils will be required. This will lead to the alteration of the Hydrological Regime of the site, leading to decreased flow inputs to the watercourses.
- **Freshwater Resources Impact – Increased sediment loads to downstream reaches:** Removal of vegetation, particularly in the drainage areas has the potential to decrease infiltration and increase surface runoff. It also has the potential to result in erosion of the drainage area while at the same time increasing sediment loads and potentially toxicants delivered downstream.
- **Contamination impact - Environmental pollution due to water runoff, spills from vehicles and erosion:** During the construction phase, equipment will be used that could potentially pollute the biological resources, should the plant not be managed in a satisfactory manner. Construction activities will generate waste. In addition, fuel, oil, lubricants and other pollutants may leak from vehicles/ machinery and contaminate the soil. Pollution and soil contamination could also occur from chemical toilets, cement mixing directly on the soil and storm water runoff may flow over the site camp area and carry contaminants off-site.
- **Dust & Noise Impact – Associated with Construction Activities:** Dust impacts may result due to construction activities and excavation activities on the site. Excavations and associated earth-moving activities may generate noise and vibration which may pose a nuisance to surrounding residents and other land users. Movement of heavy vehicles to & from the site may generate noise, which may affect surrounding residents.
- **Heritage Impact - The loss of Heritage resources, including Archaeological and Paleontological:** Due to land clearing and excavations on the site. The appointed heritage and cultural specialist has indicated that it expected that some areas (the rock engraving sites) will be of very high sensitivity, these will be identified as part of the detailed Heritage and Archaeological impact assessment undertaken.
- **Palaeontological Impact – Impacting areas of Palaeontological sensitivity –** Based on the findings of the Palaeontological assessment, numerous areas (based on the geology of the site) with a very high potential of fossiliferous material to be unearthed was identified. There is a potential that these areas could be unearthed during the construction phase of the proposed development.
- **Socio-Economic Impact – Creation of employment and business opportunities:** Members from the local communities in the area, specifically De Aar, would be in a position to qualify for most of the low skilled and semi-skilled opportunities. The business-related opportunities will be linked to the hospitality (accommodation) and services sector (catering, security, transport etc.).
- **Socio-Economic Impact – Impact of construction workers on local communities:** The presence and behaviour of construction workers can impact negatively on local communities. Members from the local communities in the area, specifically De Aar, would be at potential risk depending on where non-local construction workers are accommodated during the construction phase.

- **Socio-Economic Impact – Influx of job seekers:** The construction phase of the proposed development can cause an influx of jobseekers to the area and this has the potential to impact negatively on local communities. However, the potential for the influx of jobseekers is also influenced by the location of the project. Projects located in relatively remote, rural areas are less likely to attract jobseekers.
- **Socio-Economic Impact – Risk to safety, livestock and farm infrastructure:** The movement and activities of construction workers can impact on farming operations. The impacts include damage to fences and gates, gates being left open resulting in loss of livestock, increased risk of petty theft and stock theft etc.
- **Socio-Economic Impact – Increased risk of grass fires:** The construction phase can increase the risk of grass fires, which in turn can impact on farming operations. The impacts include loss of grazing, damage to structures, fences, and gates, etc. These impacts impact on the livelihood of farmers.
- **Socio-Economic Impact – Nuisance impacts associated with construction related activities:** Limited dust and noise impacts may result due to construction activities on the site. Excavations and associated earth-moving activities may generate noise and vibration which may pose a nuisance to surrounding residents and other land users. Movement of heavy vehicles to & from the site may generate noise, which may affect surrounding residents. Construction related activities, including the movement of heavy construction vehicles of and on the site, has the potential to create dust, noise and safety impacts and damage roads. The impacts will be largely local and can be effectively mitigated.
- **Socio-Economic Impact – Loss of farmland:** The construction phase will result in the loss of farmland, including grazing and or crops depending on the location. These impacts impact on the livelihood of farmers. However, loss of land and crops can be addressed by minimising the disturbance footprint and compensation for losses.
- **Traffic & Safety Impact:** It is proposed to deliver a significant number of materials and equipment to the site during the construction phase of the development. Numerous truck trips will be required every day that could cause a temporary disturbance to traffic in the area. Impacts are expected to occur to the traffic in the area due to increased truck and construction vehicle traffic expected during the construction phase. Construction vehicles may impact on the existing road conditions (road capacity and congestion). Vehicles may impact on road safety conditions due to an increase in construction phase vehicles entering and exiting the site and they may impact on the condition of the existing road network.
- **Visual Impact:** The construction phase is associated with temporary disturbance as a result of construction (trench excavations, vehicles, machinery, fencing & signage) that may have a negative visual impact to the area. These impacts will be seen on a regional, local and site scale.

9.2.3. Operation Phase

- **Botanical Impact - Invasion by exotic and alien species:** Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established. The project will promote the establishment of disturbance-tolerant biota, including colonization by invasive alien species, weeds and pioneer plants within the remaining habitat. Although this impact is initiated during the construction phase it is likely to persist into the operational phase.

- **Botanical Impact - Disturbances to ecological processes:** Activity may result in disturbances to ecological processes.
- **Faunal Impact – Direct mortality of fauna:** During the operational phase of the proposed development, specifically regarding the avifauna using these areas for nesting and migratory purposes, there is a likelihood of electrocution of the species due to the installation of the overhead powerlines.
- **Faunal impact - Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust, heat radiation and light pollution:** This impact could be seen in unrehabilitated land, due to the humming of the cooling fans of the battery energy storage facility, heat radiation from the solar panels, and light pollution.
- **Freshwater Resources Impact – Disturbance/Loss of aquatic vegetation and habitat:** Roads, pipelines and culverts create migration barriers to biota, resulting in reach to zone scale instream biological impacts. Localised scour around structures or flow impediments may result and alter the natural bank and channel, channel bank stability and floodplain processes. Road and pipeline crossings that concentrate diffuse flows and can also inadvertently trigger gully formation.
- **Freshwater Resources Impact – Erosion of the banks and sedimentation of the watercourses:** Where soil erosion problems initiated during the construction phase are not timeously and adequately addressed, these can persist into the operational phase of the development project and continue to have a negative impact downstream. The impact of road and pipe crossings will be considerable and, if not mitigated against, will result in further erosion. Surface runoff and velocities will be increased, and flows will be concentrated by stormwater infrastructure.
- **Socio-Economic Impact – Improve energy security and support the renewable energy sector:** South Africa's energy crisis, which started in 2007 and is ongoing, has resulted in widespread rolling blackouts (referred to as load shedding) due to supply shortfalls. The load shedding has had a significant impact on all sectors of the economy and on investor confidence. A review of the REIPPPP and establishment of renewable energy facilities not only addresses environmental issues associated with climate change and consumption of scarce water resources, but also create significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.
- **Socio-Economic Impact – Creation of employment opportunities:** The direct employment opportunities associated with the operational phase of renewable energy projects are relatively limited. However, a review of the REIPPPP indicates that the benefits associated with the operation of renewable energy projects are significant and extend beyond direct employment opportunities.
- **Socio-Economic Impact – Benefits associated with income generated for the affected farmers:** The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc.
- **Socio-Economic Impact -Benefits associated with the socio-economic contributions:** The revenue from the proposed development can be used to support a number of social and economic initiatives in the area, including Creation of jobs, education, support for and provision of basic services, school feeding schemes, training and skills development, and support for Small, Medium and Micro Enterprises.
- **Socio-Economic Impact – Potential impact on property values:** This is usually linked to the visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place.

- **Socio-Economic Impact - Tourism:** Renewable energy projects do have the potential to impact on an areas sense of place. In some instances, this can impact on tourism activities. In other cases, local landowners have indicated that the potential visual impacts and impact on tourism activities are not regarded as an issue.
- **Visual Impact – Land use character & “sense of place”:** Renewable energy projects do have the potential to impact on an areas sense of place. In some instances, this can impact on existing or proposed tourist facilities and also on property values. In other cases local landowners have indicated that the potential visual impacts are not regarded as an issue.
- **Visual impact – Impact on the commuters travelling via the N10:** There is a potential that the proposed development will lead to glare which can cause temporary ‘blindness’ of the road users.
- **Climate impact –** Due to the transformation of land/change of character of the proposed development area, the impacting of water resources (to some extent), specifically during the determination of the access roads into the proposed development site, the glare from the solar panel creating altered micro-climatic conditions (specifically when evaluated cumulatively).

9.3. Methodology Applied in Impact Assessment

The following assessment methodology was used by the Specialists and the EAP. It has been adapted from the DEAT (2002) Information Series 5, Integrated Environmental Management Information Series on Impact Significance:

Table 9-2: Methodology in determining the extent, duration, probability, significance, reversibility and cumulative impact of an environmental impact (to be read with section 9.2 impact tables below).

Determination of Extent (Scale):

Site Specific	1	The impact is limited to the development site (development footprint) or part thereof.
Local	2	The impacted area includes the whole or a measurable portion of the site, but could affect the area surrounding the development, including the neighbouring properties and wider municipal area.
Regional	3	The impact would affect the broader region (e.g. neighbouring towns) beyond the boundaries of the adjacent properties.
National	4	The impact would affect the whole country (if applicable).

Determination of Duration:

Temporary	1	The impact will be limited to part of the construction phase or less than one month.
Short term	2	The impact will continue for the duration of the construction phase, or less than one year.
Medium term	3	The impact will continue for part the operational phase
Long term	4	The impact will continue for the entire operational lifetime of the development, but will be mitigated by direct human action or by natural processes thereafter.

Permanent	5	This is the only class of impact that will be non-transitory. Such impacts are regarded to be irreversible, irrespective of what mitigation is applied.

Determination of Probability:

Improbable	1	The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
Probable	2	There is a possibility that the impact will occur to the extent that provisions must therefore be made.
Highly probable	3	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up to mitigate the activity before the activity commences.
Definite	4	The impact will take place regardless of any prevention plans.

Determination of Significance (without mitigation):

No significance	1	The impact is not substantial and does not require any mitigation action.
Low	2	The impact is of little importance, but may require limited mitigation.
Medium	3	The impact is of sufficient importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
Medium-High	4	The impact is of high importance and is therefore considered to have a negative impact. Mitigation is required to manage the negative impacts to acceptable levels.
High	5	The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.
Very High	6	The impact is critical. Mitigation measures cannot reduce the impact to acceptable levels. As such the impact renders the proposal unacceptable.

Determination of Significance (with mitigation):

No significance	1	The impact will be mitigated to the point where it is regarded to be insubstantial.
Low	2	The impact will be mitigated to the point where it is of limited importance.
Medium	3	Notwithstanding the successful implementation of the mitigation measures, the impact will remain of significance. However, taken within the overall context of the project, such a persistent impact does not constitute a fatal flaw.
High	4	Mitigation of the impact is not possible on a cost-effective basis. The impact continues to be of great importance, and, taken within the overall context of the project, is considered to be a fatal flaw in the project proposal.

Determination of Reversibility:

Completely Reversible	1	The impact is reversible with implementation of minor mitigation measures
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Partly Reversible	2	The impact is partly reversible but more intense mitigation measures
Barely Reversible	3	The impact is unlikely to be reversed even with intense mitigation measures
Irreversible	4	The impact is irreversible and no mitigation measures exist

Determination of Degree to which an Impact can be Mitigated:

Can be mitigated	1	The impact can be completely mitigated
Can be partly mitigated	2	The impact can be partly mitigated
Can be barely mitigated	3	It is possible to mitigate the impact only slightly
Not able to mitigate	4	It is not possible to mitigate the impacts

Determination of Loss of Resources:

No loss of resource	1	The impact will not result in the loss of any resources
Marginal loss of resource	2	The impact will result in marginal loss of resources
Significant loss of resources	3	The impact will result in significant loss of resources
Complete loss of resources	4	The impact will result in a complete loss of all resources

Determination of Cumulative Impact:

Negligible	1	The impact would result in negligible to no cumulative effects
Low	2	The impact would result in insignificant cumulative effects
Medium	3	The impact would result in medium cumulative effects
High	4	The impact would result in significant cumulative effects

The Significance ratings have been calculated based on the Consequence, Probability and the Reversibility of the impacts.

The following formulas were used to calculate the Significance:

Significance = (Consequence x Likelihood) + Reversibility

where:

Consequence = Degree of Loss + Extent + Duration

and:

Likelihood = Probability + Level of Mitigation

Significance ratings of impacts after mitigation have been colour coded for ease of reference, as follows:

POSITIVE IMPACTS	Rating	NEGATIVE IMPACTS
Very High	90-108	Very High
High	76-90	High
Medium-High	61-75	Medium-High
Medium	46-60	Medium
Low-Medium	31-45	Low-Medium
Low	16-30	Low
Negligible	0-15	Negligible

9.4. Pre-Construction/Planning Phase Impacts

	Legislative Compliance and Sustainability Impacts		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Failure to secure applicable legislative permits/licenses/authorizations/agreements, or failure to or plan for the incorporation of their relevant conditions, can lead to delays in terms of timeframes, as well as cost implications. Where legal non-compliance/s are observed, this can have legal penalties for the applicant.		No Impact, as no legal requirements will be required of the applicant, as the applicant is not the landowner and their agreement is only applicable if the development occurs.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Site Specific; Long Term	Site Specific; Long Term	-N/A
Probability of occurrence:	Probable	Probable	-N/A
Degree to which the impact can be reversed:	Completely Reversible	Completely Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resources	Marginal loss of resources	-N/A
Cumulative impact prior to mitigation:	Medium - High	Medium - High	-N/A
Significance rating of impact prior to mitigation	Medium	Medium	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<p>General:</p> <ul style="list-style-type: none"> Appoint a suitably qualified and/or experienced Environmental Control Officer (ECO), to ensure that any relevant environmental pre-construction conditions are complied with. The Contractor is to appoint a suitably qualified Environmental Site Officer, to undertake daily environmental monitoring. Ensure all applicable permits/licenses/agreements/authorizations are obtained prior to commencement of the relevant activities in line with these applicable permits/licenses/agreements/authorizations. <p>Planning and Budget:</p> <ul style="list-style-type: none"> The consulting engineer/applicant responsible for compiling any contract documentation for potential/appointed contractors/ subcontractors/ consultants/ sub-consultants, must ensure that the documentation takes into consideration any relevant activities/conditions, that require compliance, including conditions of the approved EMPr. - Cost and time allowances must be made for all relevant conditions/requirements/measures. 		-N/A

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Legislative Compliance and Sustainability Impacts			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> Planning must take into account the restrictions raised by specialists, including seasonal limitations (where applicable), when planning activities, including programme of works, establishment of site camp/s, access roads and material delivery, material and other storage areas. - Where activities cannot be performed on site, for example maintenance of vehicles, pre-arrangements must be made to identify areas off-site to undertake these activities. <p>Site Camp:</p> <ul style="list-style-type: none"> The ECO must be consulted when selecting the site camp, designating storage areas, and main access areas to the site camp. Designated areas must be identified for: <ul style="list-style-type: none"> - Site office position/s. - Portable toilet positioning. - Storage areas for waste. - Storage areas for material. - Storage areas for hazardous substances. - Areas for mixing concrete (if required, and may only be on transformed surfaces, or on surfaces intended to be transformed into hardened surfaces and are bunded. - Parking areas. - Transplanting areas for temporary storage of plant species to be utilized for landscaping. Consideration needs to be given to the type of fencing to be utilized around the temporary site camp. Identify registered waste landfill and re-use sites. 		
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low	Low	-N/A

9.5. Construction Phase Impact Tables

Note: There is only one site location proposed for the development, however two layout Alternatives are being assessed (**Alternative 1 and Alternative 2**). These two alternatives have been assessed compared to the NO-GO (**Alternative 3**).

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9.5.1. Agricultural Potential Impact – Loss of Agricultural Land

	Agricultural Potential Impact – Loss of Agricultural Land		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Loss of agricultural land that has the potential to be used for cultivation of crops or other agricultural purposes (opportunity cost). The land proposed for the development site has been mapped to have a moderate agricultural potential land use. According to the Agricultural impact assessment, only two (2) areas (which have since been excluded from the proposed development area) have been identified as definite no-go areas.		No impact, as agricultural land would still be available for use however this would need to go through a NEMA process if transformed to cultivated land.
Nature of impact:	Negative	Negative	No impact
Extent and duration of impact:	Site Specific; Long Term	Site Specific; Long Term	N/A
Probability of occurrence:	Improbable	Definite	N/A
Degree to which the impact can be reversed:	Completely Reversible	Irreversible	N/A
Degree to which the impact may cause irreplaceable loss of resources:	No loss to resource	Complete loss of resource	-N/A
Cumulative impact prior to mitigation:	Low	Very High	-N/A
Significance rating of impact prior to mitigation	Low	High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be barely mitigated	-N/A
Proposed mitigation:	<p>Specialist Recommendations:</p> <ul style="list-style-type: none"> • <u>Stormwater Management:</u> <ul style="list-style-type: none"> - Ensure that a system of storm water management, which will prevent erosion, is an inherent part of the engineering on site. - Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. • <u>Excavations:</u> <ul style="list-style-type: none"> - Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 20 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. - When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. 		-N/A

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Agricultural Potential Impact – Loss of Agricultural Land			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> - Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. - If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. It will be advantageous to have topsoil and vegetation cover below the panels during the operational phase to control dust and erosion 		
Cumulative impact post mitigation:	Low	High	-N/A
Significance rating of impact after mitigation	Low - Negligible (-)	High (-)	-N/A

9.5.2. Botanical Impact – Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species

Botanical Impact - Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint. A number of Species of Conservation Concern have been identified within the study area. Majority of the vegetation on site could be considered as Ecological Corridors for migrating fauna. These areas are also considered important foraging and nesting habitats. Three distinct vegetation communities were identified within the study area, with the Shrubland vegetation being the largest contributor to the natural landscape (in terms of extent).		No Impact, as no clearing would occur.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Irreversible	Irreversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	High	Very High	-N/A

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	Botanical Impact - Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Significance rating of impact prior to mitigation	High	Very High	-N/A
Degree to which the impact can be mitigated:	Can be barely mitigated	Can be barely mitigated	-N/A
Proposed mitigation:	<p>General:</p> <ul style="list-style-type: none"> • Ensure all permits relevant to any activity that may require the trimming/removal/disturbance of a specific flora species, is obtained prior to the commencement of clearance activities. • Ensure mitigation measures as per specialist recommendation are implemented in full. • Ensure labour undergoes environmental inductions which should include as a minimum: <ul style="list-style-type: none"> - Faunal mitigation measures as detailed in table 9.5.4. - Specialist recommendations. • Implement the search and rescue plan. • Transplant the rescued species until such a time that the species can be located back into the landscape. • Remove alien invasive plants and rehabilitate. • Ensure sufficient quality, quantity and connectivity of habitat is available. • Develop and implement fire management program. • Development of an Environmental Management Programme (EMPr) to control construction impacts • Only existing infrastructure must be used as access routes. • A minimum impact approach must be followed during the construction phase, specifically during the formalisation of the access roads leading to the proposed development areas. <p>Specialist Recommendation:</p> <ul style="list-style-type: none"> • All 'Very High' SEI habitats and Water resource and associated buffer zones are to be avoided where possible. • Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. • Do not clear areas of indigenous vegetation outside of the direct development footprint within the PAOI. • Minimise vegetation clearing to the minimum required. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. • Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds. • No non-environmentally friendly suppressants may be used as this could result in pollution of water sources. 		-N/A

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	Botanical Impact - Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover. Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both fossorial and epigeic biodiversity (Bennun et al, 2021). If concrete foundations are used that would increase the impact of the project as there would be direct impacts to soil permeability and characteristics, thereby influencing inhabitant fauna. In addition, stormwater runoff and runoff from cleaning the panels would be increased, increasing erosion in the surrounding areas. Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). Vegetation clearing to commence only after the necessary permits have been obtained. Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities. Plans Required: <ul style="list-style-type: none"> Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the Project site. Compile and implement a rehabilitation plan from the onset of the Project; <ul style="list-style-type: none"> Rehabilitate areas as soon as they are no longer impacted by construction. The rehabilitated areas must be revegetated with indigenous vegetation. 		
Cumulative impact post mitigation:	Medium	High	-N/A
Significance rating of impact after mitigation	Medium (-)	High (-)	-N/A

9.5.3. Botanical Impact – Introduction of alien species especially plants

	Botanical Impact – Introduction of alien spp, especially plants		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The establishment of these species could potentially lead to the loss of vegetation and habitat. Indirectly, alien and/or invasive species could cause the spread of potentially dangerous diseases due to invasive and pest species.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A

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	Botanical Impact – Introduction of alien spp, especially plants		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Probability of occurrence:	Highly Probable	Highly Probable	-N/A
Degree to which the impact can be reversed:	Barely Reversible	Barely Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Complete Loss of resource	Complete Loss of resource	-N/A
Cumulative impact prior to mitigation:	Very High	Very High	-N/A
Significance rating of impact prior to mitigation	Medium - High	Medium - High	-N/A
Degree to which the impact can be mitigated:	Can be Partly mitigated	Can be Partly mitigated	-N/A
Proposed mitigation:	<p>General:</p> <ul style="list-style-type: none"> • Alien invasive species that are removed, must be contained within a suitable bin/skip, that will not allow for the dispersal of the contents, should bad weather conditions occur. • Manage alien invasive species in line with the Alien Invasive Management Plan. • No waste material may be stored on site for more than 90-days. <p>Specialist Recommendation:</p> <ul style="list-style-type: none"> • Implement the applicable alien vegetation management plan from the onset of construction. <ul style="list-style-type: none"> - Removal methods and frequencies to must be followed as per this plan. - Monitoring must be implemented as per this plan. - This plan must be updated as/when new data is collated. • Implementation of the waste management plan. <ul style="list-style-type: none"> - Monitoring must be undertaken as per this plan. - This plan must be updated as/when new data is collated. - Waste management must be a priority and all waste must be collected, stored and disposed of adequately. - It is recommended that all waste be removed from site on a weekly basis (as a minimum) to prevent rodents and pests entering the site. • Refuse bins must be emptied and secured. • Temporary storage of domestic waste shall be in covered waste skips. • Maximum domestic waste storage period will be 7 days. <p>A pest control plan must be put in place and implemented; it is imperative that poisons not be used.</p>		-N/A

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	Botanical Impact – Introduction of alien spp, especially plants		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Cumulative impact post mitigation:	Medium	Medium	-N/A
Significance rating of impact after mitigation	Medium (-)	Medium (-)	-N/A

9.5.4. Faunal Impact – Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching)

	Faunal Impact - Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching)		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Activities associated with vegetation clearing, can result in displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching).		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Highly Probable	Highly Probable	-N/A
Degree to which the impact can be reversed:	Barely reversible	Barely reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significance loss of resources	Significance loss of resources	-N/A
Cumulative impact prior to mitigation:	Medium-High	Medium-High	-N/A
Significance rating of impact prior to mitigation	Medium-High	Medium-High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	Specialist Recommendations: <ul style="list-style-type: none"> • Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. • Prior to vegetation clearing activities, the area to be cleared should be walked on foot by 1-2 individuals to create a disturbance in order for fauna to move off. Sites should be disturbed only prior to the area having to be cleared, not more than 1 day in advance. 		-N/A

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	Faunal Impact - Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching)		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist. All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. A movement corridor within the PV area must be incorporated into the design in order to allow fauna to move to and from the rocky habitats and Degraded shrubveld habitats. Minimise vegetation clearing to the minimum required. Areas should be cleared and disturbed on a needs basis only, as opposed to clearing and disturbing a number of sites simultaneously. All personnel and contractors to undergo Environmental Awareness Training to all personnel and contractors. A signed register of attendance must be kept for proof. Discussions The training must include. The timing between clearing of an area and subsequent development must be minimized to avoid fauna from re-entering the site to be disturbed. Any holes/deep excavations must done in a progressive manner on a needs basis only. No holes/excavations may be left open overnight. In the event holes/excavations are required to remain open overnight, these areas must be covered to prevent fauna falling into these areas and subsequently inspected prior to backfilling Where possible, work should be restricted to one area at a time and be systematic. This is to reduce the number and extent of on-site activities, allowing fauna to move off as the Project progresses. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories. Considering that many of the mammal fauna recorded within the project area are nocturnal, no construction activity is to occur at night. 		
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.5.5.Freshwater impact – Loss or degradation of watercourse

	Freshwater impact – Loss or degradation of watercourse		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	<p>The proposed development will not lead to significant loss or degradation of the watercourses as the proposed development will be located outside of the 50 m buffer placed around the watercourses. The proposed development will see to the use and formalisation of existing tracks and servitudes that leads through the watercourses. Existing infrastructural corridors will be used as far as possible.</p>		
	No Impact.		

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	Freshwater impact – Loss or degradation of watercourse		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Probable	Probable	-N/A
Degree to which the impact can be reversed:	Partly Reversible	Partly Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resource	Marginal loss of resource	-N/A
Cumulative impact prior to mitigation:	High	High	-N/A
Significance rating of impact prior to mitigation	High	High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be barely mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> • Use the watercourse shapefiles provided by TBC to clearly demarcate (on the ground) the edge of the buffer on watercourses (50 m buffer). Regard these as strict no-go areas and signpost as environmentally sensitive. • All activities (including driving and equipment storage) must remain outside of the watercourse and associated buffer identified on site that will be conserved. • All infrastructure during both construction (e.g., laydown yards) and operation (e.g., offices, control room/s, storage facilities, inverters, and transformers) must remain outside of the watercourse and associated buffer identified on site that will be conserved • Hold off on the clearing of vegetation as long as possible, ensuring that all environmental and water use authorisations are in place, the site construction materials are in place and the PV infrastructure is sourced and ready for construction prior to clearing. • Take every measure to ensure that the bulk of the site clearing and earth moving activities take place in winter when rainfall is lowest (and the grass sward is thinnest) to minimize environmental damage, erosion, sedimentation, and contamination. • While clearing keep a nursery of plant sods (prioritise hydrophytes) in an on-site nursery rehabilitation of disturbed areas. • Minimize the disturbance footprint and the unnecessary clearing of vegetation outside of this area. • Use existing access roads wherever possible. 		-N/A
Cumulative impact post mitigation:	Low	Medium	-N/A

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	Freshwater impact – Loss or degradation of watercourse		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.5.6.Freshwater impact – Increased bare surfaces, flood peaks and potential for erosion

	Freshwater impact – Increased bare surfaces, flood peaks and potential for erosion		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Vegetation clearing and exposure of bare soils within and upslope of the aquatic habitat during construction will decrease the soil binding capacity and cohesion of the upslope soils and thus increase the risk of erosion and sedimentation downslope. This may cause the burying of aquatic habitat and also cause aquatic faunal fatalities. It may lead to the wetland ceasing to function. Ineffective site stormwater management, particularly in periods of high runoff, can lead to soil erosion from confined flows. Formation of rills and gullies from increased concentrated runoff. This increase in volume and velocity of runoff increases the particle carrying capacity of the water flowing over the surface. This is likely to be one of the most significant impacts upon the watercourses. Any development on the steeply sloped areas, including roads, magnifies the potential for the watercourses to be impacted upon.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Highly Likely	Definite	-N/A
Degree to which the impact can be reversed:	Partly Reversible	Partly Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	High	High	-N/A
Significance rating of impact prior to mitigation	High	High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> Use the watercourse shapefiles provided by TBC to clearly demarcate (on the ground) the edge of the buffer on watercourses (50 m buffer). Regard these as strict no-go areas and signpost as environmentally sensitive. 		-N/A

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	Freshwater impact – Increased bare surfaces, flood peaks and potential for erosion		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> All activities (including driving and equipment storage) must remain outside of the watercourse and associated buffer identified on site that will be conserved. All infrastructure during both construction (e.g., laydown yards) and operation (e.g., offices, control room/s, storage facilities, inverters, and transformers) must remain outside of the watercourse and associated buffer identified on site that will be conserved Hold off on the clearing of vegetation as long as possible, ensuring that all environmental and water use authorisations are in place, the site construction materials are in place and the PV infrastructure is sourced and ready prior to clearing. Take every measure to ensure that the bulk of the site clearing and earth moving activities take place in winter when rainfall is lowest (and the grass sward is thinnest) to minimize environmental damage, erosion, sedimentation and contamination. Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. Scrape the area where mixing and storage of sand and concrete occurred to clean and re-grass once finished. Revegetate all denuded areas beyond the buildings as soon as possible 		
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.5.7.Freshwater impact – Introduction and spread of alien and invasive vegetation

	Freshwater impact – Introduction and spread of alien and invasive vegetation		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Sources of modification that result from livestock within the game farms include where livestock trample watercourse banks removing vegetation and causing erosion. These disturbed areas create habitat availability for alien invasives to inhabit such as Mexican prickly poppy (<i>Argemone ochroleuca</i>) observed in the riparian areas. Exotic macrophytes were also observed within select instream dams in the form of oxygen weed (<i>Lagarosiphon</i>)		Due to the fact that alien invasive species have already been within the property boundaries, there is a chance that further colonisation of these species could occur if not properly managed.
Nature of impact:	Negative	Negative	Negative
Extent and duration of impact:	Local; Permanent	Local; Permanent	Local; Permanent
Probability of occurrence:	Improbable	Improbable	Probable
Degree to which the impact can be reversed:	Partly Reversible	Partly Reversible	Partly Reversible

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	Freshwater impact – Introduction and spread of alien and invasive vegetation		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss of resource	Marginal Loss of resource	Marginal Loss of resource
Cumulative impact prior to mitigation:	Medium (-)	Medium (-)	Medium (-)
Significance rating of impact prior to mitigation	Medium (-)	Medium (-)	Medium (-)
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	Can be partly mitigated
Proposed mitigation:	<ul style="list-style-type: none"> Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs). Appropriately stockpile topsoil cleared from the site. Minimize unnecessary clearing of vegetation beyond the infrastructure footprints. Lightly till any disturbed soil around the development to avoid compaction. 		<ul style="list-style-type: none"> As duty of care by the landowner is applicable in the case of the no-go alternative, the onus will rest on the landowner to ensure that an alien management and rehabilitation programme is compiled and implemented order to minimise the impact of further colonization.
Cumulative impact post mitigation:	Low	Medium	Low-Medium (-)
Significance rating of impact after mitigation	Low (-)	Medium (-)	Low-Medium (-)

9.5.8.Freshwater impact – Decreased flow inputs to watercourses

	Freshwater impact – Decreased flow inputs to watercourses		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	During the construction and installation phase of the proposed development, excavation of the soils will be required. This will lead to the alteration of the Hydrological Regime of the site, leading to decreased flow inputs to the watercourses.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Definite	Definite	-N/A

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Freshwater impact – Decreased flow inputs to watercourses			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Degree to which the impact can be reversed:	Partly reversible	Partly reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resources	Significant loss of resources	-N/A
Cumulative impact prior to mitigation:	High (-)	High (-)	-N/A
Significance rating of impact prior to mitigation	High (-)	High (-)	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be partly mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> • Use the watercourse shapefiles provided by TBC to clearly demarcate (on the ground) the edge of the buffer on watercourses (50 m buffer). Regard these as strict no-go areas and signpost as environmentally sensitive. • All activities (including driving and equipment storage) must remain outside of the watercourse and associated buffer identified on site that will be conserved. • All infrastructure during both construction (e.g., laydown yards) and operation (e.g., offices, control room/s, storage facilities, inverters, and transformers) must remain outside of the watercourse and associated buffer identified on site that will be conserved • Aim to maximise infiltration of rainwater and maintain diffuse subsurface drainage below PVs in seeps. • Develop a sound stormwater management plan that is engineered to promote rainfall infiltration, maintain diffuse subsurface flows in seep areas, minimise the development of preferential flow paths. • The stormwater plan would also benefit from Lidar based topography maps and / or site-specific contours that allow for the identification of flow paths. • All low points, flow paths or clean water drains should be engineered to minimize erosion through the installation of small drop downs and flow attenuation structures especially out outlets into the drainage areas. • Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in). • Minimise the extent of concreted / paved / gravel areas. • Avoid excessively compacting the ground beneath the solar panels. • Introduce coarse, preferably washed, gravel beneath PV arrays. 		-N/A
Cumulative impact post mitigation:	Low (-)	Medium (-)	-N/A

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	Freshwater impact – Decreased flow inputs to watercourses		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.5.9.Freshwater impact – Increased sediment loads to downstream reaches

	Freshwater impact – Increased sediment loads to downstream reaches		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Removal of vegetation, particularly in the drainage areas has the potential to decrease infiltration and increase surface runoff. It also has the potential to result in erosion of the drainage area while at the same time increasing sediment loads and potentially toxicants delivered downstream.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Partly reversible	Partly reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resources	Significant loss of resources	-N/A
Cumulative impact prior to mitigation:	High (-)	High (-)	-N/A
Significance rating of impact prior to mitigation	High (-)	High (-)	-N/A
Degree to which the impact can be mitigated:	Can be partly mitigated	Can be partly mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> Use the watercourse shapefiles provided by TBC to clearly demarcate (on the ground) the edge of the buffer on watercourses (50 m buffer). Regard these as strict no-go areas and signpost as environmentally sensitive. All activities (including driving and equipment storage) must remain outside of the watercourse and associated buffer identified on site that will be conserved. All infrastructure during both construction (e.g., laydown yards) and operation (e.g., offices, control room/s, storage facilities, inverters, and transformers) must remain outside of the watercourse and associated buffer identified on site that will be conserved 		-N/A

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	Freshwater impact – Increased sediment loads to downstream reaches		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> • Hold off on the clearing of vegetation as long as possible, ensuring that all environmental and water use authorisations are in place, the site construction materials are in place and the PV infrastructure is sourced and ready prior to clearing. • Take every measure to ensure that the bulk of the site clearing and earth moving activities take place in winter when rainfall is lowest (and the grass sward is thinnest) to minimize environmental damage, erosion, sedimentation and contamination. • Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • Scrape the area where mixing and storage of sand and concrete occurred to clean and re-grass once finished. • Revegetate all denuded areas beyond the buildings as soon as possible. • Introduce coarse, preferably washed, gravel beneath PV arrays. 		
Cumulative impact post mitigation:	Medium (-)	High (-)	-N/A
Significance rating of impact after mitigation	Medium (-)	High (-)	-N/A

9.5.10. Contamination & Pollution Impact – Associated with Construction Activities

	Contamination & Pollution Impact – Associated with Construction Activities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Construction activities will generate waste. In addition, fuel, oil, lubricants and other pollutants may leak from vehicles/ machinery and contaminate the soil. Pollution and soil contamination could also occur from chemical toilets, cement mixing directly on the soil (should cement mixing occur on-site) and stormwater runoff may flow over the site camp area and carry contaminants off-site.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Medium term	Local; Medium term	-N/A
Probability of occurrence:	Probable	Probable	-N/A
Degree to which the impact can be reversed:	Barely reversible	Barely reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resources	Marginal loss of resources	-N/A

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Contamination & Pollution Impact – Associated with Construction Activities			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Cumulative impact prior to mitigation:	Low-Medium	Medium	-N/A
Significance rating of impact prior to mitigation	Low-Medium	Medium	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be partly mitigated	-N/A
Proposed mitigation:	<p>The appointed Environmental Control Officer (ECO) must undertake at least one site inspection per month, for the duration of the construction phase, and to produce a short monthly ECO monitoring audit report, auditing on the compliance of the property developer with the conditions of the Environmental Authorisation (EA) and the approved EMP.</p> <p>General Pollution Management:</p> <ul style="list-style-type: none"> • No pollution of surface water or ground water resources may occur due to any activity on the site. • No storm water runoff containing waste, or water containing waste emanating from construction activities may be discharged into the environment. • Polluted stormwater must be contained on the site. • Cement batching / mixing may not take place directly on the soil surface, it must be done on an impervious lining that will prevent cement particles from contaminating the soil. <p>General Waste Management:</p> <ul style="list-style-type: none"> • Dedicated waste bins or skips must be provided on site and kept in a demarcated area on an impermeable surface. • Separate waste bins/skips must be provided for recyclable waste, general waste and hazardous waste. Recovered builder's rubble & green waste may be stockpiled on the ground within the site camp, or in separate skips until removal. • Waste must be placed in the appropriate waste bins/skips/ stockpiles. • Hazardous waste bins must be kept on an impermeable bunded surface capable of holding at least 110% of the volume of the bins. • Skips/ bins must be provided with secure lids or covering that will prevent scavenging and windblown waste or dust. • Waste bins/skips must be regularly emptied and must not be allowed to overflow. • Construction workers must be instructed not to litter and to place all waste in the appropriate waste bins provided on site. • The Contractor must ensure that all workers on site are familiar with the correct waste disposal procedures to be followed. • Waste generated on site must be classified and managed in accordance with the National Environmental Management: Waste Act – Waste Classification and Management Regulations (GN No. R. 634 of August 2013). 		-N/A

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Contamination & Pollution Impact – Associated with Construction Activities		
Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> Disposal of waste to landfill must be undertaken in accordance with the National Environmental Management: Waste Act – National Norms and Standard for the Assessment of Waste for Landfill Disposal (GN No. R. 635 of August 2013). All waste, hazardous as well as general, which result from the proposed activities must be disposed of appropriately at a licensed Waste Disposal Facility (WDF). <p>Pollution Management – hydrocarbons (oil, fuel etc.)</p> <ul style="list-style-type: none"> Vehicles and machinery must be in good working order and must be regularly inspected for leaks. If a vehicle or machinery is leaking pollutants it must, as soon as possible, be taken to an appropriate location for repair. The ECO has the authority to request that any vehicle or piece of equipment that is contaminating the environment be removed from the site until it has been satisfactorily repaired. Repairs to vehicles/ machinery may take place on site, within a designated maintenance area at the site camp. Drip trays, tarpaulin or other impermeable layer must be laid down prior to undertaking repairs. Refuelling of vehicles/ machinery may only take place at the site camp or vehicle maintenance yard. Where refuelling must occur, drip trays should be utilised to catch potential spills/ drips. Drip trays must be utilised during decanting of hazardous substances and when refilling chemical/ fuel storage tanks. Drip trays must be placed under generators (if used on site) water pumps and any other machinery on site that utilises fuel/ lubricant, or where there is risk of leakage/spillage. Where feasible, fuel tanks should be elevated so that leaks are easily detected. A spill kit to neutralise/treat spills of fuel/ oil/ lubricants must be available on site, and workers must be educated on how to utilise the spill kit. Soil contaminated by hazardous substances must be excavated and disposed of as hazardous waste. <p>Pollution Management – Ablution facilities</p> <ul style="list-style-type: none"> Chemical toilets should be kept at the site camp, on a level surface and secured from blowing over. Toilets must be located well outside of any storm water drainage lines, and may not be linked to the storm water drainage system in any way. Chemical toilets must be regularly emptied, by an appropriately experienced company, and the waste disposed of at an appropriate waste water disposal/ treatment site. Care must be taken to prevent spillages when moving or servicing chemical toilets. <p>Pollution Management – Hazardous Substances</p> <ul style="list-style-type: none"> Any hazardous substances (materials, fuels, other chemicals etc.) that may be required on site must be stored according to the manufacturers' product-storage requirements, which may include a covered, waterproof bunded housing structure. 	

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Contamination & Pollution Impact – Associated with Construction Activities			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible and available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases. Hazardous chemicals and fuels should be stored on bunded, impermeable surfaces with sufficient capacity to hold at least 110% of the capacity of the storage tanks. <p>Cement Batching:</p> <ul style="list-style-type: none"> Cement batching must take place on an impermeable surface large enough to retain any slurry or cement water run-off. If necessary, plastic/ bitem lined detention ponds (or similar) should be constructed to catch the run-off from batching areas. Once the water content of the cement water/ slurry has evaporated the dried cement should be scraped out of the detention pond and disposed of at an appropriate disposal facility authorised to deal with such waste Cement batching should take place on already transformed areas within the footprint of the facility. Unused cement bags must be stored in such a way that they will be protected from rain. Empty cement bags must not be left lying on the ground and must be disposed of in the appropriate waste bin. Washing of excess cement/concrete into the ground is not allowed. All excess concrete/ cement must be removed from site and disposed of at an appropriate location. 		
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.5.11. Dust & Noise Impact – Associated with Construction Activities

Dust & Noise Impact – Associated with Construction Activities			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Dust impacts may result due to construction activities and excavation activities on the site. Excavations and associated earth-moving activities may generate noise and vibration which may pose a nuisance to surrounding residents and other land users. Movement of heavy vehicles to & from the site may generate noise, which may affect surrounding residents.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Site Specific; Temporary	Site Specific; Temporary	-N/A

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	Dust & Noise Impact – Associated with Construction Activities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Probability of occurrence:	Highly probable	Highly probable	-N/A
Degree to which the impact can be reversed:	Irreversible	Irreversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	No loss of resource	No loss of resource	-N/A
Cumulative impact prior to mitigation:	Low	Low	-N/A
Significance rating of impact prior to mitigation	Medium	Medium	-N/A
Degree to which the impact can be mitigated:	Can be partly mitigated	Can be partly mitigated	-N/A
Proposed mitigation:	<p>Dust Mitigation:</p> <ul style="list-style-type: none"> • Land clearing and earthmoving activities should not be undertaken during strong winds, where possible. • Cleared areas should be provided with a suitable cover as soon as possible, and not left exposed for extended periods of time. • Stockpiles of topsoil, spoil material and other material that may generate dust must be protected from wind erosion (e.g. covered with netting, tarpaulin or other appropriate measures. Note that topsoil should not be covered with tarpaulin as this may kill the seedbank). • The location of stockpiles must take into account the prevailing wind direction, and should be situated so as to have the least possible dust impact to surrounding residents, road-users and other land-users. • Speed limits must be enforced in all areas, including public roads and private property to limit the levels of dust pollution. • The speed limit should be set at 20-40km/h. • Dust must be suppressed on access roads and the construction site during dry periods by the regular application of water or a biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that will not result in the generation of excessive run off. • Dust suppression measures such as the wetting down of sand heaps with non-potable water as well as exposed areas around the site must be implemented especially on windy days. • If dust appears to be a continuous problem the option of using shade cloth to cover open areas may be necessary or the erecting of shade netting above the fenced off area may need to be explored. • All vehicles transporting sand need to have tarpaulins covering their loads which will assist in any windblown sand occurring off the trucks. 		-N/A

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Dust & Noise Impact – Associated with Construction Activities			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> Work on site must be well-planned and should proceed efficiently so as to minimise the handling of dust generating material. Dust levels specified in the <i>National Dust Control Regulations</i> (GN 827 of November 2013) may not be exceeded. i.e. dust fall in residential areas may not exceed 600mg/m²/day, measured using reference method ASTM D1739; A Complaints Register must be available at the site office for inspection by the ECO of dust complaints that may have been received. <p>Noise Mitigation:</p> <ul style="list-style-type: none"> A noise complaints register will be opened. Excavations and earth-moving activities must be restricted to normal construction working hours (7:30 – 17:30) as far as possible. Work on site must be well-planned and should proceed efficiently so as to limit the duration of the disturbance. Vehicles and equipment must be kept in good working condition. Machinery and equipment should be fitted with mufflers/ exhaust silencers. No unnecessary disturbances should be allowed to emanate from the construction site. Workers should be educated on how to control noise-generating activities that have the potential to become disturbances, particularly over an extended period of time. Noise levels must comply with the relevant health & safety regulations and SANS codes and should be monitored by the Health & Safety Officer as necessary and appropriate. Affected parties must be informed of the excessive noise factors. The noise management and monitoring measures prescribed in the EMP_r must be adhered to. 		
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	-N/A

9.5.12. Heritage Impact – Loss of heritage resources (heritage & cultural and palaeontological)

Heritage Impact – Loss of heritage resources			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The loss of Heritage Resources, including Archaeological and Paleontological Resources, due to land clearing and excavations on the site.		No Impact.
Nature of impact:	Negative	Negative	No Impact

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	Heritage Impact – Loss of heritage resources		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Extent and duration of impact:	Site Specific; Permanent	Site Specific; Permanent	-N/A
Probability of occurrence:	Improbable	Probable	-N/A
Degree to which the impact can be reversed:	Irreversible	Irreversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resource	Marginal loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium	High	-N/A
Significance rating of impact prior to mitigation	Medium	High	-N/A
Degree to which the impact can be mitigated:	Can be partly mitigated	Can be partly mitigated	-N/A
Proposed mitigation:	<p>General:</p> <ul style="list-style-type: none"> In the event that any heritage resources (human remains, grave stones, stone tools, artefacts, old coins and pottery, fossil shell middens, rock art and engravings, remains of old built structures etc.) are encountered during construction: <ul style="list-style-type: none"> The finding should be protected from further disturbance (ideally left in situ) and the ECO and relevant Heritage Authority should be notified. The finding should be handled and/or removed from site as per instructions issued by the Heritage Authority or delegated heritage specialist. In areas of high and very-high palaeontological sensitivity, the excavation depths are not to exceed 1.5 m. 		-N/A
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.5.13. Socio-Economic Impact – Creation of Business & Employment Opportunities

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Socio-Economic Impact –Creation of Business & Employment Opportunities			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The majority of work during the construction phase is likely to be undertaken by local contractors and builders. The proposed development will therefore represent a positive benefit for the local construction and building sector in the Eden District Municipality (EDM) and George Local Municipality (GLM). The majority of the building materials associated with the construction phase will be sourced from locally based suppliers from the EDM and GLM. A significant portion of the annual wage bill will be spent in the local EDM and GLM.		The no-development option would result in a lost opportunity in terms of the employment opportunities associated with the construction. A high negative socio-economic impact significance would occur if the proposed development is not constructed.
Nature of impact:	Positive	Positive	Negative
Extent and duration of impact:	Regional; temporary	Regional; temporary	Regional; temporary
Probability of occurrence:	Definite	Definite	Definite
Degree to which the impact can be reversed:	N/A – this is a positive impact, proposed to be enhanced	N/A – this is a positive impact, proposed to be enhanced	N/A
Degree to which the impact may cause irreplaceable loss of resources:	N/A – this is a positive impact, proposed to be enhanced	N/A – this is a positive impact, proposed to be enhanced	No loss of resource
Cumulative impact prior to mitigation:	Medium (positive)	Medium (positive)	Medium (negative)
Significance rating of impact prior to mitigation / enhancement:	Medium (positive)	Medium (positive)	High (negative)
Degree to which the impact can be mitigated:	N/A – this is a positive impact, proposed to be enhanced	N/A – this is a positive impact, proposed to be enhanced	The NO-GO Alternative assumes no mitigation. It assumes the status quo.
Proposed enhancement/ mitigation:	<p>In order to enhance local employment and business opportunities associated with the construction phase of the project the following measures are proposed to be implemented:</p> <ul style="list-style-type: none"> It is proposed that the developer inform the local authorities, local community leaders, organizations and councillors of the project and the potential job opportunities for local builders and contractors; The developer will be encouraged to establish a database of local construction companies in the area, specifically SMME's owned and run by HDI's, prior to the commencement of the tender process. These companies would be notified of the tender process and invited to bid for project related work; Where possible, the developer in consultation with the appointed contractor/s will look to employ a percentage of the labour required for the construction phase from local area in order to maximize opportunities for members from the local HD communities. 		The NO-GO Alternative assumes no mitigation. It assumes the status quo.

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	Socio-Economic Impact –Creation of Business & Employment Opportunities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Cumulative impact post mitigation:	High	High	Medium (negative)
Significance rating of impact after enhancement	High (+)	High (+)	High (-)

9.5.14. Socio-Economic Impact – Impact of construction workers on local communities

	Socio-Economic Impact – Impact of construction workers on local communities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The presence and behaviour of construction workers can impact negatively on local communities. Members from the local communities in the area, specifically De Aar, would be at potential risk depending on where non-local construction workers are accommodated during the construction phase.		No impact
Nature of impact:	Negative	Negative	N/A
Extent and duration of impact:	Regional; temporary	Regional; temporary	N/A
Probability of occurrence:	Probable	Probable	N/A
Degree to which the impact can be reversed:	Reversible	Reversible	N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss of Resource	Marginal Loss of Resource	N/A
Cumulative impact prior to mitigation:	Low (-)	Low (-)	N/A
Significance rating of impact prior to mitigation / enhancement :	Low (-)	Low (-)	N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	N/A

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Socio-Economic Impact – Impact of construction workers on local communities			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Proposed mitigation:	<p>In order to enhance local employment and business opportunities associated with the construction phase of the project the following measures are proposed to be implemented:</p> <ul style="list-style-type: none"> The developer will inform the local authorities, local community leaders, organizations and councillors of the project and the potential job opportunities for local builders and contractors; The developer will establish a database of local construction companies in the area, specifically SMME's owned and run by HDI's, prior to the commencement of the tender process. These companies will be notified of the tender process and invited to bid for project related work; The developer in consultation with the appointed contractor/s will look to employ a percentage of the labour required for the construction phase from local area in order to maximize opportunities for members from the local HD communities. Where possible, the project team will integrate any outsourced employment opportunities with the locals. 		N/A
Cumulative impact post mitigation:	Low (-)	Low (-)	N/A
Significance rating of impact after enhancement	Low (-)	Low (-)	N/A

9.5.15. Socio-economic impact – Influx of job seekers

Socio-Economic Impact – Influx of job seekers			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	<p>The construction phase of the proposed development can cause an influx of jobseekers to the area, this has the potential to impact negatively on local communities. However, the potential for the influx of jobseekers is also influenced by the location of the project. Projects located in relatively remote, rural areas are less likely to attract jobseekers.</p>		No impact
Nature of impact:	Negative	Negative	N/A
Extent and duration of impact:	Regional; temporary	Regional; temporary	N/A
Probability of occurrence:	Probable	Probable	N/A
Degree to which the impact can be reversed:	Reversible	Reversible	N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss of Resource	Marginal Loss of Resource	N/A

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Socio-Economic Impact – Influx of job seekers			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Cumulative impact prior to mitigation:	Low (-)	Low (-)	N/A
Significance rating of impact prior to mitigation / enhancement:	Low (-)	Low (-)	N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	N/A
Proposed mitigation:	<p>As this is a common occurrence in South Africa, and is subsequently difficult to discourage, the developer will strive to enhance local employment and business opportunities associated with the construction phase of the project. The following will be done to mitigate the impact:</p> <ul style="list-style-type: none"> The developer will inform the local authorities, local community leaders, organizations and councillors of the project and the potential job opportunities for local builders and contractors; The developer will establish a database of local construction companies in the area, specifically SMME's owned and run by HDI's, prior to the commencement of the tender process. These companies will be notified of the tender process and invited to bid for project related work; The developer in consultation with the appointed contractor/s will look to employ a percentage of the labour required for the construction phase from local area in order to maximize opportunities for members from the local HD communities. 		N/A
Cumulative impact post mitigation:	Low (-)	Low (-)	N/A
Significance rating of impact after enhancement	Low (-)	Low (-)	No impact

9.5.16. Socio-Economic Impact – Risk to safety, livestock and farm infrastructure

Socio-Economic Impact – Risk to safety, livestock and farm infrastructure			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	<p>The presence on and movement of construction workers on and off the site poses a potential safety threat to local farmers and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged, or stock theft linked either directly or indirectly to the presence of construction workers on the site. The potential risks (safety, livestock, and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction workers on and off the site workers during the construction phase.</p>		No impact

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	Socio-Economic Impact – Risk to safety, livestock and farm infrastructure		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Nature of impact:	Negative	Negative	N/A
Extent and duration of impact:	Local; temporary	Local; temporary	N/A
Probability of occurrence:	Probable	Probable	N/A
Degree to which the impact can be reversed:	Reversible	Reversible	N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss of Resource	Marginal Loss of Resource	N/A
Cumulative impact prior to mitigation:	Medium (-)	Medium (-)	N/A
Significance rating of impact prior to mitigation / enhancement:	Medium (-)	Medium (-)	N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	N/A
Proposed mitigation:	<ul style="list-style-type: none"> Regular maintenance to the property fences, tracks and access roads must be undertaken. Security measures around the proposed development is to ensure that no wanderers are allowed in the area, specifically within proximity to the properties in to be impacted upon. 		N/A
Cumulative impact post mitigation:	Low (-)	Low (-)	N/A
Significance rating of impact after enhancement	Low (-)	Low (-)	N/A

9.5.17. Socio-economic impact – Increased risk of grass fires

	Socio-Economic Impact – Increased risk of grass fires		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could, in turn pose, a threat to livestock, crops, wildlife and farm infrastructure. The potential risk of grass fires will be higher during the dry, windy winter months from May to October. The impacts will be largely local and can be effectively mitigated.		No impact

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	Socio-Economic Impact – Increased risk of grass fires		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Nature of impact:	Negative	Negative	N/A
Extent and duration of impact:	Local; temporary	Local; temporary	N/A
Probability of occurrence:	Improbable	Improbable	N/A
Degree to which the impact can be reversed:	Reversible	Reversible	N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss of Resource	Marginal Loss of Resource	N/A
Cumulative impact prior to mitigation:	Medium (-)	Medium (-)	N/A
Significance rating of impact prior to mitigation:	Medium (-)	Medium (-)	N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	N/A
Proposed mitigation:	<ul style="list-style-type: none"> Smoking must not be permitted within the construction area of the proposed development. If deemed necessary, a designated smoking area must be assigned. This smoking area must be located within the construction site camp and must be located away from construction plant and refuelling areas. Fire extinguishers must be kept within the site camp and must be maintained as per specifications. 		N/A
Cumulative impact post mitigation:	Low (-)	Low (-)	N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	N/A

9.5.18. Socio-economic impact – Nuisance impacts associated with construction related activities

	Socio-Economic Impact – Nuisance impacts associated with construction related activities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Construction related activities, including the movement of heavy construction vehicles of and on the site, has the potential to create dust, noise and safety impacts and damage roads.		No impact
Nature of impact:	Negative	Negative	N/A
Extent and duration of impact:	Local; temporary	Local; temporary	N/A

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	Socio-Economic Impact – Nuisance impacts associated with construction related activities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Probability of occurrence:	Highly Probably	Highly Probably	N/A
Degree to which the impact can be reversed:	Reversible	Reversible	N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss of Resource	Marginal Loss of Resource	N/A
Cumulative impact prior to mitigation:	Medium (-)	Medium (-)	N/A
Significance rating of impact prior to mitigation / enhancement:	Medium (-)	Medium (-)	N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	N/A
Proposed mitigation:	<ul style="list-style-type: none"> • Speed limits must be instated throughout the construction area. • Dust suppression measures (such as water spraying) must be used throughout the construction phase, as required. • Regular maintenance must be done on all construction vehicles. All construction plant must be kept in good condition. • Any sirens and alarms (including reverse alarms on construction vehicles) are not to exceed the allowance of the regulations governing these impacts. • The OSHA is to be complied with throughout the construction phase of the proposed development. 		N/A
Cumulative impact post mitigation:	Low (-)	Low (-)	N/A
Significance rating of impact after enhancement	Low (-)	Low (-)	N/A

9.5.19. Socio-Economic impact – Loss of farmland

	Socio-Economic Impact – Nuisance impacts associated with construction related activities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The activities associated with the construction phase and establishment of the proposed project and associated infrastructure will result in the disturbance and loss of land available for grazing.		No impact
Nature of impact:	Negative	Negative	N/A

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	Socio-Economic Impact – Nuisance impacts associated with construction related activities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Extent and duration of impact:	Site Specific; permanent	Site Specific; permanent	N/A
Probability of occurrence:	Highly Probably	Highly Probably	N/A
Degree to which the impact can be reversed:	Irreversible	Irreversible	N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant Loss of Resource	Significant Loss of Resource	N/A
Cumulative impact prior to mitigation:	Medium (-)	Medium (-)	N/A
Significance rating of impact prior to mitigation / enhancement:	Medium (-)	Medium (-)	N/A
Degree to which the impact can be mitigated:	Can be partly mitigated	Can be partly mitigated	N/A
Proposed mitigation:	<ul style="list-style-type: none"> • A minimum impact approach is to be followed throughout the construction phase of the proposed development; • All impacted areas must be rehabilitated once construction in an area as come to a conclusion. • Where possible, rehabilitation should occur concurrently with the construction and installation activities. • An alien and invasive species management programme must be compiled and adhered to throughout the construction phase of the proposed development. • The solar PV panels must have a minimum height of 500 mm in order to ensure that grazing can persist underneath the infrastructure should the farmer so wish. 		N/A
Cumulative impact post mitigation:	Low (-)	Low (-)	N/A
Significance rating of impact after enhancement	Low (-)	Low (-)	N/A

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9.5.20. Traffic & Safety Impact – Associated with Construction Vehicles

Traffic & Safety Impact – Associated with Construction Vehicles			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The proposal will entail the delivery of a significant amount of materials and equipment to the site during the construction phase of the development. Numerous truck trips will be required every day that could cause a temporary disturbance to traffic in the area. Potential traffic impacts may occur due to increased truck and construction vehicle traffic expected during the construction phase. Construction vehicles may impact on the existing road conditions (road capacity and congestion). Vehicles may impact on road safety conditions due to an increase in construction phase vehicles entering and exiting the site and they may impact on the condition of the existing road network.		No Impact.
Nature of impact:	Negative	Negative	-No Impact
Extent and duration of impact:	Local; Temporary	Local; Temporary	-N/A
Probability of occurrence:	Highly Probable	Highly Probable	-N/A
Degree to which the impact can be reversed:	Completely reversible	Completely reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	No loss of resource	No loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium	Medium	-N/A
Significance rating of impact prior to mitigation	Medium	Medium	-N/A
Degree to which the impact can be mitigated:	Can be partly mitigated	Can be partly mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> • All construction vehicles must adhere to traffic laws when travelling to and from the site. • All drivers and machinery operators must be sensitised to the fact that they are working in an area with a potentially high volume of foot and vehicle traffic, and must exercise due caution when entering/ exiting the site. • Appropriate signage should be erected to warn other road users about the presence of construction vehicles. • Speed of construction vehicles and other heavy vehicles must be strictly controlled to avoid dangerous conditions for other road users. • Construction vehicles must adhere to the load carrying capacity of road surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles. 		-N/A

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	Traffic & Safety Impact – Associated with Construction Vehicles		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> The Contractor must ensure that any large or abnormal loads (including hazardous materials) that must be transported to/ from the site are routed appropriately, and that appropriate safety precautions are taken during transport to prevent road accidents. Where possible, construction traffic that may obstruct traffic flow on the surrounding roads should be scheduled for outside of peak traffic times. Where possible, heavy machinery should be parked within a secure demarcated area within the footprint of the site instead of moving the machinery to and from the site each day. 		
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	-N/A

9.5.21. Visual Impacts associated with Construction Activities

	Visual Impact – Associated with Construction Activities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The construction phase is associated with temporary disturbance as a result of construction (trench excavations, vehicles, machinery, fencing & signage) that may have a negative visual impact to the area. The visual impacts will be potentially occur from the pre-identified view-points, which included the N10-Highway, the Transnet Railway line and the three homesteads located within proximity to the proposed development.		No Impact.
Nature of impact:	Negative	Negative	-No Impact
Extent and duration of impact:	Site Specific. Temporary	Site Specific. Temporary	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Partly reversible	Partly reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	No loss of resource	No loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium	Medium	-N/A
Significance rating of impact prior to mitigation	Medium – High	Medium – High	-N/A

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Visual Impact – Associated with Construction Activities			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Degree to which the impact can be mitigated:	Can be partly mitigated	Can be partly mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> • Consult with the ECO when determining the appropriate location for the site camp. • The site camp must be kept neat and tidy and free of litter at all times (Clean-house policy to apply). • Waste must be managed according to the EMPr and the mitigation measures listed above in terms of waste management. Good housekeeping practices on site must be maintained to ensure the site is kept neat and tidy. • The site camp, storage facilities, stockpiles, waste bins, and any other temporary structures on site should be located in such a way that they will present as little visual impact to surrounding residents and road users as possible. • Work on site must be well-planned and well-managed so that work proceeds quickly and efficiently, thus minimizing the disturbance time. • The site camp may require visual screening via shade cloth or other suitable material. • Special attention should be given to the screening of highly reflective material. • Use of lighting (if required) should take into account surrounding residents and land users and should present little or no nuisance. Downward facing, spill-off type lighting is recommended. • Construction vehicles must enter and leave the site during working hours. 		-N/A
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.6. Operation Phase Impact Tables

9.6.1. Botanical Impact – Invasion by exotic and alien species

	Botanical Impact – Continued invasion by exotic and alien species		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established. Continued encroachment and displacement of the natural vegetation community due to alien invasive plant species, erosion and edge effects.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Site Specific; Long term	Site Specific; Long term	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Reversible	Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium-High	Medium-High	-N/A
Significance rating of impact prior to mitigation	Medium-High	Medium-High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> • All 'Very High' SEI habitats and Water resource and associated buffer zones are to be avoided. • It should be made an offence for any staff to /take bring any plant species into/out of any portion of the PAOI. No plant species whether indigenous or exotic should be brought into/taken from the PAOI, to prevent the spread of exotic or invasive species or the illegal collection of plants. • Implementation of an alien vegetation management plan. <ul style="list-style-type: none"> ◦ Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project. ◦ All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan 		-N/A

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	Botanical Impact – Continued invasion by exotic and alien species		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> • Compile and implement a Solid Waste Management Plan. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis as a minimum. • A Rehabilitation Plan must be written for the development area and ensured that it be adhered to. • Access roads should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. 		
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	-N/A

9.6.2. Botanical Impact – Erosion created from surface run-off due to increase in impervious and panel surfaces

	Botanical Impact – Erosion from surface run-off due to increase in impervious and panel surfaces		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established. Continued encroachment and displacement of the natural vegetation community due to alien invasive plant species, erosion and edge effects		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Site Specific; Long term	Site Specific; Long term	-N/A
Probability of occurrence:	Highly Probable	Highly Probable	-N/A
Degree to which the impact can be reversed:	Reversible	Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium	Medium	-N/A
Significance rating of impact prior to mitigation	Medium	Medium	-N/A

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	Botanical Impact – Erosion from surface run-off due to increase in impervious and panel surfaces		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> • Access roads should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There must be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial shrubs and succulents from the area. • Speed limits must be put in place to reduce erosion. • Reducing the dust generated by the listed activities above, especially the earthmoving machinery, through wetting the soil surface; putting up signs to enforce speed limit; and speed bumps built to force slow speeds; • Signs must be put up to enforce this. • A stormwater management plan must be compiled and implemented. 		-N/A
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	-N/A

9.6.3.Faunal Impact – Continued displacement and fragmentation of the faunal community, particularly the disruption of natural faunal movement corridors

	Faunal Impact - Continued displacement and fragmentation of the faunal community, particularly the disruption of natural faunal movement corridors		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	A number of faunal Species of Conservation Concern, have been identified within the study area. A majority of the vegetation on site could be considered as Ecological Corridors for migrating fauna. These areas are also considered important foraging and nesting habitats.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Long Term	Local; Long Term	-N/A
Probability of occurrence:	Probable	Definite	-N/A
Degree to which the impact can be reversed:	Barely Reversible	Barely Reversible	-N/A

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	Faunal Impact - Continued displacement and fragmentation of the faunal community, particularly the disruption of natural faunal movement corridors		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium	High	-N/A
Significance rating of impact prior to mitigation	Medium	High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> • Outside lighting should be designed and limited to minimize impacts on fauna. Lighting fixtures should be fitted with baffles, hoods or louvres and directed downward. Outside lighting should be directed away from highly sensitive areas such as the wetland. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible; • Where feasible, motion detection lighting must be used to minimise the unnecessary illumination of areas • Minimise traffic and the use of vehicle lights of the road during the night. • Noise must be kept to a minimum from dusk to dawn to minimize all possible disturbances to amphibian species and nocturnal mammals • Latest technology solar panels with an anti-reflective coating must be used. This will also improve the light transmittance and therefore increases the overall efficiency. • If panels do not possess anti-reflective coatings, then non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun et al, 2021). • All personnel and contractors must undergo Environmental Awareness Training and must include awareness about not harming or collecting species. • Any fauna threatened by the maintenance and operational activities should be removed to a safe location by an appropriate individual. • All vehicles accessing the site should adhere to a max 40 km/h max to avoid collisions. Appropriate signs must be erected. • If any excavations are dug these must not be left open for more than a few hours without ramps for trapped fauna to leave and must be filled at night. 		-N/A
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.6.4.Freshwater Resources Impact – Proliferation of alien and invasive species

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	Freshwater Impact - Proliferation of alien and invasive species		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Infrastructure create migration barriers to biota, resulting in reach to zone scale instream biological impacts. Localised scour around structures or flow impediments may result and alter the natural bank and channel, channel bank stability and floodplain processes. Road and pipeline crossings that concentrate diffuse flows and can also inadvertently trigger gully formation. The stormwater infrastructure of the proposed development has the potential to increase and concentrate flows into the watercourses. This may lead to erosion in the systems that compromises remaining habitat. The project will promote the establishment of disturbance-tolerant biota, including colonization by invasive alien species, weeds and pioneer plants within the remaining habitat. Although this impact is initiated during the construction phase it is likely to persist into the operational phase.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Highly Likely	Highly Likely	-N/A
Degree to which the impact can be reversed:	Barely Reversible	Barely Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	No loss of resource	No loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium	Medium	-N/A
Significance rating of impact prior to mitigation	Medium	Medium	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> Continue to remove all alien and invasive plant species as they arise (i.e. weedy annuals and other alien forbs) . Attempt to plant only locally indigenous plant species within the gardens. 		-N/A
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	-N/A

9.6.5.Freshwater Resources Impact – Nutrient enrichment of watercourses

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	Freshwater Resources Impact – Nutrient enrichment of watercourses		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The greater the extent of hardened surfaces (e.g. roofs, parking lots etc.), the lower the infiltration of stormwater and therefore the greater the surface runoff and increase in flood peaks. A change in water distribution generally results in altered wetness regimes, which in turn affect the biophysical processes and the vegetation patterns.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Highly Likely	Highly Likely	-N/A
Degree to which the impact can be reversed:	Reversible	Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	High	High	-N/A
Significance rating of impact prior to mitigation	High	High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be partly mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> Release only clean water into the environment. 		-N/A
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.6.6. Freshwater Resources Impact – Increased sedimentation from cleared ground beneath solar PV areas

	Freshwater Impact – Increased sedimentation from cleared ground beneath solar PV areas		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Where soil erosion problems and bank stability concerns initiated during the construction phase are not timeously and adequately addressed, these can persist into the operational phase of the development project and continue to have a negative impact downstream. The increase in hardened surface by development, and the impact of road and pipe crossings will be considerable and, if not mitigated		No Impact.

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	Freshwater Impact – Increased sedimentation from cleared ground beneath solar PV areas		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	against, will result in further erosion. Surface runoff and velocities will be increased, and flows will be concentrated by stormwater infrastructure.		
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Highly Likely	Definite	-N/A
Degree to which the impact can be reversed:	Partly Reversible	Partly Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium	High	-N/A
Significance rating of impact prior to mitigation	Medium	High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> Develop a sound stormwater management plan that is engineered to promote rainfall infiltration, maintain diffuse subsurface flows in seep areas, minimise the development of preferential flow paths. The stormwater plan would also benefit from Lidar based topography maps and / or site-specific contours that allow for the identification of flow paths. Consider the use of a coarse heavy metal-free gravel beneath the solar panels to promote infiltration and minimize surface run-off and erosion during high rainfall events. The gravel should be free of heavy metal contaminants. 		-N/A
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.6.7.Socio-Economic Impact – Improve energy security and support renewable sector

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	Socio-Economic Impact – Improve energy security and support renewable sector		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The primary goal of the proposed project is to improve energy security in South Africa by generating additional energy. The proposed PV SEFs also reduces the carbon footprint associated with energy generation. The project should therefore be viewed within the context of the South Africa's current reliance on coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPPPP. This has been elaborated upon in Section 1 and Section 7.		The No-Development option would represent a lost opportunity in terms of the benefits associated with the provision of additional energy security.
Nature of impact:	Positive	Positive	Negative
Extent and duration of impact:	National; permanent	National; permanent	National; permanent
Probability of occurrence:	Definite	Definite	Definite
Degree to which the impact can be reversed:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	Irreversible
Degree to which the impact may cause irreplaceable loss of resources:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	No loss of resource
Cumulative impact prior to mitigation:	High (+)	High (+)	Medium (-)
Significance rating of impact prior to mitigation / enhancement:	High (+)	High (+)	High (-)
Degree to which the impact can be mitigated:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	The NO-GO Alternative assumes no mitigation. It assumes the status quo.
Proposed enhancement/ mitigation:	The proposed development represents an enhancement measure on its own.		The NO-GO Alternative assumes no mitigation – status quo remains
Cumulative impact post mitigation:	Medium (+)	Medium (+)	Medium (negative)
Significance rating of impact after enhancement	Medium (+)	Medium (+)	Medium (-)

9.6.8.Socio-Economic Impact – Creation of employment opportunities

	Socio-Economic Impact – Creation of employment opportunities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The proposed development will create in the region of 20 full time employment opportunities during the operational phase, of which 70% will be unskilled, 25% semi-skilled 25%, and 5% skilled 5%. Most of the		The No-Development option would represent a lost opportunity in terms of the benefits

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Socio-Economic Impact – Creation of employment opportunities			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	unskilled and low skilled workers will be local HDI residents of De Aar. Based on similar projects the annual operating budget will be in the region of R 24 million (2022 Rand values), including wages.		associated with the provision of employment opportunities.
Nature of impact:	Positive	Positive	Negative
Extent and duration of impact:	Regional extent; permanent	Regional extent; permanent	Regional; temporary
Probability of occurrence:	Definite	Definite	Definite
Degree to which the impact can be reversed:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	N/A
Degree to which the impact may cause irreplaceable loss of resources:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	No loss of resource
Cumulative impact prior to mitigation:	Medium (+)	Medium (+)	Medium (-)
Significance rating of impact prior to mitigation / enhancement:	Medium-High (+)	Medium-High (+)	Medium-High (-)
Degree to which the impact can be mitigated:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	The NO-GO Alternative assumes no mitigation. It assumes the status quo.
Proposed enhancement / mitigation:	The proposed development represents an enhancement measure on its own.		The NO-GO Alternative assumes no mitigation – status quo remains
Cumulative impact post mitigation:	Medium (+)	Medium (+)	Medium (-)
Significance rating of impact after enhancement	Medium (+)	Medium (+)	Medium (-)

9.6.9.Socio-Economic Impact – Generate income for affected landowners

Socio-Economic Impact – Generate income for affected landowners			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The proponent will enter into rental agreements with the affected landowners for the use of the land for the establishment of the proposed PV SEFs. In terms of the rental agreement the affected landowner will be paid an annual amount dependent upon the area affected. The additional income will reduce the risk to his livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such		The No-Development option would represent a lost opportunity in terms of the benefits associated with the provision of formal sports facilities, however the public could continue

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	Socio-Economic Impact – Generate income for affected landowners		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	as fuel, feed etc. Given the low carrying capacity of the veld the additional income represents a significant benefit for the affected landowner and those employed by him.		to make use of the existing open spaces for running, cycling and fishing. Access to the dam would remain uncontrolled.
Nature of impact:	Positive	Positive	Negative
Extent and duration of impact:	Regional extent; permanent	Regional extent; permanent	Regional; temporary
Probability of occurrence:	Definite	Definite	Definite
Degree to which the impact can be reversed:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	N/A
Degree to which the impact may cause irreplaceable loss of resources:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	No loss of resource
Cumulative impact prior to mitigation:	Low (positive)	Low (positive)	Medium (negative)
Significance rating of impact prior to mitigation / enhancement:	Low (positive)	Low (positive)	Medium (negative)
Degree to which the impact can be mitigated:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	The NO-GO Alternative assumes no mitigation. It assumes the status quo.
Proposed enhancement / mitigation:	The proposed development represents an enhancement measure on its own.		The NO-GO Alternative assumes no mitigation – status quo remains.
Cumulative impact post mitigation:	Medium (+)	Medium (+)	Medium (-)
Significance rating of impact after enhancement	Medium (+)	Medium (+)	Medium (-)

9.6.10. Socio-Economic Impact – Benefits associated with the socio-economic development contributions

	Socio-Economic Impact – Benefits associated with the socio-economic development contributions		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The REIPPPP has been designed not only to procure energy but has also been structured to contribute to the broader national development objectives of job creation, social upliftment and broadening of economic ownership. Socio-economic development (SED) contributions are an important focus of the		The No-Development option would represent a lost opportunity in terms of the benefits

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Socio-Economic Impact – Benefits associated with the socio-economic development contributions			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	REIPPPP and are aimed at ensuring that local communities benefit directly from the investments attracted into the area. These contributions are linked to Community Trusts and accrue over the project operation life and, in so doing, create an opportunity to generate a steady revenue stream over an extended period. This revenue can be used to fund development initiatives in the area and support the local community. The long-term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area.		associated with a community trust established as part of the REIPPPP.
Nature of impact:	Positive	Positive	Negative
Extent and duration of impact:	Regional extent; permanent	Regional extent; permanent	Regional extent; permanent
Probability of occurrence:	Definite	Definite	Improbable
Degree to which the impact can be reversed:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	Completely reversible
Degree to which the impact may cause irreplaceable loss of resources:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	No loss of resource
Cumulative impact prior to mitigation:	Low positive	Low positive	Low negative
Significance rating of impact prior to mitigation / enhancement:	Low positive	Low positive	Medium negative
Degree to which the impact can be mitigated:	N/A – This is a positive impact proposed to be enhanced.	N/A – This is a positive impact proposed to be enhanced.	Can be mitigated
Proposed enhancement / mitigation:	The proposed development represents an enhancement measure on its own.		The NO-GO Alternative assumes no mitigation – status quo remains
Cumulative impact post mitigation:	Medium (+)	Medium (+)	Low negative
Significance rating of impact after enhancement	High (+)	High (+)	Medium (-)

9.6.11. Socio-Economic Impact – Potential impact on property value

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Socio-Economic Impact – Potential impact on property values			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The potential visual impacts associated with the proposed development has the potential to impact on property values. Based on the results of a literature review undertaken for wind farms the potential impact on property values in rural areas is likely to be limited. The findings are also likely to be relevant to solar PV developments.		The No-development alternative will see to the retention of the landscape in its current state, where no resulting impacts from the proposed infrastructure will be seen. The rural character of the landscape will remain as is.
Nature of impact:	Negative	Negative	-No Impact
Extent and duration of impact:	Local; permanent	Local; permanent	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Can be partly reversed	Can be partly reversed	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium (-)	High (-)	-N/A
Significance rating of impact prior to mitigation / enhancement:	Medium (-)	High (-)	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be barely mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> • All buffers proposed by the visual impact specialist must be strictly adhered to. This includes: <ul style="list-style-type: none"> ○ A 250 m buffer on both sides of the Railway line; ○ A 300 m buffer on both sides of the N10-Highway; ○ A 500 m buffer around the farmsteads located within proximity to the proposed development; ○ The conservation of the ridges and watercourse areas. • The use of anti-glare substrate aimed at limiting the glaring affect of the solar array. 		-N/A
Cumulative impact post mitigation:	Low - Medium (-)	Medium	N/A
Significance rating of impact after enhancement	Low - Medium (-)	Medium (-)	N/A

9.6.12. Visual Impact – Potential impact on tourism

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	Visual Impact – Potential impact on tourism		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The potential visual impacts associated with the proposed development has the potential to impact on tourism facilities and tourism in the area. Based on the findings of the literature review there is limited evidence to suggest that the proposed development would have an impact on the tourism in the PKSDM and ELM at a local and regional level.		No Impact
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Regional; Permanent	Regional; Permanent	N/A
Probability of occurrence:	Definite	Definite	N/A
Degree to which the impact can be reversed:	Barely reversible	Barely reversible	N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resource	Marginal loss of resource	N/A
Cumulative impact prior to mitigation:	Medium (-)	Medium (-)	N/A
Significance rating of impact prior to mitigation	Medium (-)	Medium (-)	N/A
Degree to which the impact can be mitigated:	Can be barely mitigated	Can be barely mitigated	N/A
Proposed mitigation:	<ul style="list-style-type: none"> • All buffers proposed by the visual impact specialist must be strictly adhered to. This includes: <ul style="list-style-type: none"> ○ A 250 m buffer on both sides of the Railway line; ○ A 300 m buffer on both sides of the N10-Highway; ○ A 500 m buffer around the farmsteads located within proximity to the proposed development; ○ The conservation of the ridges and watercourse areas. • The use of anti-glare substrate aimed at limiting the glaring affect of the solar array. 		N/A
Cumulative impact post mitigation:	Medium	Medium	N/A
Significance rating of impact after mitigation	Low - Medium (-)	Low - Medium (-)	N/A

9.6.13. Visual Impact – Visual impact and impact on sense of place

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	Visual Impact - Visual impact and impact on sense of place		
	Alternative 1	Alternative 2	Alternative 1
DESCRIPTION OF IMPACT:	The proposed PV solar farm has the potential to impact on the areas existing rural sense of place. Based on an initial assessment of the location the potential impact on the areas sense of place likely to be limited. Additionally, to the sense of place, the solar panels have a potential of having a glaring effect on the commuters of the N10-highway.		The No-development alternative will see to the retention of the landscape in its current state, where no resulting impacts from the proposed infrastructure will be seen. The rural character of the landscape will remain as is
Nature of impact:	Negative	Negative	Positive
Extent and duration of impact:	Regional extent; permanent	Regional extent; permanent	Regional extent; permanent
Probability of occurrence:	Definite	Definite	Definite
Degree to which the impact can be reversed:	Can be partly reversed	Irreversible	Completely reversible
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	No loss of resource
Cumulative impact prior to mitigation:	Medium (-)	High (-)	Low - Medium (+)
Significance rating of impact prior to mitigation / enhancement:	Medium (-)	High (-)	Low - Medium (+)
Degree to which the impact can be mitigated:	Can be mitigated	Can be barely mitigated	N/A – This is a positive impact proposed to be enhanced.
Proposed mitigation:	<ul style="list-style-type: none"> • All buffers proposed by the visual impact specialist must be strictly adhered to. This includes: <ul style="list-style-type: none"> ○ A 250 m buffer on both sides of the Railway line; ○ A 300 m buffer on both sides of the N10-Highway; ○ A 500 m buffer around the farmsteads located within proximity to the proposed development; ○ The conservation of the ridges and watercourse areas. • The use of anti-glare substrate aimed at limiting the glaring affect of the solar array. 		N/A – This is a positive impact proposed to be enhanced.
Cumulative impact post mitigation:	Low - Medium (-)	Medium (-)	Negligible
Significance rating of impact after enhancement	Low - Medium (-)	Medium (-)	Negligible

9.6.14. Climate Change Impact

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	Climate Change Impact		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	As discussed in Section 1 and Section 7.1, the impact of the country's current major electricity supply relies on fossil fuels (charcoal), where the total GHG for the operational phase of the coal fired stations are significantly higher than that of the operational phase of a solar PV plant (Figure 7-2). The proposed development is in line with the Zero Carbon Emissions Target by 2050 of the country. This project also aligns with the country's movement toward decommissioning the coal-fired stations. Other potential impacts of the proposed development on climate change, as changes to the micro-climate of the area would possibly be observed.		As identified in the Agricultural Baseline Study, due to irregular rainfall, which is likely to be exacerbated by climate change, agriculture in the area will come under increased pressure in terms of economic viability.
Nature of impact:	Positive	Positive	Negative
Extent and duration of impact:	Regional; Long Term	Regional; Long Term	Regional; Long Term
Probability of occurrence:	Definite	Definite	Highly probable
Degree to which the impact can be reversed:	N/A	N/A	Partly reversable
Degree to which the impact may cause irreplaceable loss of resources:	N/A	N/A	No loss to resource
Cumulative impact prior to mitigation:	Medium (+)	Medium (+)	Medium (-)
Significance rating of impact prior to mitigation	Medium (+)	Medium (+)	Medium (-)
Degree to which the impact can be mitigated:	N/A	N/A	Can be partly mitigated
Proposed/ enhancement mitigation:	<ul style="list-style-type: none"> Apply all buffers around resources identified by the various appointed specialists. Apply all mitigation measures toward managing the receiving environment as proposed by the appointed specialists and within the EMP to be compiled as part of the EIR phase of the EIA process. 		Allow for the proposed development to be constructed.
Cumulative impact post mitigation:	Medium (+)	Medium (+)	Medium (-)
Significance rating of impact after mitigation	Medium (+)	Medium (+)	Medium (-)

9.7. Decommissioning Phase Impact Tables

9.7.1. Ecological impact of decommissioning activities

	Ecological impact of decommissioning activities		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Decommissioning activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions and persecution. Destruction of vegetation, encroachment and displacement of the natural vegetation community due to alien invasive plant species, erosion and edge effects.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Site Specific; Long term	Site Specific; Long term	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Reversible	Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium-High	Medium-High	-N/A
Significance rating of impact prior to mitigation	Medium-High	Medium-High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species. Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate. Any fauna threatened by the decommissioning activities should be removed safely by an appropriately qualified environmental officer or removal specialist. All decommissioning vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner. 		-N/A

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Ecological impact of decommissioning activities			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
	<ul style="list-style-type: none"> Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter. Limiting the closure and rehabilitation activities to the footprint areas only. Avoid entry/access to previously undisturbed or already rehabilitated areas. Areas other than the footprint areas and existing surface infrastructure areas, should be declared as 'no-go' areas to vehicles (only). All essential operational staff – machinery must be limited to development area (no need to go outside the authorised area). The rehabilitated areas must be revegetated with indigenous vegetation. Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds. Implementation of rehabilitation plan. Implementation of alien vegetation management plan. 		
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	-N/A

9.7.2. Botanical impact – Disturbance of soil leading to vulnerability of area

Botanical impact – Disturbance of soil leading to vulnerability of area			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Disturbance created during decommissioning will leave the development area vulnerable to erosion and alien plant invasion for several years.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Long term	Local; Long term	-N/A
Probability of occurrence:	Highly Probable	Definite	-N/A
Degree to which the impact can be reversed:	Reversible	Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A

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	Botanical impact – Disturbance of soil leading to vulnerability of area		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Cumulative impact prior to mitigation:	Medium-High (-)	Medium-High (-)	-N/A
Significance rating of impact prior to mitigation	Medium-High (-)	Medium-High (-)	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be partly mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase. Monitoring of the rehabilitated area must be undertaken at quarterly intervals for 3 years after the decommissioning phase. All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora. 		-N/A
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.7.3.Freshwater Resource Impact - Degradation of vegetation and proliferation of alien and invasive species

	Freshwater Resource Impact - Degradation of vegetation and proliferation of alien and invasive species		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Disturbance created during decommissioning will leave the development area vulnerable to erosion and alien plant invasion for several years. This includes vehicular access.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Medium Term	Local; Medium Term	-N/A
Probability of occurrence:	Probable	Probable	-N/A
Degree to which the impact can be reversed:	Barely Reversible	Barely Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resource	Marginal loss of resource	-N/A

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	Freshwater Resource Impact - Degradation of vegetation and proliferation of alien and invasive species		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Cumulative impact prior to mitigation:	Medium	Medium	-N/A
Significance rating of impact prior to mitigation	Medium	Medium	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> Decommissioning is unlikely for the foreseeable future, however, if the water supply infrastructure ever needs upgrading and needs to be moved the following is recommended: See mitigation for the impacts on degradation of downslope watercourses and spread of alien and Invasive plants. Alien and invasive species control should continue for a minimum of three years following decommissioning. 		-N/A
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	-N/A

9.7.4.Freshwater Resources Impact – Increased bare surfaces, runoff and potential for erosion

	Freshwater Impact - Increased bare surfaces, runoff and potential for erosion		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The project will promote the establishment of disturbance-tolerant biota, including colonization by invasive alien species, weeds and pioneer plants within the remaining habitat. Although this impact is initiated during the decommissioning phase it is likely to persist into the decommissioning phase.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Local; Permanent	Local; Permanent	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Barely Reversible	Barely Reversible	-N/A
Degree to which the impact may cause	Marginal Loss of resource	Significant Loss of resource	-N/A

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	Freshwater Impact - Increased bare surfaces, runoff and potential for erosion		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
irreplaceable loss of resources:			
Cumulative impact prior to mitigation:	High	High	-N/A
Significance rating of impact prior to mitigation	High	High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> See mitigation for increased bare surfaces, runoff and potential for erosion and increased sediment loads during decommissioning. Landscape and rehabilitate project area. 		-N/A
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.7.5.Sustainable management of infrastructure upon decommissioning of plant

	Sustainable management of infrastructure upon decommissioning of plant		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	As discussed in Section 1 of this report, very little is known about the End-of-Life phase (decommissioning phase) of solar PV panels, due to the longevity of the infrastructure. It is important to ensure that the infrastructure is handled in an appropriate manner, whereby which the Triple-R concept should be adopted during the decommissioning phase.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Regional; Medium term	Regional; Medium term	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Reversible	Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant Loss of resource	Significant Loss of resource	-N/A

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	Sustainable management of infrastructure upon decommissioning of plant		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Cumulative impact prior to mitigation:	High	High	-N/A
Significance rating of impact prior to mitigation	High	High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> • Checks must be done on the infrastructure in order to determine which preferred method of reintroduction into the system will be followed: <ul style="list-style-type: none"> ○ Where infrastructure is still intact, but has reached the age where it has surpassed its optimal generation capacity, the infrastructure must be sourced to households in the local community; ○ Infrastructure which has failed must be repaired if possible and be reintroduced into the electricity generating system (on either the proposed development or another similar development in the area); or ○ Where infrastructure cannot be repaired or redistributed due to the faults recorded for the device, the raw components thereof must be recycled and reintroduced into the Life-Cycle of solar infrastructure manufacturing. 		-N/A
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	-N/A

9.8. Cumulative Impacts Phase Impact Tables

9.8.1. Cumulative terrestrial impact – Proposed development in light of approved developments within a 30 km radius

	Cumulative terrestrial impact – Proposed development in light of approved developments within a 30 km radius		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Presently, the surrounding immediate and broader landscape consists of natural vegetation used for supporting livestock and to a lesser extent game. The remnants layer was released as part of the NBA (Skowno, et al., 2018) and provides the present spatial extent of vegetation. The South African Renewable Energy EIA Application Database contains spatial data for renewable energy applications for environmental authorisation. The project which are currently approved have been described in Section 4.1.3. above. Data is captured and managed on a parcels level as well as aggregated to the project level at the boundary level.		No Impact.
Nature of impact:	Negative	Negative	No Impact

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	Cumulative terrestrial impact – Proposed development in light of approved developments within a 30 km radius		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Extent and duration of impact:	Regional; Long-term	Regional; Long-term	-N/A
Probability of occurrence:	Probable	Probable	-N/A
Degree to which the impact can be reversed:	Reversible	Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium-High (-)	Medium-High (-)	-N/A
Significance rating of impact prior to mitigation	Medium-High (-)	Medium-High (-)	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> All mitigation measures provided by the various specialist must be applied on site during all phases of the proposed development. 		-N/A
Cumulative impact post mitigation:	Medium (-)	Medium (-)	-N/A
Significance rating of impact after mitigation	Medium (-)	Medium (-)	-N/A

9.8.2.Socio-Economic impacts – Sense of place and the landscape

	Socio-Economic impact – Sense of place and the landscape		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	<p>The potential cumulative impacts on the areas sense of place will be largely linked to potential visual impacts. The experience of driving along a tourist road, for example, needs to be considered as a dynamic sequence of views and visual impacts, not just as the cumulative impact of several developments on one location. The viewer may only see one renewable energy facility and the associated infrastructure at a time, but if each successive stretch of the road is dominated by views of renewable energy facilities, then that can be argued to be a cumulative visual impact (National Wind Farm Development Guidelines, DRAFT - July 2010). As indicated above, the potential impact of the proposed solar PV farm and associated infrastructure on the areas sense of place is likely to be limited. The cumulative impacts are also likely to be limited. This will be confirmed during the assessment phase.</p>		No Impact.

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	Socio-Economic impact – Sense of place and the landscape		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Regional; Long Term	Regional; Long Term	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Reversible	Partly reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resource	Marginal loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium (-)	Medium-High (-)	-N/A
Significance rating of impact prior to mitigation	Medium-High (-)	Medium-High (-)	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> No clearing outside of development and infrastructure footprints to take place. Open Space to be incorporated in final plan to include ecological corridors and riparian zones. 		-N/A
Cumulative impact post mitigation:	Low	Medium	-N/A
Significance rating of impact after mitigation	Low (-)	Medium (-)	-N/A

9.8.3.Socio-economic impact on local services and accommodation

	Socio-economic impact on local services and accommodation		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	Section 4.1.3 describes the approved renewable energy project within a 30 km radius from the proposed development site. The establishment of numerous renewable energy facilities has the potential to place pressure on local services and accommodation, specifically during the construction phase. The objective will be to source as many low and semi-skilled workers for the construction phase from the ELM. This will reduce the pressure on local services and accommodation and the nearby town of De Aar.		No Impact.
Nature of impact:	Negative	Negative	No Impact

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	Socio-economic impact on local services and accommodation		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Extent and duration of impact:	Regional; Medium-term	Regional; Medium-term	-N/A
Probability of occurrence:	Highly Likely	Highly Likely	-N/A
Degree to which the impact can be reversed:	Barely Reversible	Barely Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	No loss of resource	No loss of resource	-N/A
Cumulative impact prior to mitigation:	Medium	Medium	-N/A
Significance rating of impact prior to mitigation	Medium	Medium	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> As many as possible low and semi-skilled workers for the construction phase of the proposed development must be sourced from the ELM. 		-N/A
Cumulative impact post mitigation:	Low - Medium	Low - Medium	-N/A
Significance rating of impact after mitigation	Low - Medium (-)	Low - Medium (-)	-N/A

9.8.4.Socio-economic impact – Cumulative impact on local economy

	Socio-economic impact – Cumulative impact on local economy		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	<p>The establishment of renewable energy facilities and associated infrastructure, including the proposed development, will also create several socio-economic opportunities for the ELM. The positive cumulative opportunities include creation of employment, skills development and training opportunities, and downstream business opportunities.</p> <p>The potential cumulative benefits for the local and regional economy are associated with both the construction and operational phase of renewable energy projects and associated infrastructure and extend over a period of 20-25 years. However, steps must be taken to maximise employment opportunities for members from the local communities in the area and support skills development and training programmes.</p>		No Impact.

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	Socio-economic impact – Cumulative impact on local economy		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Nature of impact:	Positive	Positive	No Impact
Extent and duration of impact:	Regional; Permanent	Regional; Permanent	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	N/A	N/A	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	N/A	N/A	-N/A
Cumulative impact prior to mitigation:	N/A	N/A	-N/A
Significance rating of impact prior to mitigation	N/A	N/A	-N/A
Degree to which the impact can be mitigated:	N/A	N/A	-N/A
Proposed mitigation/enhancement measures:	<ul style="list-style-type: none"> As many as possible low and semi-skilled workers for the construction phase of the proposed development must be sourced from the ELM. Decommissioning activities (of the plant or the infrastructure) must make use of local companies where available 		-N/A
Cumulative impact post mitigation:	High (+)	High (+)	-N/A
Significance rating of impact after mitigation	High (+)	High (+)	-N/A

9.8.5. Life-Cycle Assessment – Cumulative impact

	Freshwater Impact – Water Pollution		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	As discussed in Section 1, the life-cycle of the proposed infrastructure sees to the involvement of numerous industries and processes. As many of these processes/components are outside of the scope of assessment of the process for this project, the cumulative impact of the various phases of the proposed development has been presented as well.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Regional; Permanent	Regional; Permanent	-N/A

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	Freshwater Impact – Water Pollution		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Probability of occurrence:	Highly likely	Highly likely	-N/A
Degree to which the impact can be reversed:	Partly Reversible	Partly Reversible	-N/A
Degree to which the impact may cause irreplaceable loss of resources:	Significant loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	High	High	-N/A
Significance rating of impact prior to mitigation	High	High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> All resources must be obtained from sources proven to be environmentally sound. 		-N/A
Cumulative impact post mitigation:	Low	Low	-N/A
Significance rating of impact after mitigation	Low (-)	Low (-)	-N/A

9.8.6.Cumulative Impact – Proposed development and Grid infrastructure

	Cumulative Impact – Proposed development and Grid Infrastructure		
	Alternative 1	Alternative 2	Alternative 3: NO – GO
DESCRIPTION OF IMPACT:	The proposed development will form part of the Hercules Solar PV Cluster and will encompass the construction of the solar PV generation plant and the grid connection infrastructure (to be applied for in a separate EA application). The infrastructure will be located within close proximity to a number of sensitive features in the receiving environment, however through the implementation of the measures provided by the various specialists and the EAP, the impacts on the receiving environment should be sufficiently mitigated.		No Impact.
Nature of impact:	Negative	Negative	No Impact
Extent and duration of impact:	Regional; Permanent	Regional; Permanent	-N/A
Probability of occurrence:	Definite	Definite	-N/A
Degree to which the impact can be reversed:	Partly Reversible	Irreversible	-N/A

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Cumulative Impact – Proposed development and Grid Infrastructure			
	Alternative 1	Alternative 2	Alternative 3: NO – GO
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss of resource	Significant loss of resource	-N/A
Cumulative impact prior to mitigation:	High	Very-High	-N/A
Significance rating of impact prior to mitigation	High	Very-High	-N/A
Degree to which the impact can be mitigated:	Can be mitigated	Can be mitigated	-N/A
Proposed mitigation:	<ul style="list-style-type: none"> All applicable buffers as recommended by the various specialists must be maintained for the proposed solar PV development; All mitigation measures proposed by the various specialists must be implemented on site as required. All permits, licences and authorisations must be obtained prior to the commencement of the construction works. 		-N/A
Cumulative impact post mitigation:	Low-Medium	Medium (-)	-N/A
Significance rating of impact after mitigation	Low-Medium (-)	Medium (-)	-N/A

10. CONCLUDING ENVIRONMENTAL STATEMENT

10.1. Outcome of Comparative Assessment

10.1.1. Construction Phase Impacts Post Mitigation

The following conclusions can be drawn from the impact assessment findings as shown in the impact tables above for the construction phase:

- The preferred development Layout is expected to result in environmental impacts, during the construction phase, to the physical, social, cultural and biological environment as opposed to the NO-GO Alternative 3 of not developing the site which is not expected to result in any physical, cultural or biological impacts to the environment during the construction phase because the NO-GO assumes the status quo will remain and no construction related impacts will occur to the environment. However, the no-development option would result in a lost opportunity in terms of the expected temporary employment opportunities associated with the construction phase. A high negative socio-economic impact significance in terms of employment and job opportunities would occur if the proposed development is not constructed. Additionally, a duty of care would still be required in terms of land management as the site has already been exposed to colonization of alien invasive plant species.
- Freshwater impacts in terms of loss of habitat and associated biota, erosion and flow modification is expected to be mitigated to a Low-Medium level of impact significance.
- Botanical and Faunal loss of habitat and species of conservation concern are expected to be mitigated to a Medium-Low significance.
- The Creation of business and employment opportunities are expected to result in a High Positive impact after enhancement.
- All other identified impacts are expected to be mitigated to a Low negative significance, which means that it is expected to mitigate the impact to the point where it is of limited importance.

The table below is a summary of the projected impacts that could take place during the construction phase of the development and the associated significance of the impact, **post mitigation**.

Table 10-1: Summary Table of Projected Construction Phase Impacts AFTER MITIGATION

CONSTRUCTION PHASE IMPACTS				
ASPECT	IMPACT	IMPACT SIGNIFICANCE (after mitigation)		
		Alternative 1	Alternative 2	Alternative 3: NO – GO
Agricultural Potential Impact	Loss of agricultural land	Negligible (-)	High (-)	No Impact
Botanical Impact	Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species	Medium (-)	High (-)	No Impact
Botanical Impact	Introduction of alien species especially plants	Medium (-)	Medium (-)	No Impact
Faunal impact	Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching)	Low (-)	Medium (-)	No Impact
Freshwater Resources Impact	Loss or degradation of watercourse	Low (-)	Medium (-)	No Impact
Freshwater Resources Impact	Increased bare surfaces, flood peaks and potential for erosion	Low (-)	Medium (-)	No Impact
Freshwater Resources Impact	Introduction and spread of alien and invasive vegetation	Low (-)	Medium (-)	Low – Medium (-)
Freshwater Resource impact	Decreased flow inputs to watercourse	Low (-)	Medium (-)	No Impact
Freshwater Resource impact	Increased sediment loads to downstream reaches	Medium (-)	High (-)	No Impact
Contamination	Contamination and pollution impact associated with construction activities	Low (-)	Medium (-)	No Impact
Dust and noise impact	Dust and noise impact associated with construction activities	Low (-)	Low (-)	No Impact
Heritage impact	Loss of heritage resources	Low (-)	Medium (-)	No Impact

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CONSTRUCTION PHASE IMPACTS				
ASPECT	IMPACT	IMPACT SIGNIFICANCE (after mitigation)		
		Alternative 1	Alternative 2	Alternative 3: NO – GO
Socio-Economic Impact	Creation of Business & employment opportunities	High (+)	High (+)	High (-)
Socio-Economic Impact	Impact of construction workers on local communities	Low (-)	Low (-)	No impact
Socio-Economic Impact	Influx of job seekers	Low (-)	Low (-)	No impact
Socio-Economic Impact	Risk to safety, livestock and farm infrastructure	Low (-)	Low (-)	No impact
Socio-Economic Impact	Increased risk of grass fires	Low (-)	Low (-)	No impact
Socio-Economic Impact	Nuisance impacts associated with construction related activities	Low (-)	Low (-)	No impact
Socio-Economic Impact	Loss of farmland	Low (-)	Low (-)	No impact
Traffic & Safety Impact	Associated with construction vehicles	Low (-)	Low (-)	No impact
Visual Impacts	Visual impacts associated with construction activities	Low (-)	Low (-)	No impact

10.1.2. Operation Phase Impacts Post Mitigation

The table below is a summary of the projected impacts that could take place during the operational phase of the development and the associated significance of the impact, **post mitigation.**

The following conclusions can be drawn from the impact assessment findings as shown in the impact tables above for the operational phase:

- The preferred development Layout is expected to result in negative environmental impacts, during the operational phase, to the biological environment (freshwater, faunal and terrestrial systems) and visual "sense of place" of the area, as opposed to the NO-GO Alternative 3 of not developing the site which is not expected to result in any visual, or botanical impacts because the NO-GO assumes the status quo will remain and no development will take place. However, the no-development option would result in a lost opportunity in terms of the expected socio-economic benefits associated with the operational phase.
- Freshwater impacts in terms of erosion, sedimentation and alien invasive species control is expected to be mitigated to a low level of impact significance.
- Botanical impacts are expected to be mitigated to be of Low significance.
- The provision of additional electricity source to feed into the National Electricity grid Medium - High Positive impacts after enhancement.
- The visual impacts were identified will be mitigated to a Low-Medium negative impact significance.

Table 10-2: Summary Table of Projected Operation Phase Impacts AFTER MITIGATION

OPERATIONAL PHASE IMPACTS				
ASPECT	IMPACT	IMPACT SIGNIFICANCE (after mitigation)		
		Alternative 1	Alternative 2	Alternative 3: NO – GO
Botanical Impact	Invasion by exotic and alien species	Low (-)	Low (-)	No Impact
Botanical Impact	Erosion created from surface run-off due to increase in impervious and panel surfaces	Low (-)	Low (-)	No Impact
Faunal Impact	Continued displacement and fragmentation of the faunal community, particularly the disruption of natural faunal movement corridors	Low (-)	Medium (-)	No Impact
Freshwater Resources Impact	Proliferation of alien and invasive species	Low (-)	Low (-)	No Impact
Freshwater Resources Impact	Nutrient enrichment of watercourses	Low (-)	Medium (-)	No Impact
Freshwater Resources Impact	Increased sedimentation from cleared ground beneath solar PV areas	Low (-)	Medium (-)	Low – Medium (-)
Socio-Economic Impact	Improve energy security and support renewable sector	Medium (+)	Medium (+)	Medium (-)
Socio-Economic Impact	Creation of employment opportunities	Medium (+)	Medium (+)	Medium (-)
Socio-Economic Impact	Generate income for affected landowners	Medium (+)	Medium (+)	Medium (-)
Socio-Economic Impact	Benefits associated with the socio-economic development contributions	High (+)	High (+)	Medium (-)
Socio-Economic Impact	Potential impact on property values	Low - Medium (-)	Medium (-)	No impact
Socio-Economic Impact	Potential impact on tourism	Low – Medium (-)	Low – Medium (-)	No impact
Visual Impacts	Visual impacts and impact on sense of place	Low – Medium (-)	Medium (-)	No impact

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OPERATIONAL PHASE IMPACTS				
ASPECT	IMPACT	IMPACT SIGNIFICANCE (after mitigation)		
		Alternative 1	Alternative 2	Alternative 3: NO - GO
Climate Change Impact	Lowered GHG emissions due to the use of a renewable resource	Medium (+)	Medium (+)	Medium (-)

10.1.3. Decommissioning Phase Impacts Post Mitigation

Table 10-3 below is a summary of the projected impacts that could take place during the decommissioning phase of the development and the associated significance of the impact, **post mitigation.**

The following conclusions can be drawn from the impact assessment findings as shown in the impact tables above for the decommissioning phase:

The preferred development Layout is expected to result in negative environmental impacts, during the decommissioning phase, to the biological environment (freshwater, faunal and terrestrial systems) opposed to the NO-GO Alternative 3 of not developing the site which is not expected to result in any impacts because the NO-GO assumes the status quo will remain and no development will take place. However, the no-development option would result in a lost opportunity in terms of the upliftment programmes that could result from the proposed development due to the decommissioning strategies associated with the solar PV infrastructure.

Table 10-3: Summary Table of Projected Decommissioning Phase Impacts AFTER MITIGATION

DECOMMISSIONING PHASE IMPACTS				
ASPECT	IMPACT	IMPACT SIGNIFICANCE (after mitigation)		
		Alternative 1	Alternative 2	Alternative 3: NO – GO
Ecological Impact	Ecological impact of decommissioning activities	Low (-)	Low (-)	No Impact
Botanical Impact	Disturbance of soil leading to vulnerability of the area	Low (-)	Medium (-)	No Impact
Freshwater Resources Impact	Degradation of vegetation and proliferation of alien and invasive species	Low (-)	Low (-)	No Impact
Freshwater Resources Impact	Increased bare surfaces, runoff and potential for erosion	Low (-)	Medium (-)	No Impact
Sustainable management	Sustainable management of infrastructure upon decommissioning of the plant	Low (-)	Low (-)	No impact

10.2. Concluding Environmental Statement

- The proposed site is the best situated site for establishing the proposed solar PV development. **The proposed project is located within the Strategic Transmission Corridor as promulgated in 2018 (GNR 113 of 2018) in terms of the NEMA (Act 107 of 1998).**
- The “No Go” alternative is the option of not developing the proposed solar PV facility. The no-development option would result in a lost opportunity in terms of the employment opportunities associated with the construction and operation phase as well as the benefits associated with the provision of an additional energy resource. **A significantly high negative socio-economic impact significance would occur if the proposed development is not constructed in terms of the lost opportunity.**
- The NO-GO alternative would result in the conservation of the site and prevention of any further development (status quo). Should the site not be developed, one can expect the current use of the farm portions for low impact agriculture, instances of overgrazing and the further colonisation of alien invasive species.
- The proposed development is compatible with and supports the key principles and objectives contained in the relevant key land use planning and policy documents that pertain to the Northern Cape and Pixley Ka Seme District, this includes the Pixley Ka Seme Municipality Integrated Development Plan 2017-2022, the Emthanjeni Local Municipality Integrated Development Plan (2022), the Provincial Spatial Development Framework (2012), the National Development Plan 2030, the National Growth Framework, and the National Infrastructure Plan. The entire proposed development is also located within a Strategic Transmission Corridor. The proposed site has therefore been identified as a desirable site location for the purposes of the proposed solar PV development.
- The most significant impacts associated with the proposed development, in the construction and operation phase, includes the expected impacts to the Freshwater Resources (habitat and biota), Botanical Impacts (loss vegetation of conservation importance), the Faunal Impacts (loss of habitat and direct mortality to the species of conservation concern), the expected Visual Impact of the development in terms of the land use character of the site and “sense of place” of the area being significantly changed and socio-economic impact.
- We believe that a “balanced approach” to impacts has been undertaken. We believe that although the proposed project will result in varying degrees of negative impacts in terms of visual, botanical and especially freshwater impacts, we are of the opinion that the Preferred Alternative layout and mitigation measures proposed will ensure that these impacts are reduced to an acceptable level of impact significance given the positive impact that this proposed development will have on the socio-economic environment.
- It is proposed to include the following Specialist Impact Assessment Studies during the EIA Phase:
 - A **Freshwater Habitat Assessment;**
 - A **Terrestrial Biodiversity Impact Assessment, including Fauna and Flora;**
 - A **Socio-Economic Impact Assessment;**
 - A **Visual Constraints Assessment;**
 - An **Archaeological and Cultural Assessment;**
 - A **Palaeontological Assessment;** and
 - An **Agricultural Compliance Statement.**

This report is being submitted for Acceptance per the Regulations. Once this has been completed the Impact Assessment phase can begin.

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