



FINAL BASIC ASSESSMENT REPORT

PPC Slurry Solar Park



ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

**PROPOSED DEVELOPMENT OF A 10MW AC SOLAR PHOTOVOLTAIC
(PV) PLANT AND ASSOCIATED INFRASTRUCTURE ON PORTIONS OF
FARM BENADEPLAATS 93 JO AND SLURRY 96 JO, NEAR MAHIKENG,
NORTH WEST PROVINCE**

DEDECT REF: NWP/EIA/62/2021

FINAL BASIC ASSESSMENT REPORT

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PROJECT TEAM

CES has been appointed by Sturdee Energy as independent consultants to undertake a Basic Assessment (BA) process for the proposed installation of a 10MW AC Solar Photovoltaic (PV) Plant and associated infrastructure, as required by the NEMA EIA Regulations, 2014 (as amended 2017). The BA process is largely dependent on the information and assessments provided by the independent specialists and the input received during the public participation process in order to inform the overall environmental assessment of the proposed development on both environmental and social aspects.

The process where the environmental impacts associated with a project are assessed is a collective effort from a team of appropriate and independent specialists, as well as an independent Environmental Assessment Practitioner (EAP). The EIA is required to assess the planned development from a holistic perspective, considering all aspects and characteristics within the affected natural and social environment.

The following specialist consultants have provided expert input and a detailed assessment of the project in order to assess the environmental and social impacts within the affected environment as well as the acceptability of the application.

CES team and responsibilities

CES TEAM MEMBER	PROJECT RESPONSIBILITIES
<i>Dr Ted Avis</i>	Environmental Assessment Practitioner
<i>Mr Gregory Shaw</i>	Project Leader, Report Reviewer
<i>Mr Aidan Gouws</i>	Project Manager, Public Participation Manager
<i>Mr Alex Ndlovu</i>	Lead Report Writer



EXECUTIVE SUMMARY

BACKGROUND

Sturdee Energy proposes to construct a 10MW AC Solar PV Plant and associated infrastructure adjacent to the PPC Slurry Factory, located near Mahikeng in the North West Province. The intention of the project is to generate power to supplement the electricity consumption by the PPC cement manufacturing plant with Solar PV energy required to operate the plant and associated equipment including facilities on the site.

CES has been appointed by Sturdee Energy as an independent Environmental Assessment Practitioner (EAP) to undertake a Basic Assessment (BA), including specialist studies, and apply for the necessary Environmental Authorisation (EA) for the proposed project.

LOCATION, SITE AND PROJECT DESCRIPTION

PPC Cement proposes to develop a 10MW AC Solar PV Plant and associated infrastructure adjacent to the PPC Slurry Factory, located near Mahikeng in the North West Province. The proposed Solar PV plant will encompass an area of 19.9 hectares and will be used to generate power for private consumption at the adjacent cement factory. A 6.6kV dual-circuit overhead line (OHL), 850m in length, will be required to connect the new proposed plant to the existing PPC 6.6kV substation. An OHL to underground cable transition will also be required as the line approaches the substation.

In terms of the Environmental Impact Assessment (EIA) regulations of 2014 (as amended), the Solar Park project requires an Environmental Authorisation, from the Department of Economic Development, Environment, Conservation and Tourism (DEDECT). The triggered activities are listed under Listing Notices 1 & 3 (published in Government Notices No. R 327 and No. R 324 respectively), and as such, the BA Process needs to be followed.

Listed Activities triggered in the 2014 NEMA EIA Regulations (as amended 2017) - (Basic Assessment)

ACTIVITY NUMBER	ACTIVITY DESCRIPTION	DESCRIPTION OF PROJECT ACTIVITY THAT TRIGGERS LISTED ACTIVITY
GN R 327 – Listing 1		
1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where— ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare;	The proposed development will be a solar photovoltaic facility, with an output of 10 megawatts. The facility will cover an area of 19.9 ha. Although the development will be for photovoltaic facilities and infrastructure, the proposed site does not fall within an urban area or in an area with existing infrastructure.



ACTIVITY NUMBER	ACTIVITY DESCRIPTION	DESCRIPTION OF PROJECT ACTIVITY THAT TRIGGERS LISTED ACTIVITY
14	The development 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 meters or more but not exceeding 500 cubic meters.	The proposed development may require the storage, or the storage and handling of 500 cubic meters dangerous goods.
24	The development of a road— ii) with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 metres;	The proposed development will require the construction of 8 m wide access roads.
27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation	The proposed development is outside of urban areas and will require the clearance of 19.9 hectares.
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The proposed development occurs outside of an urban area and will encompass an area of 19.9 ha on land previously zoned for agriculture.
GN R 324 – Listing 3		
4	The development of a road wider than 4 metres with a reserve less than 13.5 metres. h. North West iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;	The proposed development may require the construction of 8 m wide access roads, within a Critical Biodiversity Area (CBA) 2.
10	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. h. North West iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority; vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.	The proposed development will require the storage and handling of dangerous goods of 80 cubic metres within a Critical Biodiversity Area (CBA) 2 and 45 m from a wetland.
12	The clearance of an area of 300 square metres or more of indigenous vegetation. h. North West iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority; vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.	The proposed development will require the clearance of 19.9 ha within a Critical Biodiversity Area (CBA) 2 and 45 m from a wetland.

PUBLIC PARTICIPATION PROCESS

Public consultation is a legal requirement throughout the BA process. The Public Participation Process included:

- Placing notice boards on site;



- Identifying and registering Interested and Affected Parties (I&APs) and relevant stakeholders;
- Providing notice to I&APs and stakeholders of the intent to submit an application for EA and the release of the Draft Basic Assessment Report (BAR) for public review.
- Publishing an advertisement in a local newspaper notifying the public of the release of the Draft BAR for public review;
- Keeping a register of all comments by and responses to registered I&APs and stakeholders for inclusion in the Final BAR.

IMPACT ASSESSMENT

Prior to mitigation, the proposed development is anticipated to have 8 impacts of HIGH and 49 of MODERATE negative significance, with 35 LOW and 1 VERY LOW impact of negative significance. Provided that the proposed mitigation measures are implemented and adhered to, the impacts can be reduced to a significance of MODERATE, LOW and VERY LOW.

Importantly eight VERY LOW, LOW and MODERATE positive impacts are anticipated.

Table 1.1: Summary of impacts before and after mitigation across phases.

Theme	Before Mitigation				After Mitigation			
	Very Low	Low	Moderate	High	Very Low	Low	Moderate	High
<i>Environmental policy</i>				-3		-3		
<i>Built environment</i>			-9 (+2)			-9	(+2)	
<i>Socio-economic</i>		+3	-11		-11 (+1)	(+2)		
<i>Rehabilitation and maintenance</i>			-3		-3			
<i>Terrestrial Biodiversity</i>	-1	-13	-21	-5	-7	-24	-9	0
<i>Aquatic Biodiversity and Wetland</i>		-1 (+1)	-9			-10 (+1)		
<i>Avifaunal</i>		-9 (+1)				-9 (+1)		
<i>Agricultural</i>			-2			-2		
<i>Heritage</i>		-4		-1		-4		-1
Total	-1	-35 (+7)	-49 (+2)	-8	-21 (+1)	-61 (+5)	-10 (+2)	-1

SITE SENSITIVITY

It is the professional opinion of CES and specialists that:

- **NO FATAL FLAWS** are currently associated with the proposed solar PV installation as all identified impacts can be adequately mitigated to reduce the risk or significance of impacts to an acceptable level, provided mitigation measures recommended in this report are implemented and maintained throughout the life of the project.
- If any changes to these layouts are made, the input of the relevant specialist must be obtained and incorporated into any changes.



- The information in the report is sufficient to allow DEDECT to make an informed decision.

RECOMMENDATION OF THE EAP AND SPECIALIST

It is the recommendation of CES that the proposed solar park at PPC Slurry should be approved provided that the proposed mitigation measures are implemented and that the EMPr is implemented, maintained and adapted to incorporate relevant legislation, standard requirements and audit reporting, throughout the life of the development. The mitigation measures for all impacts identified in the BAR must be incorporated into the EMPr and must be used by the engineers during the detailed Planning & Design Phase, by the contractors during the Construction Phase and by Sturdee Energy/PPC during the Operation Phase.



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ACRONYMS

AIS	Alien Invasive Species
BID	Background Information Document
BAR	Basic Assessment Report
CA	Competent Authority
CBA	Critical Biodiversity Area
CES	Coastal and Environmental Services (Pty) Ltd. (t/a CES)
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GN	Government Notice
IDP	Integrated Development Plan
I&AP	Interested and Affected Party
MEC	Member of the Executive Council
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Area
NDP	National Development Plan
PPP	Public Participation Process
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SCC	Species of Conservation Concern
SG	Surveyor General
TFR	Transnet Freight Rail



1 INTRODUCTION

1.1 BACKGROUND

Sturdee Energy proposes to construct a 10MW AC Solar PV Plant and associated infrastructure adjacent to the PPC Slurry Factory, in the Ngaka Modiri Molema District Municipality located near Mahikeng (Mahikeng Local Municipality) in the North-West Province. The intention of the project is to generate energy to supplement the electricity consumption by the PPC cement manufacturing plant with Solar PV energy required to operate the plant and associated equipment including facilities on the site.

CES has been appointed by Sturdee Energy as an independent Environmental Assessment Practitioner (EAP) to undertake a Basic Assessment (BA), including specialist studies, and apply for the necessary Environmental Authorisation (EA) for the proposed project.

1.2 PURPOSE OF THIS REPORT

In accordance with the National Environmental Management Act, 1998 (Act No. 107 Of 1998) (NEMA) and the NEMA EIA Regulations (2014), as amended, the issuing of an Environmental Authorisation (EA) requires the undertaking of a BA process, with associated Public Participation Process (PPP) and required specialist studies. This will enable the competent authority to decide whether to issue an EA for the proposed development, and if so, on what conditions.

In terms of the EIA regulations of 2014 (as amended), the triggered activity for this project is listed under Listing Notice 1 and Listing Notice 3 (published in Government Notices No. R 327 and No. R 324), and as such, the BA Process will be followed and include the following specialist studies:

- Avifaunal assessment;
- Agricultural assessment;
- Heritage and Palaeontological assessment;
- Wetland assessment; and
- Ecological assessment.

This report documents the process and findings of the BA for the proposed facility and associated infrastructure. This report was subject to a public comment period after which it was finalised and hereby submitted to the competent authority for review.

1.3 DETAILS AND EXPERIENCE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

In fulfilment of the legislative requirement (see Section 4.1 below) the details of the EAP that prepared this Basic Assessment Report (BAR) as well as the expertise of the individual members of the study team are provided below.



CES was established in 1990 as a specialist environmental consulting company based in Grahamstown, with branches in East London, Cape Town, Port Elizabeth and Centurion. CES has considerable experience in terrestrial, marine and freshwater ecology, the Social Impact Assessment (SIA) process, and state of environment reporting (SOER), Integrated Waste Management Plans (IWMP), Spatial Development Frameworks (SDF), public participation, as well as the management and co-ordination of all aspects of the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) processes. CES has been active in all of the above fields, and in so doing have made a positive contribution to towards environmental management and sustainable development in the Eastern Cape, South Africa and many other African countries.

Dr Ted Avis (*Role: Environmental Assessments Practitioner [EAP]*)

Ted Avis is a leading expert in the field of Environmental Impact Assessments, having project-managed numerous large-scale ESIA's to international standards, especially those of the International Finance Corporation (IFC). Ted also has experience in large scale Strategic Environmental Assessments in southern Africa and has been engaged by the IFC on a number of projects. Between 1994 and 1996 Ted was instrumental in establishing the Environmental Science Department at Rhodes University, whilst a Senior lecturer in Botany at that time. This resulted from his experience running honours modules in EIA practice and environmental management, as well as the applied research he undertook in these disciplines. He was an Honorary Visiting Fellow in the Department of Environmental Sciences at Rhodes between 1998 and 2003. He was one of the first certified Environmental Assessment Practitioner in South Africa, gaining certification in April 2002. He has delivered papers and published in the field of EIA, Strategic Environmental Assessment and Integrated Coastal Zone Management, and has been a principal of CES since its inception in 1990 and Managing Director since 1998.

Mr Gregory Shaw is a Principal Environmental Consultant and the Business Development Manager at CES. Greg has 12 years' experience in conducting environmental consultancy services in the energy, transport, maritime and agricultural sectors on behalf of South African and overseas government departments and agencies, local government authorities, private developers, international funding organisations, and non-government organisations. He has a strong track record of projects completed within budget, on time and in accordance with national and/or international environmental legislation and guidelines. Greg's skills include ESIA, environmental survey development, management, execution and monitoring, report writing, project management and strategic planning.

Mr Alex Ndlovu obtained his BSc Honours degree in Geography from University of South Africa, having conducted a research proposal on solid waste problems in the Mamelodi Township. Funded by Gauteng Campus Regional Academy (GCRA) throughout his studies as being the top achiever in high school. Prior to this, he obtained his BA in Environmental Management majoring in Geography from University of South Africa. Did an internship at Leapenviro Consulting where he managed to write BAR, EIA, WULA and GA reports. Alex joined CES in May 2021 and is already involved in several projects, including Basic Assessment, General Authorisation and Environmental Audit reports. He works from the Gauteng office and his interests include the general Environmental Impact Assessments (EIA) process, Environmental Audits and Public Participation Process (PPP).



Mr Aidan Gouws obtained his MSc in Environmental Science (Cum laude) from Rhodes University, having conducted research on the spatio-temporal dynamics of Acacia dealbata invasions and broader land-use and cover changes in the northern Eastern Cape, funded through a study bursary awarded by the Agricultural Research Council (ARC). Prior to this, he obtained his BSc Honours in Geographical and Environmental Sciences (Cum laude) from the University of Pretoria, studying plant ecology and EIA methodology amongst others. He is also member of the Golden Key Honours Society. Aidan joined CES in 2018 and has been involved in several projects, including Basic Assessments, Full Scoping and Environmental Impact Assessments, Environmental Audits and Resettlement Action Plan (RAP) Audit. He works from the Johannesburg office and his interests include the general Environmental Impact Assessment (EIA) process, GIS mapping, ecological studies and the Public Participation Process (PPP).

Full Curricula Vitae (CV) for individual members of the project team are attached as Appendix F1.

1.4 NATURE AND STRUCTURE OF THE REPORT

The structure of this report is based on Appendix 1 of GN R 982, of the EIA Regulations (2014) (as amended), which clearly specifies the required content of a Basic Assessment Report.

- **Chapter 1** introduces the proposed project and describes the purpose of this report and its structure.
- **Chapter 2** details the project location and describes the proposed project in detail, including primary infrastructure such as the solar PV panels, access roads and electrical distribution infrastructure.
- **Chapter 3** describes the needs and desirability of the project.
- **Chapter 4** describes the legislation that is applicable to the project.
- **Chapter 5** describes the biophysical and social environment of the proposed project site.
- **Chapter 6** describes the Public Participation Process (PPP) undertaken.
- **Chapter 7** provides a description of the alternatives to the proposed development, or components of the proposed development.
- **Chapter 8** covers the impact assessment methodology.
- **Chapter 9** provides a summary of the key findings of the specialist study for the proposed project.
- **Chapter 10** covers the impact assessment for the proposed project.
- **Chapter 11** provides a sensitivity analysis.
- **Chapter 12** provides a summary of the key environmental findings.
- **Chapter 13** provides recommendations and concludes this report.

1.5 SCOPE OF ASSESSMENT AND CONTENT OF THE BASIC ASSESSMENT REPORT

Section 3 of Appendix 1 of GN R982, as amended, specifies the content requirements for a Basic Assessment Report. The table below indicates how this document complies with these requirements.



Section 3	NEMA EIA Regulations – Appendix 1 Requirement	Section in Report
(a)	details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	Section 1.3 Appendix F1
(b)	the location of the activity, including- (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 2.1
(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;	Section 2.1 and Appendix A1
(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;	Section 4.1 and Section 4.2
(e)	a description of the policy and legislative context within which the development is proposed including (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	Section 4.2
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Chapter 3
(g)	a motivation for the preferred site, activity and technology alternative;	Chapter 7
(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including - (i) details of all the alternatives considered; (ii) details of the PPP 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 I&APs, 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 which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts- (aa) can be reversed;	Chapter 7 Chapter 6 and Appendix D Appendix D6 Chapter 5 Chapter 9, Chapter 10 and Appendix B



Section 3	NEMA EIA Regulations – Appendix 1 Requirement	Section in Report
	(bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Chapter 8 Chapter 9, Chapter 10 and Appendix B Chapter 9, Chapter 10 and Appendix B N/A Chapter 7 Section 13.3
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including - (i) a description of all environmental issues and risks that were identified during the EIA process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Chapter 8, Chapter 9, Chapter 10 and Appendix B
(j)	an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	Chapter 9, Chapter 10 and Appendix B
(k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Chapter 9
(l)	an environmental impact statement which contains— (i) a summary of the key findings of the EIA; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	Chapter 12 Chapter 10 Chapter 12



Section 3	NEMA EIA Regulations – Appendix 1 Requirement	Section in Report
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	Appendix E
(n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapter 13
(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Chapter 13
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter 3
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	N/A
(r)	an undertaking under oath or affirmation by the EAP in relation to— <ul style="list-style-type: none"> (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; and 	Appendix F2
(s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t)	any specific information that may be required by the competent authority; and	N/A
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A



2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

PPC Cement proposes to develop a 10MW AC Solar PV Plant and associated infrastructure adjacent to the PPC Slurry Factory, located near Mahikeng in the North-West Province. The proposed Solar PV plant will encompass an area of 19.9 hectares and will be used to generate power for private consumption at the adjacent cement factory. A 6.6 kV dual-circuit overhead line (OHL), 850 m in length, will be required to connect the new proposed plant to the existing PPC 6.6 kV substation. An OHL to underground cable transition will also be required as the line approaches the substation.

The proposed infrastructure will be located on Portions of the Farm Benadeplaats 93 JO and Slurry 96 JO, near Mahikeng, North West province. Figure 2.1 illustrates the project location (A3 Locality map provided in Appendix A1).

2.2 GENERAL SITE OBSERVATIONS

The proposed project is situated at the PPC Slurry Operations plant in a rural agricultural zone of in the North-West Province. Vegetation in the project area range from moderately dense to dense surface cover which has been altered in places by agricultural activities, digging and refuse dumping. A shallow quarry occurs along the western boundary of the project area where calcrete rock banks, which seems to constitute much of the substrate of the project area, were exposed. Heaps of rock, building rubble and refuse occur in places in the area.

A small wetland occurs in the project area but no other prominent landscape features (e.g. hills, drainage lines) occur within or in the immediate surroundings of the study area. The region consists mostly of crop, cattle and game farms but an increasing number of mines and quarries occur around rich limestone and cement resources. The major land use of the study area as classified by the Environmental Potential Atlas of South Africa (2000) is vacant / unspecified land. Site photographs can be found in Appendix A2.

2.3 TECHNICAL DETAILS

The design specifications of the plant are summarised in Table 2.1 below.

Table 2.1: Proposed PPC Slurry Design Basis Summary

PRE-DESIGN INPUT	PPC SLURRY SOLAR PV PLANT SPECIFICATION
Contracted Capacity (AC)	• 10MW
Maximum Export Capacity (AC)	• 10MW
Plant nameplate DC capacity	• 11MW
DC/AC Ratio	• 110%
PV module type	• Mono-crystalline N-S tracker with back-tracking
Number of modules	• 23 920
Number of module strings	• 920
Mounting structure	• Single-axis ground-mount N-S tracker with back-tracking
Tracker specification	• 30x1 modules in portrait



PRE-DESIGN INPUT	PPC SLURRY SOLAR PV PLANT SPECIFICATION
	<ul style="list-style-type: none"> Pitch of 6.5m GCR = 34.8% Angle rotation +-60°
Bi-facial system specification	<ul style="list-style-type: none"> Ground albedo = 20% Bi-faciality factor = 74% Rear shading factor = 5% Axis height above ground = 2m
Axis tilt	<ul style="list-style-type: none"> 0 degrees
PV inverter type	<ul style="list-style-type: none"> 1500V outdoor grid-tied central inverter
Inverter continuous AC rated capacity	<ul style="list-style-type: none"> 4x 2500kWac
Plant Transformer rating	<ul style="list-style-type: none"> 4x 3MVA 400V/6.6kV
Plant grid interconnection voltage	<ul style="list-style-type: none"> 6.6kV
Planned grid interconnection	<ul style="list-style-type: none"> 1800m 6.6kV overhead line to PPC 6.6kV Main Distribution Substation

2.4 WATER REQUIREMENTS

The project will require water to facilitate both the construction and operational phases of the project. During construction approx. 2000 kl per annum will be required while during operation approx. 2000 kl will be required per annum. The water will be sourced from boreholes located on with the PPC Slurry site and stored locally (likely in “JoJo” tanks).

The intention for the water-use during construction is to facilitate the installation of the concrete footings used to secure the tracking decks. During operation, the water will be used to clean the panels.

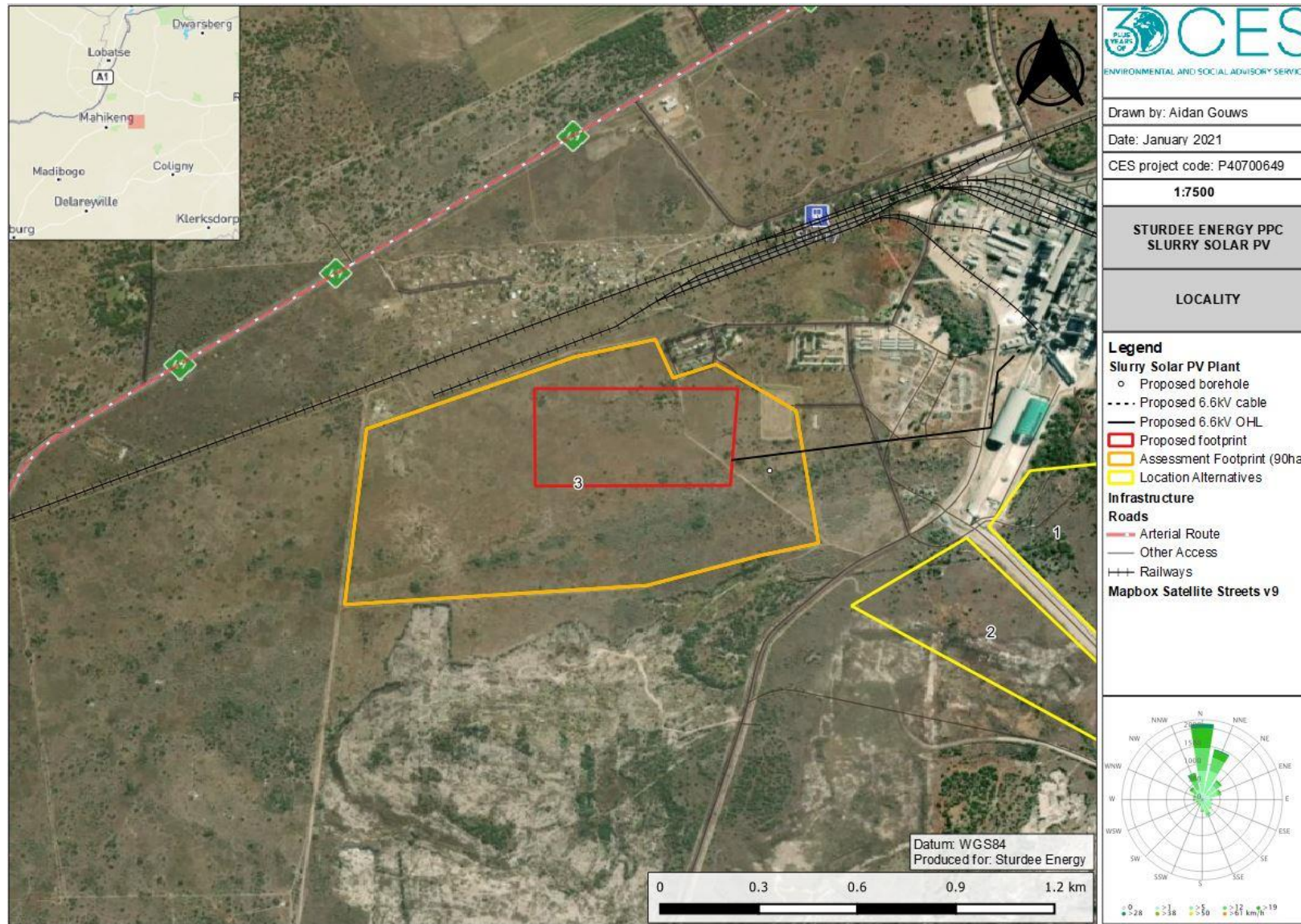


Figure 2.1: Location of the proposed site at PPC Slurry near Mahikeng, North West.



3 PROJECT NEED AND DESIRABILITY

The need and desirability of the proposed solar plant were evaluated in terms of the Integrated Environmental Management Guideline on Need and Desirability (General Notice 891 of 2014, as amended). This guideline outlines the legislative, strategic and statutory considerations for identifying and describing the need and desirability of proposed developments, which trigger NEMA listed activities. The need and desirability of a proposed development is described in terms of its ecological sustainability, socio-economic justifiability and overall contribution to sustainable development. The following considerations were taken into account in determining the need and desirability of the proposed solar plant.

3.1 DEVELOPMENT PLANNING

The National Development Plan (NDP) represents a new approach by Government to promote sustainable and inclusive development in South Africa. The proposed solar park contributes to the NDP goals indirectly by addressing climate change commitments through the reduced reliance on carbon-based power generation.

3.2 INFRASTRUCTURE DEVELOPMENT

The Ngaka Modiri Molema District Municipality's Integrated Development Plan (IDP) (2020/2021) identifies energy as a key limitation to the development of industry and economic sustainability. The proposed activity does not compromise any of the objectives set within IDP (2020/2021). The proposed project will also be supportive of the IDP's objective of creating more job opportunities. Even though this solar facility will not provide the municipality directly with electricity, the energy produced by the facility will feed directly into PPC operational plant. The proposed project will create job opportunities and economic spin offs during the construction and operational phases (if an EA is granted by DEDECT). It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase. Therefore, the proposed solar facility would help to address the need for increased and stable electricity supply while also be providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area.

3.3 ENVIRONMENTAL MANAGEMENT

The basic needs of landowners and the public were taken into account during the planning phase of the proposed project, which aims to stimulate economic growth, create employment opportunities and make significant contribution towards food security. Minimisation of potential negative impacts and optimisation of potential positive impacts will be ensured by way of effective implementation of the EMP. Thus, the proposed project is deemed to be socially, environmentally and economically sustainable.



3.4 INTEGRATED ENVIRONMENTAL MANAGEMENT (SECTION 23 OF NEMA)

The general objectives of Integrated Environmental Management were taken into account by considering all the potential negative and positive impacts of the proposed project on both the biophysical and socio-economic environments. In order to avoid potentially significant impacts, specialist inputs were obtained in relation to terrestrial and aquatic ecology. Based on the findings of the specialist studies a number of recommendations / mitigation measures have been identified for consideration in further project design and implementation. The public and authorities were given adequate opportunity to comment on the proposed project and to participate in the Basic Assessment Process.

3.5 RIGHTS OF THE LOCAL COMMUNITY

The project will not affect the rights of the local community. The project is expected to economically benefit the local community by creating job opportunities and upskill the community in an industry outside that related to mining which is the main livelihood for the community currently. The renewable energy value chain encompasses: manufacturing and distribution of renewable energy equipment; renewable energy project development; construction and installation work associated with the development of renewable energy capacity; operation and maintenance of renewable energy facilities; and a range of cross-cutting activities that contribute to more than one of the other value chain stages.

3.6 BENEFITS AND DRAWBACKS

The project benefits outweigh the negative impacts. Although the project will result in the loss of vegetation and infringe on the natural environment, habitat fragmentation will be minimized due to the proposed site falling on the edge of the natural area. The development will be undertaken in a manner that aims to minimise environmental impacts.

The development will place additional pressure on the existing municipal services (e.g. water). However, these pressures can be alleviated if effectively managed.

The project will make a positive contribution to sustainable economic growth, skills development and employment opportunities in Ngaka Modiri Molema District Municipality.



4 RELEVANT LEGISLATION

4.1 ENVIRONMENTAL AUTHORISATION IN SOUTH AFRICA

The regulation and protection of the environment within South Africa, occurs mainly through the application of various items of legislation, within the regulatory framework of the Constitution, 1996 (Act No. 108 of 1996).

The primary legislation regulating Environmental Impact Assessment (EIA) within South Africa is the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). NEMA makes provision for the Minister of Environmental Affairs to identify activities which may not commence prior to authorisation from either the Minister or the provincial Member of the Executive Council ("the MEC"). In addition to this, NEMA also provides for the formulation of regulations in respect of such authorisations.

The EIA Regulations (2014) (as amended) allow for a Basic Assessment (BA) process for activities with limited environmental impact (listed in GN R 327 & 324, 2014, as amended) and a more rigorous two-tiered approach to activities with potentially greater environmental impact (listed in GN R 984, 2014, as amended). This two-tiered approach includes both a Scoping and EIA process.

In terms of the Environmental Impact Assessment (EIA) regulations of 2014 (as amended), the Solar Park project requires Environmental Authorisation, from the Department of Economic Development, Environment, Conservation and Tourism (DEDECT). The triggered activities are listed under Listing Notices 1 & 3 (published in Government Notices No. R 327 and No. R 324 respectively), and as such, the BA Process needs to be followed. The listed activities that have been applied for are provided in Table 4.1 below.

Table 4.1: Listed Activities triggered in the 2014 NEMA EIA Regulations (as amended 2017) - (Basic Assessment)

ACTIVITY NUMBER	ACTIVITY DESCRIPTION	DESCRIPTION OF PROJECT ACTIVITY THAT TRIGGERS LISTED ACTIVITY
GN R 327 – Listing 1		
1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where— ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare;	The proposed development will be a solar photovoltaic facility, with an output of 10 megawatts. The facility will cover an area of 19.9 ha. Although the development will be for photovoltaic facilities and infrastructure, the proposed site does not fall within an urban area or in an area with existing infrastructure.



ACTIVITY NUMBER	ACTIVITY DESCRIPTION	DESCRIPTION OF PROJECT ACTIVITY THAT TRIGGERS LISTED ACTIVITY
14	The development 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 meters or more but not exceeding 500 cubic meters.	The proposed development may require the storage, or the storage and handling of 500 cubic meters dangerous goods.
24	The development of a road— ii) with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 metres;	The proposed development will require the construction of 8 m wide access roads.
27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation	The proposed development is outside of urban areas and will require the clearance of 19.9 hectares.
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The proposed development occurs outside of an urban area and will encompass an area of 19.9 ha on land previously zoned for agriculture.
GN R 324 – Listing 3		
4	The development of a road wider than 4 metres with a reserve less than 13.5 metres. h. North West iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;	The proposed development may require the construction of 8 m wide access roads, within a Critical Biodiversity Area (CBA) 2.
10	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. h. North West iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority; vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.	The proposed development will require the storage and handling of dangerous goods of 80 cubic metres within a Critical Biodiversity Area (CBA) 2 and 45 m from a wetland.
12	The clearance of an area of 300 square metres or more of indigenous vegetation. h. North West iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority; vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.	The proposed development will require the clearance of 19.9 ha within a Critical Biodiversity Area (CBA) 2 and 45 m from a wetland.

The competent authority that must consider and decide on the application for authorisation in respect of the activities listed in Table 4.1 is the Department of Economic Development, Environment, Conservation and Tourism (DEDECT). DEDECT is required to provide a decision regarding the proposed project based on comments from state stakeholders. This



decision has been made in terms of Section 24(C) (3) of the National Environmental Management Act, 1998 (Act No 107 of 1998).

It is important to note that in addition to the requirements for an authorisation in terms of NEMA, there may be additional legislative requirements which need to be considered prior to commencing with the activity, for example:

- National Heritage Resources Act, 1999 (Act No. 25 of 1999).
- Aviation Act, 1962 (Act No. 74 of 1962): 13th Amendment of the Civil Aviation Regulations (1997).
- NEM: Biodiversity Act, 2004 (Act No. 10 of 2004).
- National Water Act, (Act No. 36 of 1998).

4.2 APPLICABLE LEGISLATION

This section describes the South African (national), provincial and municipal legislation considered during the Basic Assessment process of the proposed development.

4.2.1 NATIONAL

4.2.1.1 *The Constitution Act, 1996 (Act No. 108 of 1996)*

This is the supreme law of the land. As a result, all laws, including those pertaining to the proposed development, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, “everyone has the right –

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

RELEVANCE TO THE PROPOSED PROJECT

- *The developer has an obligation to ensure that the proposed activity will not result in pollution and ecological degradation.*
- *The developer has an obligation to ensure that the proposed activity is ecologically sustainable, while demonstrating economic and social development.*

4.2.1.2 *National Environmental Management Act, 1998 (Act No. 107 of 1998)*

The National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA) provides for the basis for environmental governance in South Africa by establishing principles and institutions for decision-making on matters affecting the environment.

A key aspect of NEMA is that it provides a set of environmental management principles that apply throughout the Republic to the actions of all organs of state that may significantly affect the environment. Section 2 of NEMA contains principles (see Table 4-1) relevant to the proposed development, and likely to be utilised in the process of decision making by DFFE.

**Table 4.2: NEMA Environmental Management Principles**

Number	Description of Principles
(2)	Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
(3)	Development must be socially, environmentally and economically sustainable.
(4)(a)	Sustainable development requires the consideration of all relevant factors including the following: <ul style="list-style-type: none"> i. That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; ii. That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; iii. That waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner.
(4)(e)	Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.
(4)(i)	The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.
(4)(j)	The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.
(4)(p)	The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.
(4)(r)	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.

As these principles are utilised as a guideline by the competent authority in ensuring the protection of the environment, the proposed development should, where possible, be undertaken in accordance with these principles. Where this is not possible, deviation from these principles would have to be very strongly motivated.

NEMA introduces the duty of care concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution and may lead to the prosecution of managers or directors of companies for the conduct of the legal persons. Employees who refuse to perform environmentally hazardous work, or whistle blowers, are protected in terms of NEMA.

In addition, NEMA introduces a new framework for environmental impact assessments, the EIA Regulations (2010), which aims to avoid detrimental environmental impacts through the regulation of specific activity that cannot commence without prior environmental authorisation (discussed in Section 4.1).



RELEVANCE TO THE PROPOSED PROJECT

- *An application for Environmental Authorisation (as triggered by the EIA Regulations 2014 (as amended)) will be required. In terms of Section 28, every person who causes, has caused, or may cause significant pollution or degradation of the environment, must take reasonable measures to prevent pollution or rectify the damage caused. The undertaking of various specialist studies, in order to identify potential impacts on the environment and to recommend mitigation measures to minimise these impacts, complies with Section 28 of NEMA. The developer must apply the NEMA principles, the fair decision-making and conflict management procedures that are provided for in NEMA. The developer must apply the principles of Integrated Environmental Management and consider, investigate and assess the potential impact of existing and planned activities on the environment, socio-economic conditions and the cultural heritage.*
- *In terms of the EIA regulations, the construction of the proposed solar plant and associated infrastructure will trigger the need for a Basic Assessment process under the NEMA EIA Regulations of 2014 (as amended) in Listing Notice 1 and 3 (refer to Section 4.1 for a detailed description of the listed activity applied for).*

4.2.1.3 National Environment Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

The National Environment Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) provides for the management and conservation of South Africa's biodiversity and the protection of species and ecosystems that warrant national protection.

The objectives of NEMBA are:

- (a) *within the framework of the National Environmental Management Act, to provide for—*
 - (i) *the management and conservation of biological diversity within the Republic and of the components of such biological diversity;*
 - (ii) *the use of indigenous biological resources in a sustainable manner; and*
 - (iii) *the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources;*
- (b) *to give effect to 'ratified international agreements relating to biodiversity which are binding on the Republic;*
- (c) *to provide for co-operative governance in biodiversity management and conservation; and*
- (d) *to provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.*

The Act provides for the management and conservation of South Africa's biodiversity within the framework of the NEMBA. In terms of the Biodiversity Act, the developer has a responsibility for:

The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (including The Endangered and Threatened Ecosystem Regulations, Government Notice R. 1002 dated 9th December 2011).

- Application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all developments within the area are in line with ecological sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.

The Act's permit system is further regulated in the Act's Threatened or Protected Species Regulations Government Notice R. 152 of 23 February 2007.



RELEVANCE TO THE PROPOSED PROJECT

- *The developer must not cause a threat to any endangered ecosystems and must protect and promote biodiversity;*
- *The developer must assess the impacts of the proposed development on endangered ecosystems;*
- *The developer may not remove or damage any protected species without a permit; and*
- *The developer must ensure that the site is cleared of alien vegetation using appropriate means.*
- *Alien Invasive Species (AIS) Regulations, Government Notice R. 598 of 1st April 2014 are applicable.*

4.2.1.4 National Environmental Management: Waste Management Act, 2008 (Act No. 59 of 2008)

The National Environmental Management: Waste Management Act, 2008 (Act No. 59 of 2008) (NEMWMA) gives legal effect to the Government's policies and principles relating to waste management in South Africa, as reflected in the National Waste Management Strategy (NWMS). The objects of the Act are *"to protect health, well-being and the environment by providing reasonable measures for—*

- *minimising the consumption of natural resources;*
- *avoiding and minimising the generation of waste;*
- *reducing, re-using, recycling and recovering waste;*
- *treating and safely disposing of waste as a last resort;*
- *preventing pollution and ecological degradation;*
- *securing ecologically sustainable development while promoting justifiable economic and social development;*
- *promoting and ensuring the effective delivery of waste services;*
- *remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and*
- *achieving integrated waste management reporting and planning."*

RELEVANCE TO THE PROPOSED PROJECT

- *The developer must ensure that all activities associated with the project address waste related matters in compliance with the requirements of the Act.*
- *The developer must consult with the local municipalities to ensure that waste is disposed of at a registered landfill site.*

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

The objective of this Act is to provide for the health and safety of persons at work. In addition, the Act requires that, "as far as reasonably practicable, employers must ensure that their activities do not expose non-employees to health hazards". The importance of the Act lies in its numerous regulations, many of which will be relevant to the proposed project. These cover, among other issues, noise and lighting.

RELEVANCE TO THE PROPOSED PROJECT

- *The developer must be mindful of the principles and broad liability and implications contained in the OHSA and mitigate any potential impacts.*



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

The National Environmental Management: Air Quality Act (No. 39 of 2004)(NEMAQA) is the principal legislation regulating air quality in South Africa. The objects of the Act are to:

- Give effect to section 24(b) of the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people, and
- Protect the environment by providing reasonable measures for:
 - Protection and enhancement of the quality of air in the Republic.
 - Prevention of air pollution and ecological degradation.
- Securing ecologically sustainable development while promoting justifiable economic and social development.

The Air Quality Act empowers the Minister to establish a national framework for achieving the objects of this Act. The said national framework will bind all organs of state. The said national framework will *inter alia* have to establish national standards for municipalities to monitor ambient air quality and point, non-point and mobile emissions.

RELEVANCE TO THE PROPOSED PROJECT

- *Although no major air quality issues are expected, the developer needs to be mindful of the Act as it also relates to potential dust generation during construction, etc.*

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

The National Water Act (NWA) provides for fundamental reform of the law relating to water resources in South Africa.

The purpose of the Act is “to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors—

- (a) meeting the basic human needs of present and future generations;
- (b) promoting equitable access to water;
- (c) redressing the results of past racial and gender discrimination;
- (d) promoting the efficient, sustainable and beneficial use of water in the public interest;
- (e) facilitating social and economic development;
- (f) providing for growing demand for water use;
- (g) protecting aquatic and associated ecosystems and their biological diversity;
- (h) reducing and preventing pollution and degradation of water resources;
- (i) meeting international obligations;
- (j) promoting dam safety;
- (k) managing floods and droughts.”

Section 21 of the NWA describes activities defined as a water use under the Act. These activities may only be undertaken subject to the application for, and issue of, a Water Use License (WUL) or General Authorisation (GA). Water use activities include—

- (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.”*

RELEVANCE TO THE PROPOSED PROJECT

- *The project will require water to facilitate both the construction and operational phases of the project. During construction approx. 2000 kl will be required while during operation approx. 2000 kl will be required per annum. The water will be sourced from boreholes located on with the PPC Slurry site and stored locally (likely in “JoJo” tanks).*
- *The specific supply should have a separate meter for any other logistical purposes. This water may require temporary storage on site, triggering the need for a Water Use Authorisation (WUA) under the National Water Act (NWA), (Act No 36 of 1998) Section 21 for the following water use: 21(b) for the storage of water.*
- *Additionally, the proposed development site encompasses a wetland and will therefore require a WUA under Section 21(c) and 21(i) of the NWA. Under Section 21 of the NWA, the proposed development would require either a General Authorisation (GA) or full Water Use Licence (WULA) (depending on the level of risk) for any development occurring within 500 m of a wetland.*

4.2.1.8 Strategic Transmission Corridors – Northern Corridor

The Strategic Environmental Assessment for Electricity Grid Infrastructure (EG) in South Africa has identified five Strategic Transmission Corridors that are of strategic importance for the rollout of the supporting large scale electricity transmission and distribution infrastructure in terms of Strategic Integrated Project 10: Electricity Transmission and Distribution.

The development of 10MW AC Solar PV Plant and associated infrastructure adjacent to the PPC Slurry Factory, located near Mahikeng in the North-West Province falls within the Northern Strategic Transmission Corridor. According to the Department of Environmental Affairs (DEA), an application for environmental authorisation is required for a large-scale electricity transmission and distribution facilities. Strategic Transmission Corridors must follow the basic assessment procedure contemplated in Regulation 19 and 20 of the Environmental Impact Assessment Regulations, 2014 in order to obtain environmental authorisation, as required in terms of the Act.

4.2.1.9 National Road Traffic Act, 1996 (Act No. 93 of 1996)

The National Road Traffic Act (No. 93 of 1996) (NRTA) provides for all road traffic matters and is applied uniformly throughout South Africa. The Act enforces the necessity of registering and licensing motor vehicles. It also stipulates requirements regarding fitness of drivers and vehicles as well as making provision for the transportation of dangerous goods.



RELEVANCE TO THE PROPOSED PROJECT

- *All the requirements stipulated in the NRTA will need to be complied with during the construction and operational phases of the proposed solar park.*

4.2.1.10 Other Relevant National Legislation

Other legislation that may be relevant to the proposed solar plant and associated infrastructure includes:

- The Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA) Noise Control Regulations, which specifically provide for regulations to be made with regard to the control of noise, vibration and shock, including prevention, acceptable levels, powers of local authorities and related matters;
- Provincial Nature and Environmental Conservation Ordinance, 1974 (Act No. 19 of 1974), which lists species of special concern which require permits for removal. Schedules 1 to 4 list protected and endangered plant and animal species.
- Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013 – came into force on 1 July 2015) (SPLUMA) aims to provide inclusive, developmental, equitable and efficient spatial planning at the different spheres of the government. This act repeals national laws on the Removal of Restrictions Act, Physical Planning Act, Less Formal Township Planning Act and Development Facilitation Act.

4.2.2 PROVINCIAL

4.2.2.1 North West Biodiversity Plan

The North West Biodiversity Plan is a useful tool for addressing the need to take biodiversity into account in land use planning and decision-making, in order to promote sustainable development. The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land use planning and decision making guidelines.

RELEVANCE TO THE PROPOSED PROJECT

- *The proposed development must be aligned with provincial spatial planning guidelines and targets.*
- *The developer must not cause a threat to any endangered ecosystems and must protect and promote biodiversity.*
- *The developer must assess the impacts of the proposed development on endangered ecosystems.*

4.2.2.2 The Government of the Northwest Territories (GNWT) 2030 Energy Strategy

The Northwest Territories' 2030 Energy Strategy (Energy Strategy) sets out the Government of the Northwest Territories' (GNWT) long-term approach to supporting secure, affordable and sustainable energy supply and use in the NWT. The goal of this strategy is to guide the development of secure, affordable, and sustainable energy for transportation, heat and electricity, support energy efficiency and conservation, and promote renewable and alternative



energy solutions for the NWT. By 2030, the NWT will have a secure, affordable and sustainable energy system that is less dependent on fossil fuels, and contributes to the economic, social and environmental wellbeing of the Territory and its residents. The GNWT will achieve this vision by following guiding principles in decision making that include shared responsibility, Indigenous and community engagement, leading by example, as well as transparency and accountability.

4.2.3 DISTRICT

4.2.3.1 Ngaka Modiri Molema District Integrated Environmental Management Programme

The Municipality does not have an EMF, however an Integrated Environmental Management Programme was compiled by the District Municipality to ensure that land use decision making is taken with adequate environmental resource information being available to ensure sustainable and appropriate environmental management to the benefit of its residents. One of the set goals for the Plan is ensuring that all environmental issues are appropriately addressed.

Renewable energy projects such the proposed PPC Slurry Solar Energy Facility will contribute to clean energy generation as a sustainable resource and holds huge benefits for the local region and the country as a whole. Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future, the project aims on achieving the set goals for the Plan through addressing all possible environmental issues associated with the development and address measure to mitigate environmental issues.

RELEVANCE TO THE PROPOSED PROJECT

- *The proposed development must be aligned with district spatial planning guidelines and targets.*

4.2.4 OTHER

In addition to the above, aside from the environmental authorisation, there are other permits, contracts and licenses that will need to be obtained by the project proponent for the proposed project some of which fall outside the scope of the EIA. However, for the purposes of completeness, these include:

- North West Spatial Development Framework
- Ngaka Modiri Molema District Municipality and Mafikeng Local Municipality Spatial Frameworks
- Ngaka Modiri Molema District Municipality and Mafikeng Local Municipality By-Laws
- Ngaka District Municipality and Mafikeng Local Municipality Integrated Development Plans

In addition to the above, the following spatial tools from the South African National Biodiversity Institute (SANBI) need to be taken into consideration:

- The South African Vegetation Map (Mucina and Rutherford);
- The North West Biodiversity Plan;
- The Ngaka Modiri Molema District Bioregional Plan; and
- The National Freshwater Ecosystem Priority Areas (NFEPA) project.



5 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter provides a description of the affected environment within the vicinity of the proposed solar plant. This information is provided to assist the reader in understanding the possible effects of the project on the environment within which it is proposed to be developed. This information has been sourced from existing information available for the area as well as the specialist consultants who have undertaken studies for the proposed development. This chapter aims to provide the context within which this BA is being conducted.

5.1 BIOPHYSICAL ENVIRONMENT

5.1.1 CLIMATE

The proposed development site is situated at the PPC Slurry facility, near Mahikeng in the North West Province, characterised by a warm-temperate climate, with hot, wet summers and cool, dry winters (Mucina & Rutherford, 2018). The Mean Annual Precipitation (MAP) and Mean Annual Potential Evaporation (MAPE) of the area are 593 mm and 1 778 mm, respectively (Mucina & Rutherford, 2018). The Annual Precipitation Coefficient of Variation (APCV) of the area is recorded at 22 % (Mucina & Rutherford, 2018), with the highest average rainfall occurring in January (91 mm) and lowest in July (1 mm) (Meteoblue, 2021). The Mean Annual Temperature (MAT) of the area is 16.1 °C (Mucina & Rutherford, 2018), with the highest mean daily temperatures occurring in December (30 °C) and lowest occurring in June and July (3 °C) (Meteoblue, 2021). An average of 37 days of frost are recorded in the area per year (Mucina & Rutherford, 2018). A summary of the climate at Slurry is provided in Figure 5.1 below.

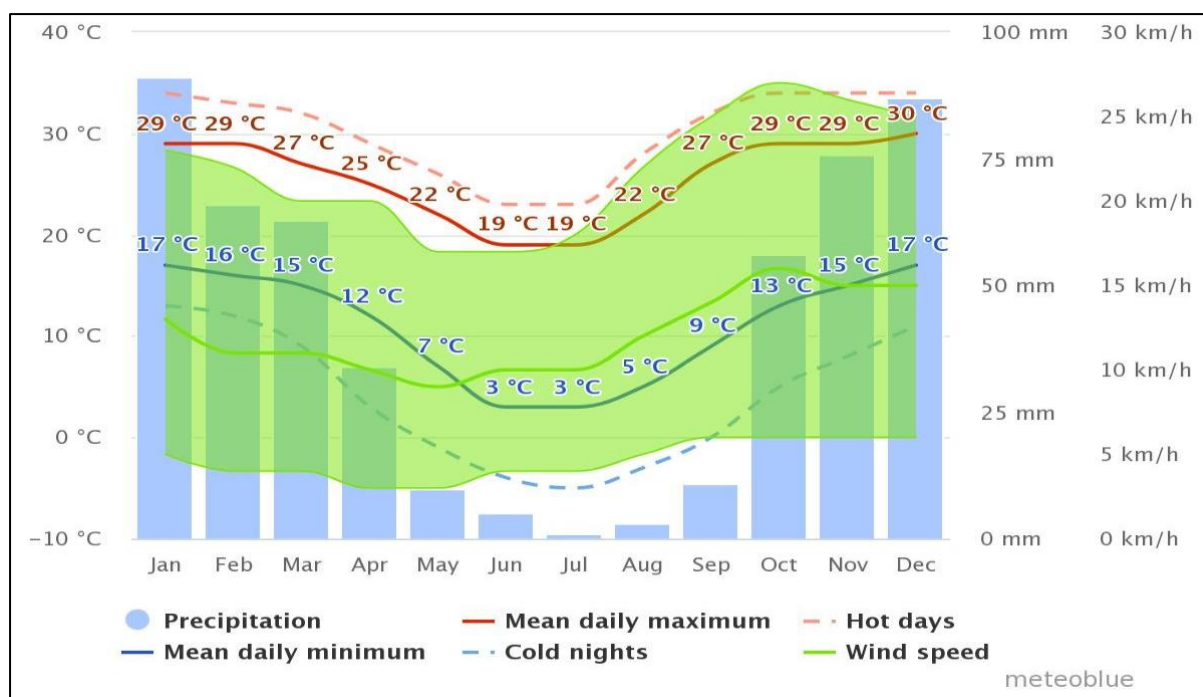


Figure 5.1: Climatic data for PPC Slurry, North West (Meteoblue, 2021).



5.1.2 TOPOGRAPHY

The topography of the area is characterised by “slightly undulating plains dissected by prominent rocky chert ridges” (Mucina & Rutherford, 2018, p. 388). The terrain across the site is nearly flat, with a slight eastward sloping (0.9 %) and elevations ranging from 1 402-1 409 m above mean sea level (amsl). The topographical profile and map of the site are provided in Figure 5.2 and Figure 5.3, respectively.

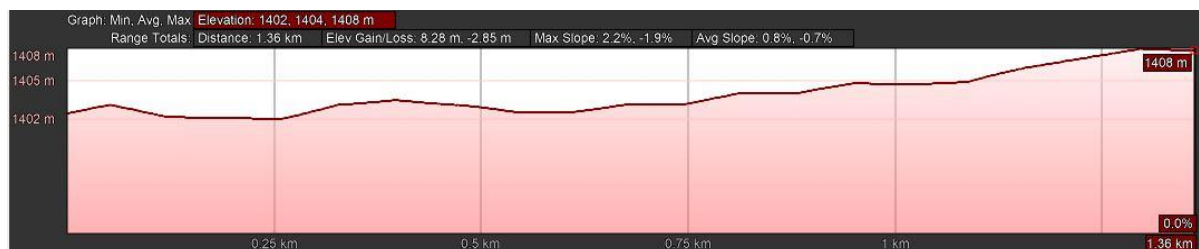


Figure 5.2: Topographic profile of the proposed site from west to east.

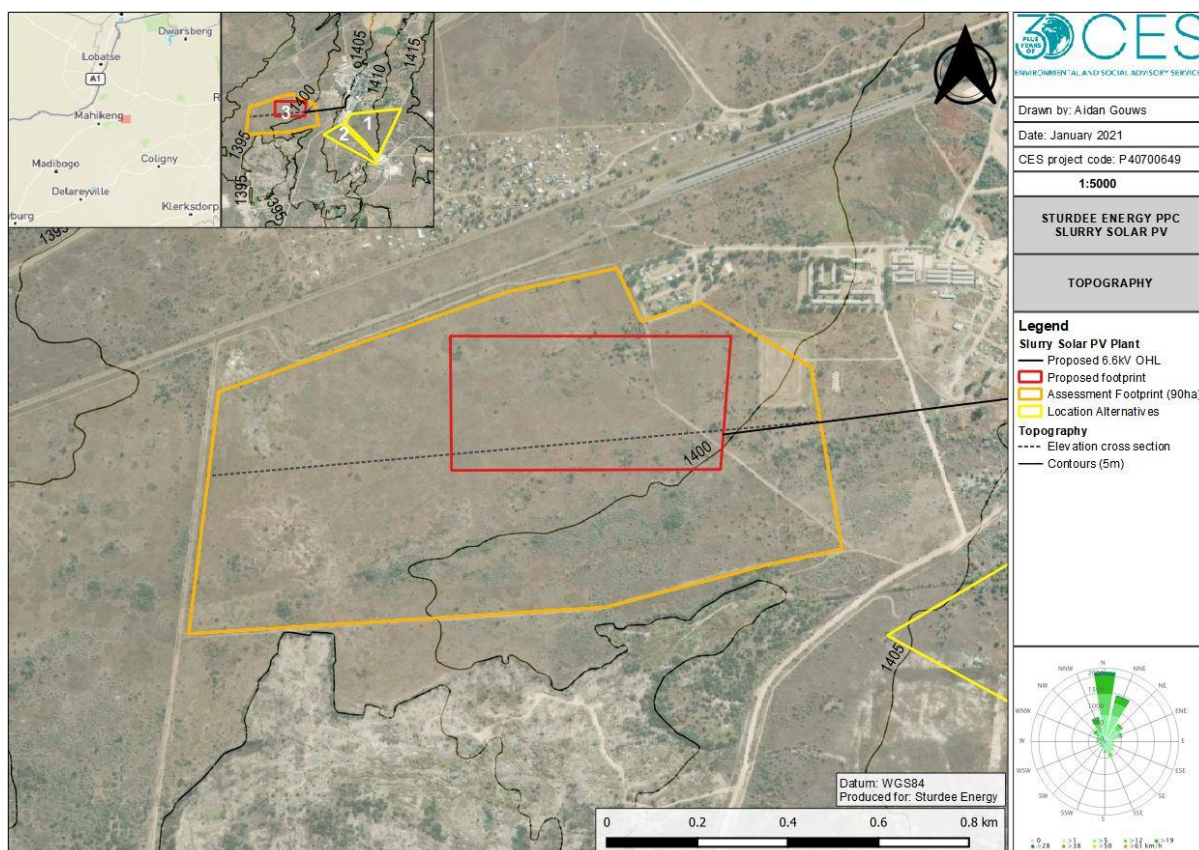


Figure 5.3: Topographic map of the proposed Solar PV facility at PPC Slurry, North West.

5.1.3 GEOLOGY AND SOILS

The geology of the area consists primarily of limestone and sand from the Kalahari Group, overlain by type E1 soils, which includes minimally developed, shallow soils, occurring on hard or weathering rock, with or without intermittent diverse soils, and the general occurrence of lime (**Figure 5.4**). According to Mucina & Rutherford (2018), the Carletonville Dolomite Grassland found within and eastwards of the site is typically supported by dolomitic and chert geology of the Malmani Subgroup (Transvaal Supergroup), with shallow Mispah and Glenrosa soils, as well as deeper red to yellow apedal soils. The



Klerksdorp Thornveld vegetation found to the west of the site is typically supported by the shale, slate and quartzite of the Pretoria Group, diabase sills and Hekpoort lava, with shallow and rocky soils, as well as red plinthic soils of the Ventersdorp Supergroup (Mucina & Rutherford, 2018).

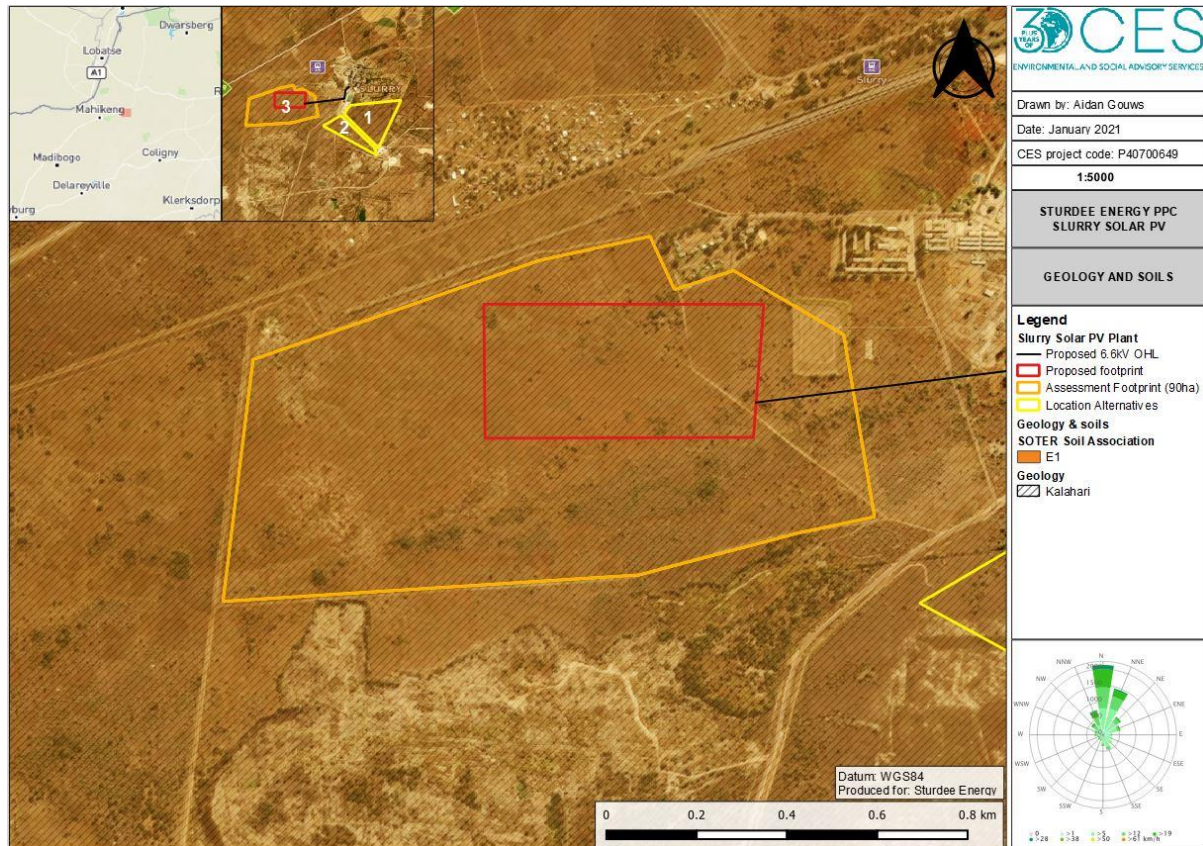


Figure 5.4: Geology and soil map of the proposed Solar PV facility at PPC Slurry, North West.

5.1.4 LAND USE AND COVER

The primary land use and cover within the assessment footprint is natural grassland, with a ridgeline of woodlands near the southern border, evidence of historical mining in the north-western corner, formal PPC residences on the north-eastern corner and an urban recreational area (sports field) on the eastern edge (Figure 5.5). Outside of the assessment footprint, an informal residential area and an extensive old quarry are found to the north and south of the site, respectively, with the PPC Plant found approximately 400 m towards the east (Figure 5.5).

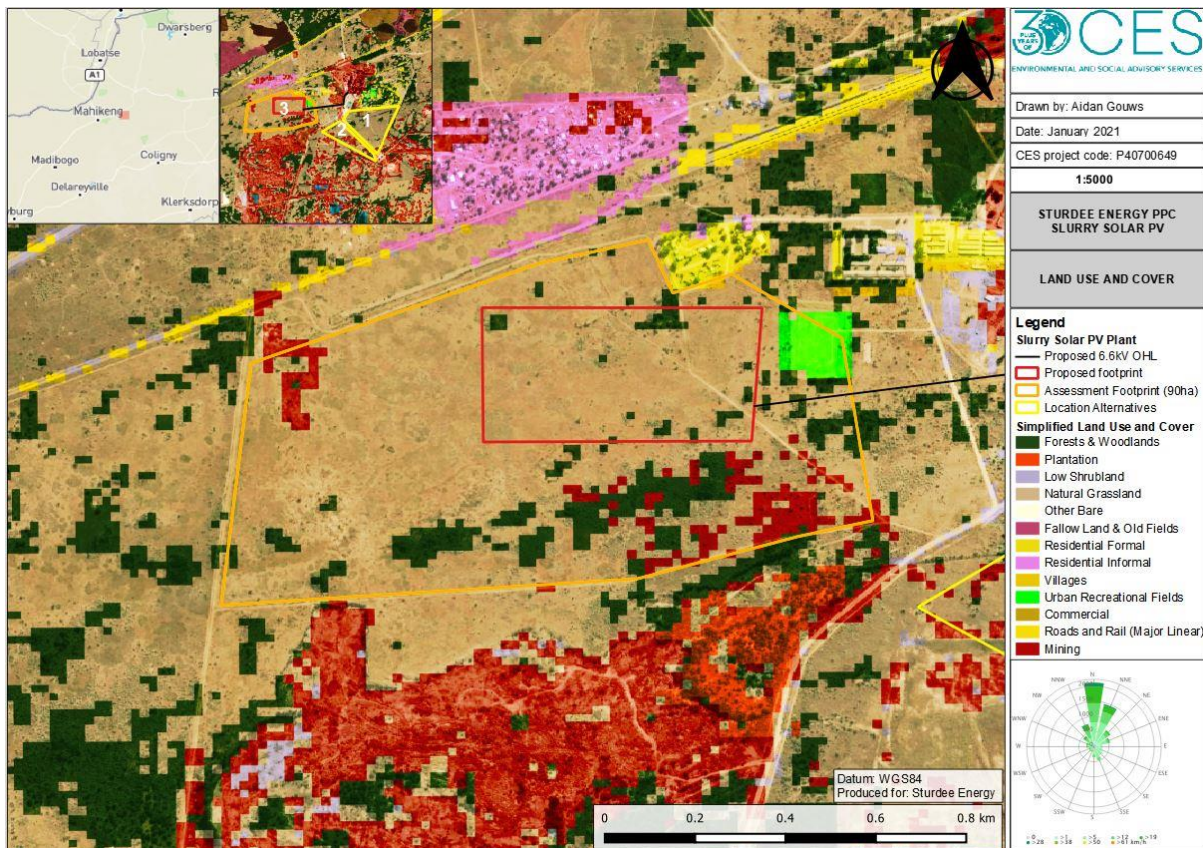


Figure 5.5: Land use and cover map of the proposed Solar PV facility at PPC Slurry, North West.

5.1.5 DRAINAGE, RIVER AND WETLAND ECOSYSTEM CONTEXT

The assessment footprint falls entirely within Quaternary Catchment D41A, situated in the upper reaches of the Molopo River (Figure 5.6). The upper Molopo is part of the Crocodile (West) and Marico Water Management Area. The entire site and surrounding area also fall within the Bo-Molopo Karst Belt Strategic Water Source Area (SWSA).

The reach of the Molopo River that flows closest to the assessment footprint (approximately 3.7 km to the south) has been assigned a 'Critically Endangered' ecosystem threat status in terms of the National Biodiversity Assessment (NBA, 2018). Critically Endangered ecosystems are ecosystem types that have very little of their original extent (measured as area, length or volume) left in natural or near-natural condition. Most of the ecosystem type has been heavily, severely or critically modified from its natural state. Any further loss of natural habitat or deterioration in condition of the remaining healthy examples of these ecosystem types must be avoided, and the remaining healthy examples should be the focus of urgent conservation action (Nel & Driver, 2012). According to the NBA (2018), this reach of the Molopo has a Present Ecological Score of "D: Largely Modified", i.e. a large change in ecosystem processes and loss of natural habitat and biota and has occurred.

This section of the Molopo River is also categorised as a Fish Support Area in terms of the National Freshwater Ecosystem Priority Areas (NFEPA) project (2014). Fish Support Areas include fish sanctuaries in rivers and their associated sub-quaternary catchments with lower than an A or B ecological condition. These also include sub-quaternary catchments that are important for migration of threatened fish species. Ideally, the river condition should



be improved and alien invasive fish should be removed from Fish Support Areas, so that these sub-quaternary catchments can maintain their fish populations. Where instream dams are unavoidable, guidelines for designing appropriate fishways should be followed (Bok et al. 2007; Rossouw et al. 2007).

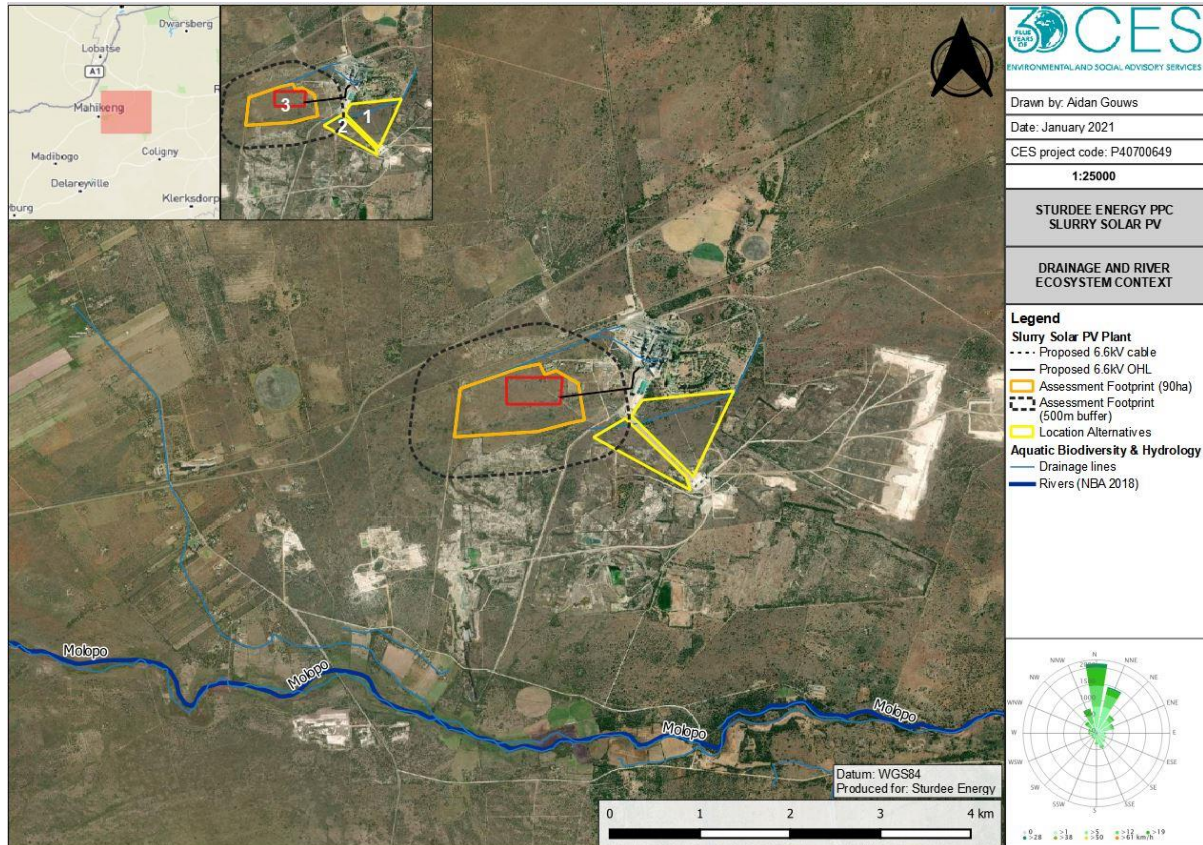


Figure 5.6: River ecosystem map of the proposed Solar PV facility at PPC Slurry, North West.

According to the National Wetland Map Version 5 (2018), a number of natural wetlands occur in the surrounding landscape, including the channelled valley bottom (CVB) of the Molopo River, a seep to the south-east of the PPC facility and scattered depressions (Figure 5.7). There are also several artificial wetlands, particularly in the old quarry to the south of the assessment footprint. According to NFEPA (2014), the Molopo CVB also forms part of a wetland cluster. Of these wetlands, one natural wetland (W1) and one artificial wetland (W2) occur within 500 m of the assessment footprint.

The Aquatic CBA map shows that the assessment footprint encompasses an Aquatic Ecological Support Zone (ESA), namely an ESA 1 zone, corresponding to the onsite wetland (Figure 5.8). Both an ESA 1 and an ESA 2 zone occur approximately 150 m to the south-west of the assessment footprint, with an Aquatic CBA 1 zone occurring approximately 1.7 km to the south the assessment footprint.

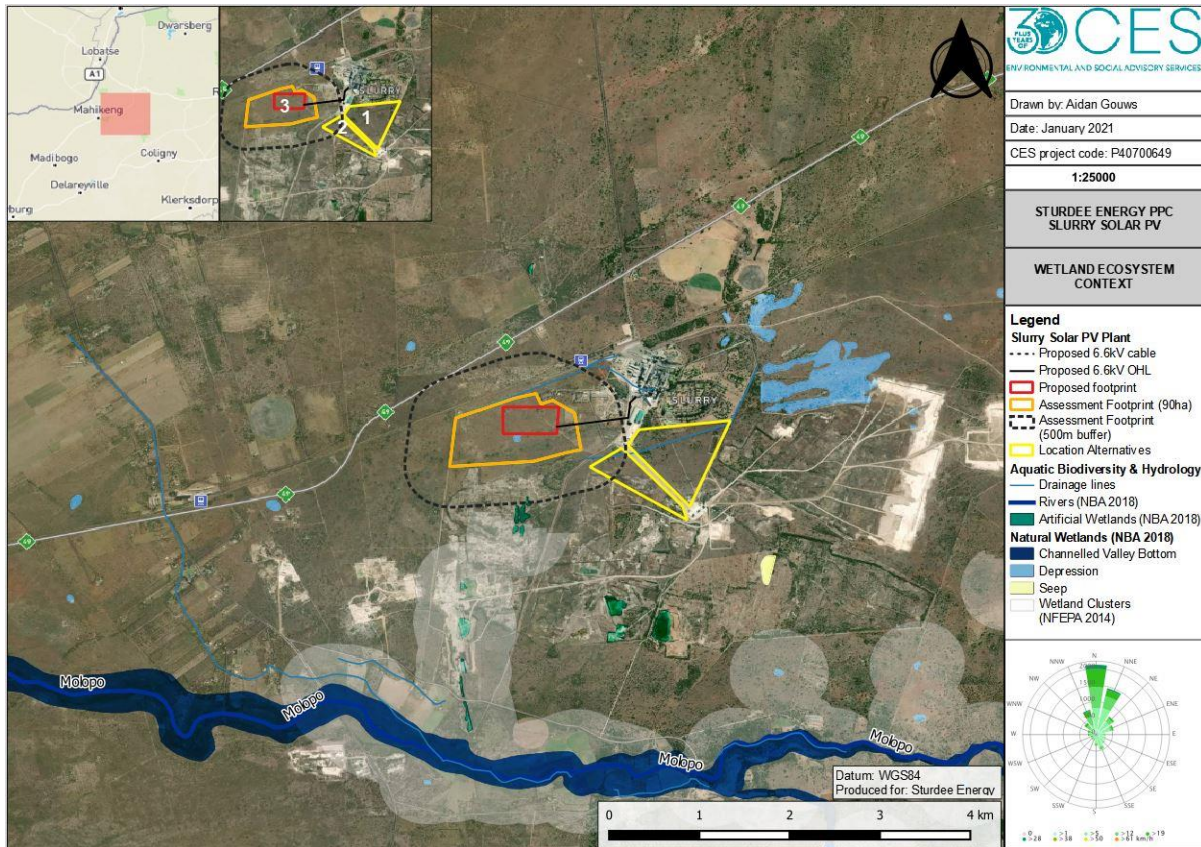


Figure 5.7: Wetland Ecosystem map of the proposed Solar PV facility at PPC Slurry, North West.

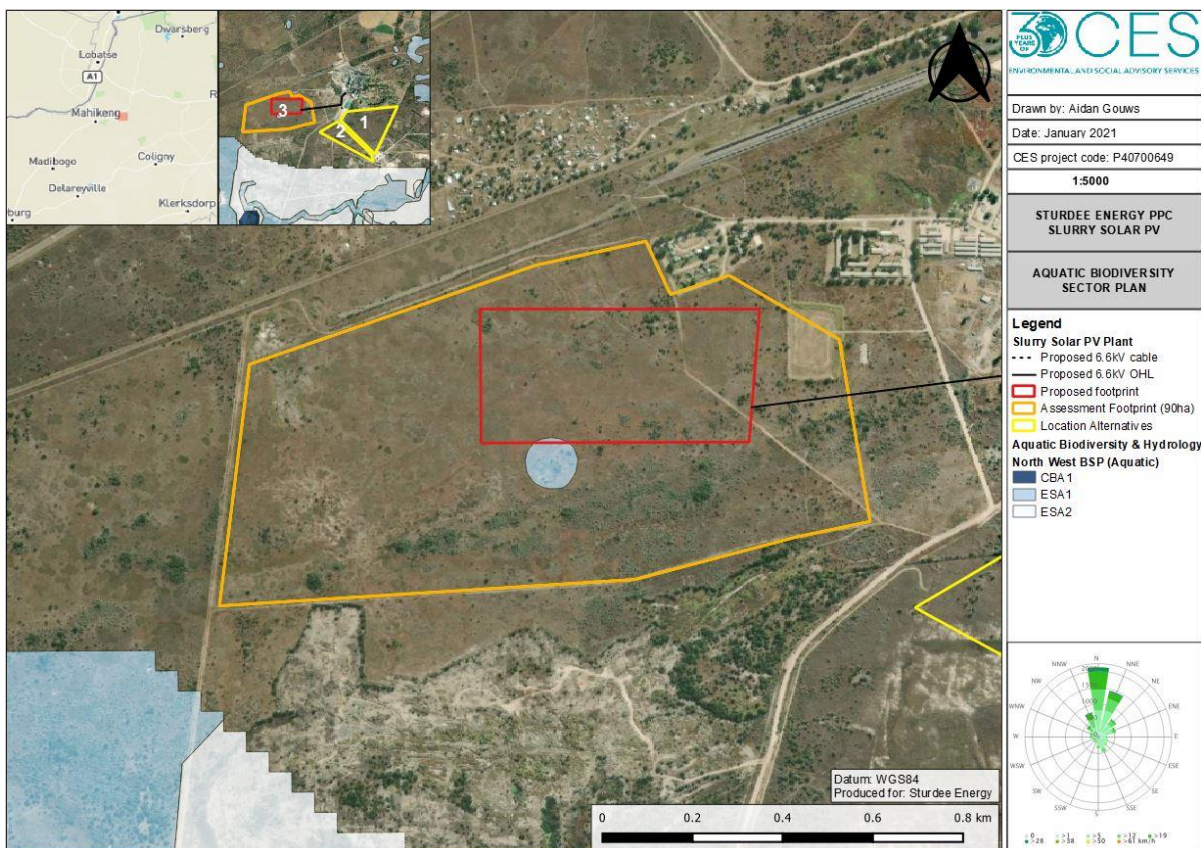


Figure 5.8: Aquatic CBA & ESA map of the proposed Solar PV facility at PPC Slurry, North West.



5.1.6 VEGETATION AND FLORISTICS

5.1.6.1 National Vegetation Map (Mucina & Rutherford 2018)

The PPC Slurry site falls near the western edge of the Carletonville Dolomite Grassland and transition to the Klerksdorp Thornveld. The Carletonville Dolomitic Grassland is the primary vegetation type occurring within the assessment footprint, with Klerksdorp Thornveld occurring approximately 100 m to the west (Mucina & Rutherford, 2018) (Figure 5.9). According to the NBA (2018), most of the assessment unit has retained its natural grassland vegetation, with the exception of the historical mining area in the north-western corner of the site, the sports field to the west and areas to the south-east of the ridge where the impacts of the old quarry have likely degraded the vegetation (Figure 5.9).

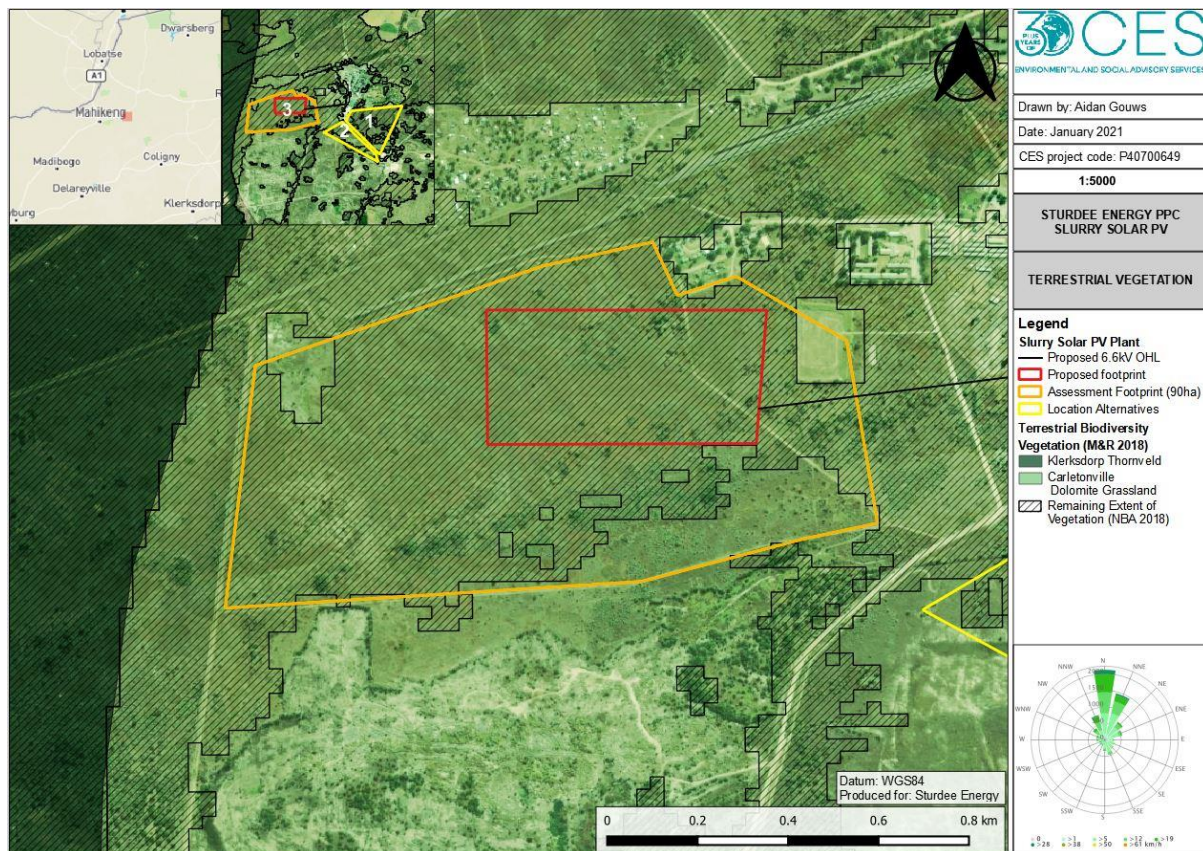


Figure 5.9: Mucina & Rutherford Vegetation map of the proposed Solar PV facility at PPC Slurry, North West.

The Carletonville Dolomite Grassland occurs in the North West, Gauteng and parts of Free State, extending approximately 50 km north-west of Ottoshoop and southeast to Litchenburg, then mostly eastwards to Carletonville, where it branches south-westwards towards Potchefstroom, eastwards through Lenasia and towards Heidelberg, and north-eastwards towards Centurion and Bapsfontein (Mucina & Rutherford, 2018). The undulating plains and rocky, chert-ridged landscapes are vegetated by species-rich grasslands, dominated by graminoids such as *Aristida congesta*, *Cynodon dactylon*, *Diheteropogon amplexans*, *Eragrostis chloromelas* and *E. racemosa*, *Heteropogon contortus*, *Setaria sphacelata* and *Themeda triandra* (Mucina & Rutherford, 2018). In terms of its conservation status, this vegetation type is categorised as “Least Concern” (NBA, 2018).



The Klerksdorp Thornveld occurs in the in the region of Wolmaransstad, Ottosdal and Hartbeesfontein, as well as from Botsolano Game Park to Madibogo, in the North West Province (Mucina & Rutherford, 2018). These landscapes are characterised by sometimes irregular, undulating plains of open grasslands, dominated by species such as *E. lehmanniana*, *E. trichophora*, *Microchloa caffra* and *Panicum coloratum*, to dense *Vachellia karroo*-dominated bushveld (Mucina & Rutherford, 2018). This vegetation type is categorised as “Least Concern” (NBA, 2018).

5.1.6.2 Critical Biodiversity Areas and broad-scale processes

The North West Biodiversity Sector Plan (NW BSP, 2015) is a biodiversity and spatial planning tool, which outlines areas containing important biodiversity needed to meet national and provincial biodiversity targets. This is achieved by identifying a network of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the province based on a systematic biodiversity plan. In general, CBAs are described as natural or near-natural areas that are important for preserving both biodiversity pattern and ecological process, whereas ESAs are semi-natural or transformed areas that at least retain some ecological function. More than half of the province is covered by CBAs (29.1%) and ESAs (27.6%) collectively, with the remainder covered by Other Natural Areas (18%), areas with no natural habitat remaining (23%) and a small portion covered by Protected Areas (2.3%).

Most of the assessment footprint falls within a Terrestrial Critical Biodiversity Area (CBA) (Figure 5.10), namely a CBA 2 zone, where the management objective is to maintain the area in a natural state and limit the loss of biodiversity, preserving spatial patterns and ecological processes, including endangered and vulnerable ecosystems, endemic vegetation types and focus wildlife areas (READ, 2015). A Terrestrial CBA 1 zone is located approximately 200 m to the south-west of the assessment unit. Here, the management objective is to maintain the area in a natural state and limit the loss of biodiversity and includes critically endangered ecosystems, irreplaceable sites, critical biodiversity corridors and kloofs (READ, 2015).

5.1.6.3 Ecosystem Threat Status

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) provides a National List of Ecosystems that are threatened and in need of protection – GN 1002 of 2011. According to the NEMBA List of threatened ecosystems, the proposed solar PV site does not occur within or near to a threatened ecosystem. These findings are supported by the NBA (2018) Terrestrial ecosystem threat status assessment which confirmed that the ecosystems within and surrounding the project area are classified as Least Concern. The nearest threatened ecosystem identified by the NBA (2018) is the Western Highveld Sandy Grassland (Endangered) which is located approximately 15 km south south-west of the project area.

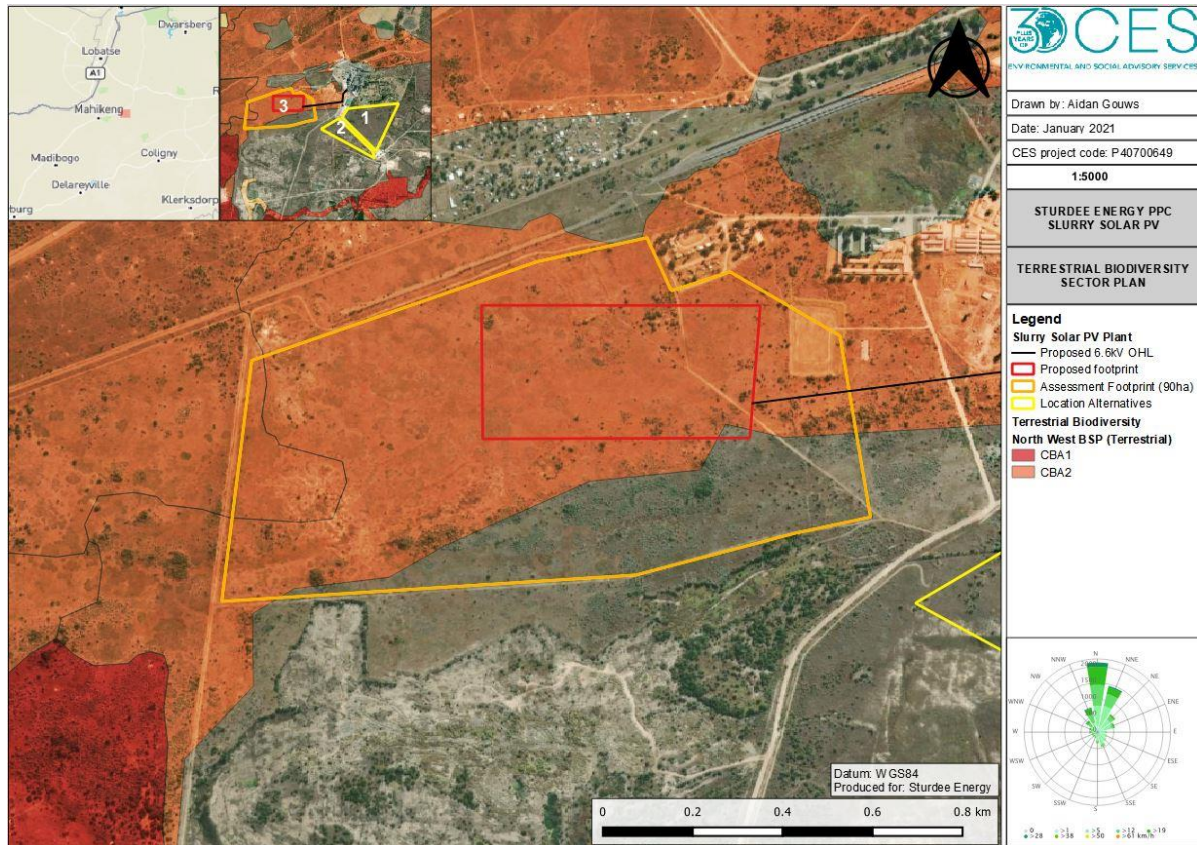


Figure 5.10: Terrestrial CBAs and ESAs map of the proposed Solar PV facility at PPC Slurry.

5.1.6.4 Protected and Priority Areas

The National Protected Areas Expansion Strategy (NPAES, 2008) was developed to “*achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change.*” The NPAES originated as Government recognised the importance of protected areas in maintaining biodiversity and critical ecological process. The NPAES sets targets for expanding South Africa’s protected area network, placing emphasis on those ecosystems that are least protected.

The site is not located within an NPAES Focus Area, formal or informal protected area (Figure 5.11). The nearest NPAES Focus Area (North West / Gauteng Bushveld NPAES Focus Area) is located approximately 12-18 km east of the study site.

The site is not located within a protected area as identified by the South African Protected Areas Database (SAPAD, 2020), however it is located approximately 2.7 km from the Marico Biosphere Reserve according to the South African Conservation Areas Database (SACAD, 2020).

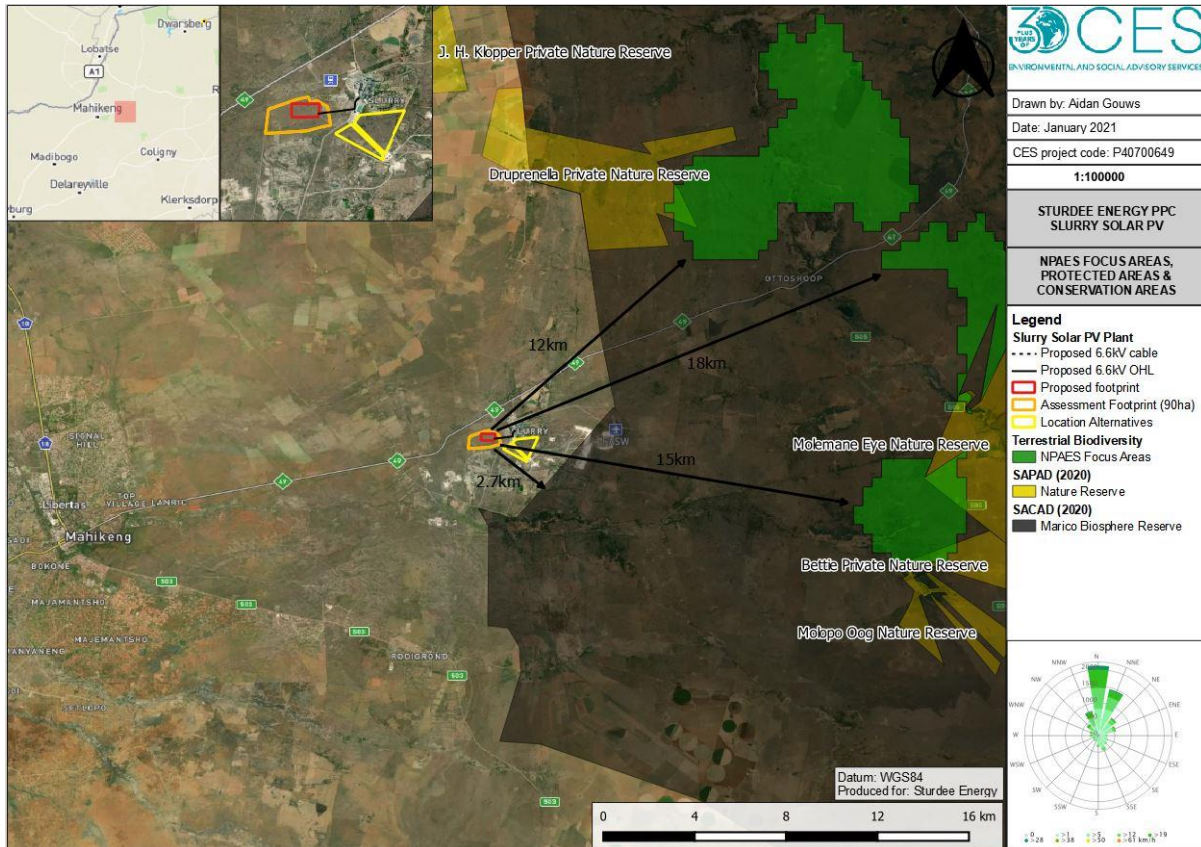


Figure 5.11: NPAES Focus Areas, Protected Areas and Conservation Areas.

5.1.7 FAUNA

South Africa is a faunally diverse country, with approximately 1,663 terrestrial vertebrate faunal species of which 850 species are birds, 343 species are mammals, 350 species are reptiles, and 120 species are amphibians spread across seven biomes and 122 million km². The North West (NW) Province is home to approximately 113 reptile species, 39 amphibian species, 212 mammal species and 553 bird species (ADU, 2021; IUCN, 2021; Lepage, 2021).

5.1.7.1 Amphibians

North West Province is home of the 39 amphibian species, 21 species have a distribution range which includes the proposed development site (ADU, 2021; iNaturalist, 2021; IUCN, 2021). Thirteen of these species have been recorded within a 30 km radius of the site (ADU, 2021). No SCCs are likely to be found on site and species likely to occur on site are all listed as of least concern.

5.1.7.2 Reptiles

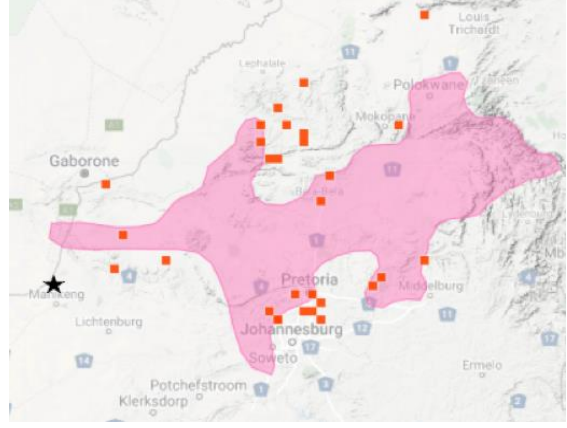
The North West Province is home to 113 reptile species (ADU, 2021), 50 of which have a distribution which includes the proposed development site (ADU, 2021; iNaturalist, 2021; IUCN, 2021). Approximately 36 reptile species have been recorded within a 30 km radius of the site (ADU, 2021). Only one of these species, *Sensitive animal species A¹*, is considered a SCC due to its vulnerable status. However, the likelihood of occurrence of this species within the project area is low because, although the species is known to occur within the vicinity of

¹ The name has been withheld as the species may be prone to illegal harvesting and must be protected.



the Mahikeng Local Municipality (iNaturalist, 2021), the closest verifiable observation of the species occurred approximately 50 km north-east of the site and the closest edge of the known distribution range occurs approximately 30 km to the north of the site (Table 3.1). All other species are listed as of least concern.

Table 5.1: Reptilian SCC distributional ranges (pink area) and observations (orange squares – iNaturalist 2021, pink squares – GBIF 2021) in relation to the project area (black star).

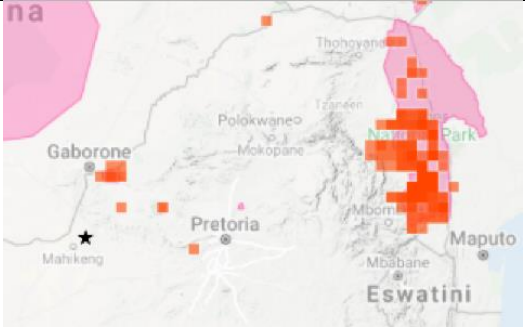
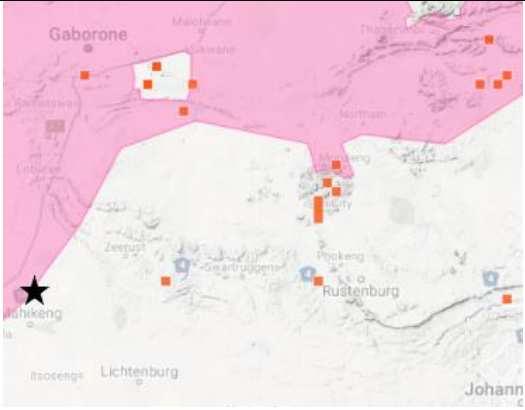
SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION AND OBSERVATIONS (iNaturalist, 2021; GBIF, 2021)
<i>Sensitive animal species A</i>	VU	<p>Sensitive animal species A is near-endemic to South Africa, inhabiting the rocky hillsides of mixed <i>Acacia</i> / <i>Combretum</i> woodlands, tropical Bushveld and Thornveld, ranging from dense, short shrubland to open tree savanna .</p> <p>Its distributional ranges extend from the north-eastern parts of the North West Province, eastwards through northern Gauteng and adjacent parts of Mpumalanga and northwards into Limpopo, south of the Soutpansberg (Broadley & Boycott, 2008; TTWG, 2017).</p>	 <p>The likelihood of occurrence of this species is low because, although the species is known to occur within the vicinity of the Mahikeng Local Municipality (iNaturalist, 2021), the closest verifiable observation of the species occurred approximately 50 km north-east of the site and the closest edge of the known distribution range occurs approximately 30 km to the north of the site.</p>

5.1.7.3 Mammals

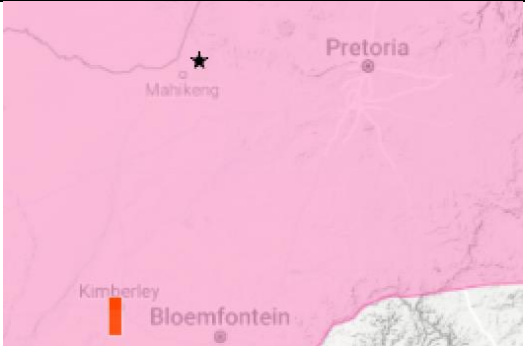
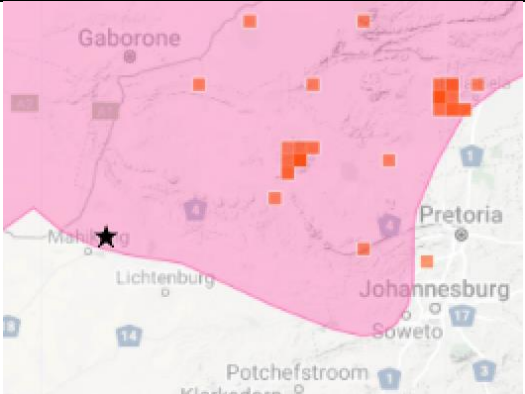
North West Province is home to 212 mammal species, 103 have a distribution which includes the proposed development site (ADU, 2021; iNaturalist, 2021; IUCN, 2021) and approximately 48 of these have been recorded within a 30 km radius of the site (ADU, 2021). Nine of the 103 species with distribution ranges which include the site are considered SCCs, including one critically-endangered, one endangered and seven vulnerable species (Table 5.2). With the exception of the smaller mammals, such as the Black-footed Cat (*Felis nigripes*) and White-tailed Rat (*Mystromys albicaudatus*), both of which have extensive ranges, most of these SCCs are unlikely to be found on site due to no or limited suitable available habitat. A full list of mammal species with a distribution range which includes the development area is provided in Terrestrial Biodiversity Specialist Assessment Report.



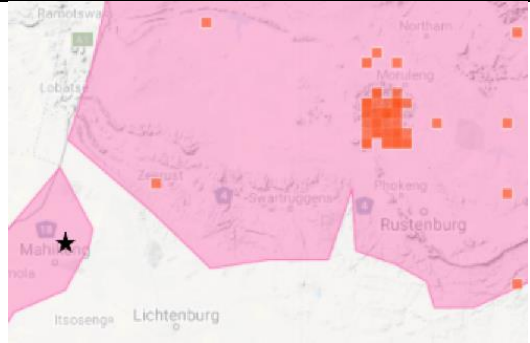
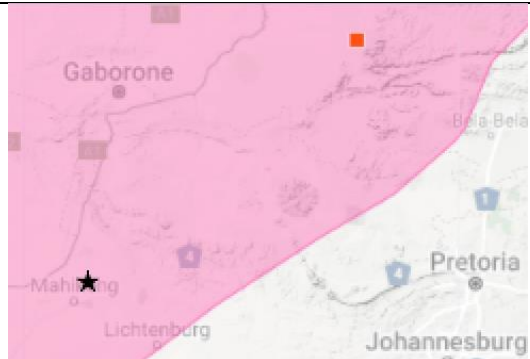
Table 5.2: Mammalian SCC distributional ranges (pink area) and observations (orange squares – iNaturalist 2021, pink squares – GBIF 2021) in relation to the project area (black star).

SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION
<i>Lycaon pictus</i>	EN	African Wild Dogs are generalist predators, occupying a range of habitats including short-grass plains, semi-desert, bushy savannas and upland forest. It appears that their current distribution is limited primarily by human activities and the availability of prey, rather than by the loss of a specific habitat type (Woodroffe & Sillero-Zubiri, 2020)	 <p><i>Lycaon pictus</i> is unlikely to occur within the project area because, although the species is known to occur within the vicinity of the Mahikeng Local Municipality (iNaturalist, 2021), the closest verifiable observation of the species occurred approximately 95 km north-east of the site. Additionally, the site falls adjacent to current and historical land use activities and lacks sufficient prey to support large carnivores, such as the African Wild Dog.</p>
<i>Acinonyx jubatus</i>	VU	Cheetahs are found in a wide range of habitats and ecoregions, ranging from dry forest and thick scrub through to grassland and hyper-arid deserts. They are only absent from tropical and montane forest. Cheetah appear to show relatively low habitat selectivity compared with other carnivores (Durant, Mitchell, Ipavec, & Groom, 2015).	 <p><i>Acinonyx jubatus</i> is unlikely to occur within the project area as this species is typically limited to fenced-off reserves. Although the species is known to occur within the vicinity of the Mahikeng Local Municipality (iNaturalist, 2021), the closest verifiable observation of the species is a spoor recorded >60 km north-east of the site and the closest edge of the known distribution range occurs approximately 30 km to the north-west of the site. Additionally, the site falls adjacent to current and historical land use activities and lacks sufficient prey to support large carnivores, such as the Cheetah.</p>

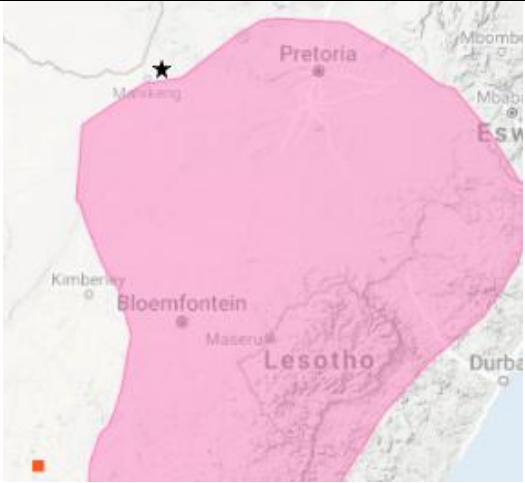
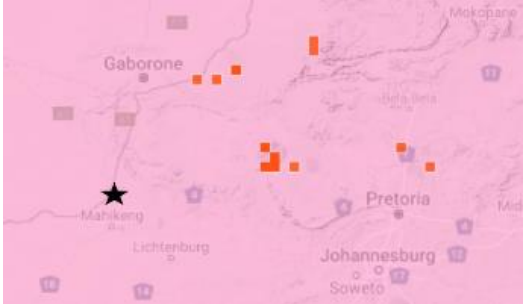


SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION
<i>Felis nigripes</i>	VU	The Black-footed Cat can be found in dry savannas, subtropical grasslands and the Karoo semi-desert with sparse shrub and tree cover. Predominantly ground-dwellers and during the day use dens in termite mounds or made by other animals (Sliwa, Wilson, Küsters,, & Tordiffe, 2016).	 <p>Although the closest verifiable observation was recorded south of Kimberley, <i>Felis nigripes</i> may occur within the project area because its distributional range includes the site and there is sufficient suitable habitat for the species.</p> <p>It is recommended that a search and rescue team be sent ahead of vegetation clearance and construction teams to ensure that no individuals are found on site. This team should focus on checking termite mounds, burrows and dens in particular.</p>
<i>Panthera pardus</i>	VU	Leopards have a wide habitat tolerance and highly varied diet. Their habitats include woodland, grassland savanna and mountain habitats but they also occur widely in coastal scrub, shrubland and semi-desert (Swanepoel, et al., 2016).	 <p><i>Panthera pardus</i> is unlikely to occur within the project area because, although its distribution range includes the site (iNaturalist, 2021), the closest verifiable observation of the species occurred >100 km to the north-east. Additionally, the site falls adjacent to current and historical land use activities and lacks sufficient prey to support large carnivores, such as the Leopard.</p>



SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION
<i>Giraffa camelopardali</i> and <i>Giraffa camelopardalis giraffa</i>	VU	Giraffes are most often found in savanna/woodland habitats, but range widely throughout Africa. They are browsers that subsist on a variable diet that includes leaves, stems, flowers, and fruits. They do not need to drink on a daily basis. Acacia is fed on in high proportions wherever Giraffes are found, but during the dry season, the preferred plant species varies by location. <i>Faidherbia</i> , <i>Boscia</i> , <i>Grewia</i> , and <i>Kigelia</i> have all been identified as the most common plant species in the diet of giraffes in the dry season in different locations (Muller, et al., 2018).	 <p><i>Giraffa camelopardalis</i> is unlikely to occur within the project area because, although its distribution range includes the site (iNaturalist, 2021), the closest verifiable observation of the species occurred approximately 50 km to the north-east, near Zeerust. Additionally, the site falls adjacent to current and historical land use activities and lacks a sufficiently large habitat and carrying capacity to support mega-herbivores, such as the Giraffe. Most mega-herbivores in South Africa are confined to fenced-off parks and reserves.</p>
<i>Sensitive animal species B</i>	VU	<p>This is a predominantly solitary, terrestrial species that inhabits mainly savannas and woodlands in low-lying regions with moderate to dense scrub. It also occurs in floodplain grassland, rocky slopes and sandveld. It occurs widely on well-managed livestock farms where it is afforded protection from human persecution, but is absent from croplands and human settlements (Pietersen, Jansen, & Connelly, 2019).</p> <p>The most important habitat requirements are believed to be a sufficient population of the various ant and termite prey species and the availability of dens or above-ground</p>	 <p>Although the closest verifiable observation was recorded north of Thabazimbi, <i>Sensitive animal species B</i> may occur within the project area because its distributional range includes the site and there is sufficient suitable habitat for the species.</p> <p>It is recommended that a search and rescue team be sent ahead of vegetation clearance and construction teams to ensure that no individuals are found on site. This team should focus on checking termite mounds, burrows and dens in particular.</p>



SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION
		debris in which to shelter (Pietersen, Jansen, & Connelly, 2019).	
<i>Mystromys albicaudatus</i>	VU	Very little is known about this rare species in the wild and more research is required into their habitat requirements and ecology. Museum records suggest that they may have a preference for Carletonville Dolomite Grasslands in North-West Province, on sloped clay soils and are often associated with calcrete soils within grasslands. In addition they are never found on soft, sandy substrate, rocks, wetlands or riverbanks (Avenant, et al., 2019).	 <p>Despite a limited observational record and the closest edge of its distributional range falling 10 km south-east of the site, <i>Mystromys albicaudatus</i> may occur within the project area because of its apparent preference for Carletonville Dolomite Grasslands.</p> <p>It is recommended that a search and rescue team be sent ahead of vegetation clearance and construction teams to ensure that no individuals are found on site.</p>
<i>Diceros bicornis</i>	CR	Black Rhino occur in a wide variety of habitats from desert areas in Namibia to wetter wooded areas. The highest densities of rhinos are found in savannas on nutrient-rich soils and in succulent Valley Bushveld areas. Black Rhino are browsers and favour small acacia's and other palatable woody species (Grewia's, Euphorbiaceae species, etc.) as well as palatable herbs and succulents. Apart from plant species composition and size structure, Black Rhino carrying capacity is related to rainfall, soil	 <p><i>Diceros bicornis</i> is unlikely to occur within the project area because, although its distribution range includes the site (iNaturalist, 2021), the closest verifiable observation of the species occurred >100 km to the north-east, near the Pilanesberg National Park. Additionally, the site falls adjacent to current and historical land use activities and lacks a sufficiently large habitat and carrying capacity to support mega-herbivores, such as the Black Rhino. Due to its critically endangered status, the Black Rhino is primarily confined to fenced-off reserves in South Africa.</p>



SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION
		nutrient status, fire histories, levels of grass interference, extent of frost and densities of other large browsers (Emslie, 2020).	

5.1.7.4 Avifauna

The Important Bird and Biodiversity Areas (IBA) is a conservation programme which speaks to all four focal areas including species, sites, habitat and people. The IBA Programme aims to conserve a network of sites considered to be critical for the long-term survival of bird species that are globally threatened, have a restricted range and/or are restricted in terms of specific biomes or vegetation types. No IBAs have been identified in close proximity to the site.

The first and second Southern African Bird Atlas Projects (Harrison *et al*, 1997; & www.mybirdpatch.adu.org.za) recorded a combined total of approximately 338 bird species in the broader area (10km radius) within which the Slurry 10MW PV SEF is located.

Given the high number of species within the broader study area, it is necessary to prioritise the species most relevant to the Slurry development to streamline the impact assessment process. Relevant to this study, priority species include species of conservation concern (Taylor *et al* 2015; IUCN 2020 & TOPS, 2005), in particular those unique to the region, and especially those that may be susceptible to solar energy impacts. Sixteen of the 298 species recorded in the broader study area which could occur on site are considered regional Red List species (Taylor *et al*, 2015): White-backed Vulture is Critically Endangered; Martial Eagle, Tawny Eagle, African Marsh-harrier *Circus ranivorus*, Yellow-billed Stork *Mycteria ibis*, Cape Vulture, Lappet-faced Vulture are 'Endangered'; Lanner Falcon *Falco biarmicus*, Secretarybird *Sagittarius serpentarius*, Great White Pelican *Pelecanus onocrotalus* and Pink-backed Pelican *Pelecanus rufescens* are 'Vulnerable'; and Blue Crane, Maccoa Duck *Oxyura maccoa*, Red-footed Falcon *Falco vespertinus*, Greater Flamingo *Phoenicopterus roseus*, Lesser Flamingo *Phoeniconaias minor*, Short-clawed Lark *Certhilauda chuana*, European Roller *Coracias garrulus*, and Abdim's Stork *Ciconia abdimii* are 'Near-threatened'. Seven of the aforementioned species are TOPS listed species in addition to Lesser Kestrel *Falco naumanni* (section 1.5). An additional two species are South African Endemics: South African Cliff-swallow *Petrochelidon spilodera* and Pied Starling *Lamprotornis bicolor* with Jackal Buzzard *Buteo rufofuscus*, Cloud Cisticola *Cisticola textrix*, Fairy Flycatcher *Stenostira scita*, Fiscal Flycatcher *Sigelus silens*, Cape Clapper Lark *Mirafra apiata*, Melodious Lark *Mirafra cheniana*, Karoo Thrush *Turdus smithi*, Cape Weaver *Ploceus capensis* and Cape White-eye *Zosterops virens*.



5.2 SOCIO-ECONOMIC PROFILE

The PPC Slurry site is within the North West Province adjacent to the border of the North West Province and within the Mahikeng Local Municipality of the Ngaka Modiri Molema District. The municipality is classified as Category B and is approximately 2 hours from Tshwane and close to the international border with Botswana.

5.2.1 POPULATION

With 961 960 people, Ngaka Modiri Molema District Municipality housed approximately 1.6% of South Africa's total population or 23.3% of the total population in the North-West province in 2019, while Mahikeng Local Municipality had the second highest growth in terms of its population, with an average annual growth rate of 1.5%. Between 2008 and 2018, the population growth within the District Municipality increased from 0.6% to 1.58% in 2019 (Profile: Ngaka Modiri Molema District, 2020).

Ngaka Modiri Molema's population is projected to grow at an average annual rate of 1.6% from 946 989 in 2018 to 1.02 million in 2023. The population is dominated by females with 51.31% of the population being female and males comprising 48.69%. Ninety four percent of the population in the municipality is black African. The next largest demographic group is white at 3.38%. The remaining 2% minority is made up of coloured, Indian or Asian and other (Profile: Ngaka Modiri Molema District, 2020).

The age distribution revealed that the babies and kids make up the highest population (33.26%) component with the highest concentrations occurring between 0-14 years. The second larger number of people is the young working age (25-44 years) with a total of share of 27.75%, followed by the older working age (45-64 years) age category with 16.77% people (Profile: Ngaka Modiri Molema District, 2020).

5.2.2 ECONOMY

The economic drivers in the District includes Agriculture, Tourism (Heritage sites and Game farms), Mining Houses (Kalgold, Slurry, Sephaku, Lafarge, Majemantsho informal mining and Diamond informal mining). The Strategic Location of the District offers great opportunities towards the economic development of the District underpinned by various development corridors. The economic opportunities that lie within the District have the potential to create much-needed jobs, reduce poverty and inequality (Profile: Ngaka Modiri Molema District, 2020).

In 2018, the community services sector is the largest within Ngaka Modiri Molema District Municipality accounting for R18.2 billion or 36.5% of the total GVA in the District Municipality's economy. The sector that contributes the second most to the GVA of the Ngaka Modiri Molema District Municipality is the finance sector at 15.9%, followed by the trade sector with 13.3%. The sector that contributes the least to the economy of Ngaka Modiri Molema District Municipality is the construction sector with a contribution of R 1.53 billion or 3.08% of the total GVA (Profile: Ngaka Modiri Molema District, 2020).



When looking at the regions within the District Municipality, the Mahikeng Local Municipality made the largest contribution to the community services sector at 49.50% of the District Municipality. As a whole, the Mahikeng Local Municipality contributed R 21.6 billion or 43.34% to the GVA of the Ngaka Modiri Molema District Municipality, making it the largest contributor to the overall GVA of the Ngaka Modiri Molema District Municipality (Profile: Ngaka Modiri Molema District, 2020).

5.2.3 EMPLOYMENT, EDUCATION, INCOME AND POVERTY

A total of 469 000 individuals in Ngaka Modiri Molema District Municipality were considered functionally literate in 2018, while 162 000 people were considered to be illiterate. Expressed as a rate, this amounts to 74.38% of the population, which is an increase of 0.093 percentage points since 2008 (65.11%). The number of illiterate individuals decreased on average by - 1.84% annually from 2008 to 2018, with the number of functional literate people increasing at 2.60% annually. For those aged 20 years and above, Ngaka Modiri Molema District has 11.74% of the population without any education. The number of people who falls within the 'Matric only' category is at 136 480 (24.25%). The number of people with 'Matric and a Certificate/Diploma' is at 23 764 (4.22%), while those with a 'Matric and a Bachelor's' degree are at 21 270 (3.77%).

The number of formally employed people in Ngaka Modiri Molema District Municipality counted 204 593 in 2019, which is about 84.69% of total employment, while the number of people employed in the informal sector counted 36 972 or 15.31% of the total employment. In Ngaka Modiri Molema District the economic sectors that has the largest number of employees is the community service sector at 33.5% of total formal employment in the District followed by the trade sector with 36 254 people or 17.7%. The electricity sector with 0.6% (1 316 people) is the formal sector that employs the least number of people in Ngaka Modiri Molema District, followed by the mining sector at 2.5%.

In 2019, the Ngaka Modiri Molema District Municipality comprised of 268 099 households. This population accounts to one fifth of the population in the North West province. Approximately 72.8% of the households within Ngaka Modiri Molema District live in fully paid off properties or properties that are in the process of being 'fully paid off'. About 10% of the households live in properties rented from private individuals and 7% of households are occupying rent free.



6 PUBLIC PARTICIPATION PROCESS

Public consultation is a legal requirement throughout the Basic Assessment (BA) process. Developers are required to conduct public consultation throughout the BA process. Formal BA documents are required to be made available for public review, which include the project brief, Draft Basic Assessment Report (BAR), Draft Environmental Management Programme (EMPr), and the decision of the Competent Authority.

According to Regulation 41(2) of the NEMA EIA Regulations 2014 (as amended 2017) “*The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act. . .*”, including:

- The 2012 Public Participation Guidelines (General Notice 807 of 2012), which provides information and guidance for applicants, I&APs and EAPS on the public participation requirements of the BA process; and
- The Promotion of Access to Information Act (PAIA), 2000 (Act No. 2 of 2000), which allows citizens access to any information held by the State, and any information held by private bodies that is required for the exercise and protection of any rights.

“ . . . and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by:

6.1 SITE NOTICES

- (a) fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of—*
- (i) the site where the activity to which the application or proposed application relates is or is to be undertaken; and*
 - (ii) any alternative site.*

A site notice was placed at the entrance to the PPC Slurry Facility (25°48'13.5"S 25°50'26.7"E) during the initial site visit on the 17th of December 2020.

6.2 I&AP AND STAKEHOLDER NOTIFICATIONS

- (b) giving written notice, in any of the manners provided for in section 47 D of the Act, to—*
- (i) the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, and to any alternative site where the activity is to be undertaken;*
 - (ii) owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;*
 - (iii) the municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;*
 - (iv) the municipality which has jurisdiction in the area;*
 - (v) any organ of state having jurisdiction in respect of any aspect of the activity; and*
 - (vi) any other party as required by the competent authority;*



Formal notifications were sent out via email and postal mail to notify potential Interested and Affected Parties (I&APs) of the inception of the proposed development and invite them to register to be added to the I&APs database and provide initial comments. All registered I&APs were notified via email and postal mail of the availability of the Draft BAR and EMPr for public review. All notification proofs are provided in Appendix D.

6.3 NEWSPAPER ADVERTISEMENT

- (c) *placing an advertisement in—*
- (i) *one local newspaper; or*
 - (ii) *any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;*
- (d) *placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii);*

A newspaper advertisement was placed in the Mafikeng Mail, in order to notify the general public of the proposed development and availability of the Draft BAR for public review. Proof of publication is provided in are provided in Appendix D.

6.4 REGISTER OF STAKEHOLDERS AND I&APS

According to Regulation 42 of the NEMA EIA Regulations 2014 (as amended 2017) “A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of—

- (a) *all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;*
- (b) *all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and*
- (c) *all organs of state which have jurisdiction in respect of the activity to which the application relates.*

A comprehensive I&AP register was compiled (Appendix D). This register includes the following parties, among others:

- Immediate neighbours,
- The National Department of Forestry, Fisheries and the Environment (DFFE);
- The Department of Mineral Resources and Energy (DMRE);
- The Department of Human Settlement, Water and Sanitation (DHSWS);
- The North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT);
- The North West Provincial Heritage Resources Authority (PHRA);
- Ngaka Modiri Molema District Municipality and Mahikeng Local Municipality, including the Municipal Ward councillor(s); and



- Eskom.

6.5 PUBLIC REVIEW OF DRAFT BASIC ASSESSMENT REPORT

The Draft BAR and EMPr were subject to a 30-day public review period. The draft reports were made available electronically on the CES website. Letters of notification were emailed and/or posted to the registered I&APs, notifying them of the commencement of the public review period and the availability of the draft reports (including the link to the CES website), as well as providing the contact details (telephone and email) of the EAP. I&APs were invited to provide comment on the draft reports via a number of contact options, namely telephone, post, fax and/or email. Additionally, I&APs were provided the option of receiving a hardcopy version of the executive summary of the draft reports via registered post, upon request, in cases where they were unable to access the electronic version. The medium of correspondence is noted in the I&APs register.

6.6 ISSUES RAISED BY I&APS

The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans, and that such written comments, including responses, are attached to the reports and plans that are submitted to the competent authority in terms of these regulations."

A full record of the issues raised by the I&APs, as well as the response by the applicant and EAP, were kept throughout the duration of the project. A full Issues and Response Trail (IRT) has been attached in Appendix D.



7 ALTERNATIVES

Alternatives should include consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. In all cases, the no-go alternative must be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment.

“**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—

- (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.
- (f) The option of not implementing the activity.

7.1 FUNDAMENTAL, INCREMENTAL AND NO-GO ALTERNATIVES

7.1.1 FUNDAMENTAL ALTERNATIVES

Fundamental alternatives are developments that are totally different from the proposed project description and usually include the following:

- Alternative property or location where it is proposed to undertake the activity.
- Alternative type of activity to be undertaken.
- Alternative technology to be used in the activity.

7.1.2 INCREMENTAL ALTERNATIVES

Incremental alternatives relate to modifications or variations to the design of a project that provide different options to reduce or minimise environmental impacts. There are several incremental alternatives that can be considered with respect to the current project, including:

- Alternative design or layout of the activity.
- Alternative operational aspects of the activity.

7.1.3 NO-GO ALTERNATIVE

It is mandatory to consider the “no-go” option in the BA process. The “no-go” alternative refers to the current status quo and the risks and impacts associated with it. Some existing activities may carry risks and may be undesirable (e.g. an existing contaminated site earmarked for a development). The no-go is the continuation of the existing land use, i.e. maintain the status quo.



7.2 ALTERNATIVES CONSIDERED

7.2.1 LOCATION ALTERNATIVES

Three location alternatives were considered by Sturdee Energy and PPC Cement. A site visit was conducted by both parties at the PPC Slurry facility on 7th October 2020 during which a meeting with relevant site stakeholders was held, and a visual inspection was conducted of two existing options, Area 1 and Area 2 (Figure 7.1). Based on the visual inspections, a third option, Area 3, was identified and proposed as the preferred location alternative (Figure 7.1). The advantages and disadvantages of the location alternatives are presented in Table 7.1 below.

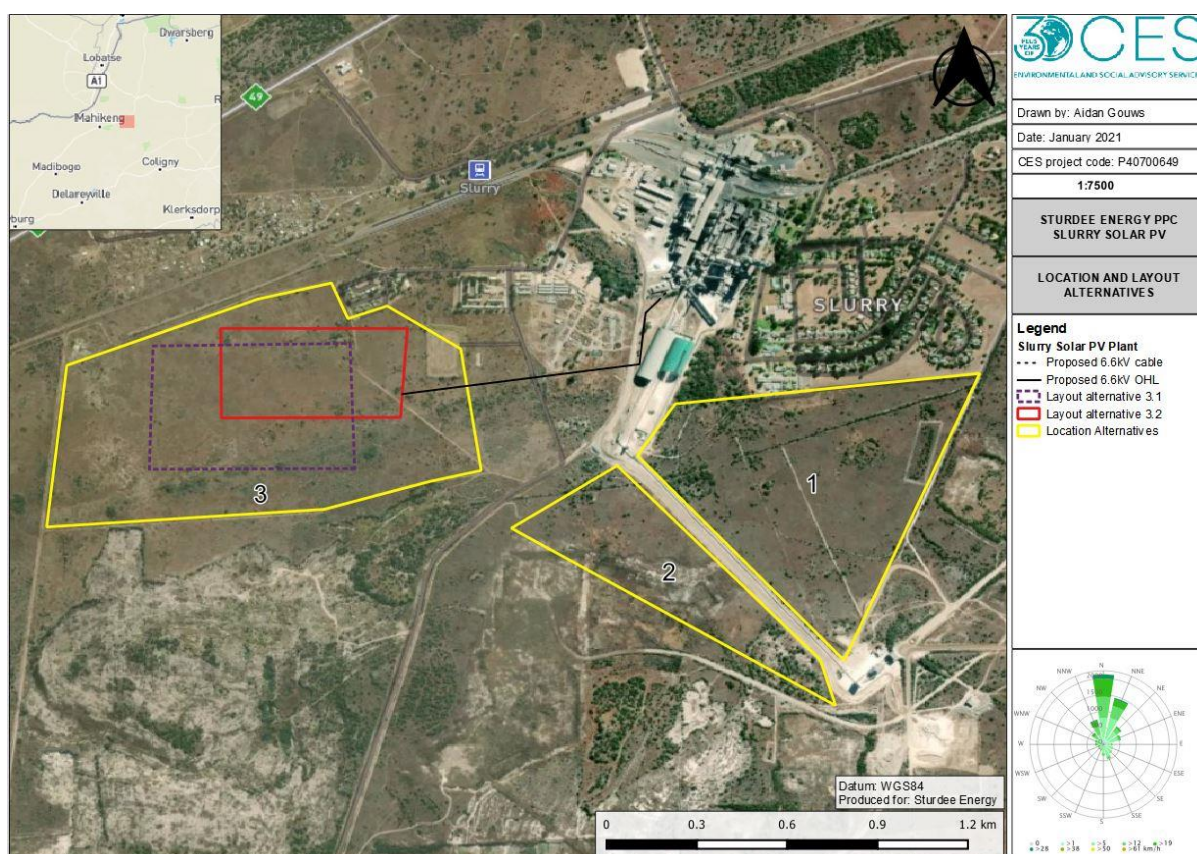


Figure 7.1: Location alternatives for the proposed Solar PV facility at PPC Slurry, North West.

7.2.2 TECHNOLOGY ALTERNATIVES

Two technology alternatives were considered by Sturdee Energy and PPC Cement, namely:

1. Solar photovoltaic (PV) panels, where the panels are comprised of a packaged interconnected assembly of solar cells, also known as photovoltaic cells; and
2. Concentrated Solar Power (CSP), whereby sunlight is concentrating through a lens onto high performance solar cells, thus increasing the electricity generated.

Based on the project requirements, solar PV panels were identified as the preferred technology alternative. The advantages and disadvantages of the technology alternatives are presented in below.



7.2.3 LAYOUT ALTERNATIVES

This relates mostly to alternative ways in which the proposed development or activity can be physically laid out on the ground to minimise or reduce environmental risks or impacts. Two layout alternatives were considered for Area 3, namely layout alternatives 3.1 and 3.2 (Figure 7.1). Layout 3.1 was initially considered, but was subsequently ruled out as the preferred alternative because it would result in the complete loss of wetland W1, a greater loss of near-natural vegetation and increased edge disturbance impacts. The selection of the proposed preferred alternative, layout 3.2, was informed by the aquatic and terrestrial sensitivity assessments. Compared to layout 3.1, layout 3.2 will not result in the loss of wetland W1. Moreover, layout 3.2 will result in a reduced loss of near-natural vegetation and reduce the impacts of edge disturbances.

7.2.4 NO-GO ALTERNATIVE

The No-Go alternative in the context of this project implies that the solar PV plant would not be developed and the current land use would persist. If the project does not proceed the negative impacts such as loss of wetland functionality would be avoided. However, it would also mean that the project would not provide the energy requirements of the PPC facility.



Table 7.1: Analysis of the proposed alternatives for the Solar PV facility at PPC Slurry, North West.

LEVEL	ALTERNATIVES	ADVANTAGES	DISADVANTAGES	REASONABLE AND FEASIBLE	FURTHER ASSESSMENT
Property or location	Area ³ (preferred site)	<ul style="list-style-type: none"> • Single 90 ha land parcel (orange boundary area). • Land parcel is large enough to accommodate any micro-siting. • Should be able to achieve 19.9 ha of solar plant area optimised for large pitch tracker blocks. • Very flat, minimal slope will be required. • Access road is easy and close to main tarred road, away from PPC operations. • Reduced and easier OHL/underground cable route and length (OHL = 1.25km, cable route = 0.05km) to PPC 6.6kV substation. • Land falls out of PPC mining operational area thus access control will be less onerous than mining health & safety regulations. • Dust risk is significantly reduced due to further proximity from operations and the prevailing wind directions if solar PV plant is kept to the western side of this identified area (i.e. the site is out of the prominent wind direction). • Other infrastructure, such as construction power much easier and closer than original Areas 1 and 2. 	<ul style="list-style-type: none"> • Presence of wetland within property portion boundary. • Geotechnical study was not conducted in this area. • Environmental review to confirm if any major no-go areas required. 	YES	YES



LEVEL	ALTERNATIVES	ADVANTAGES	DISADVANTAGES	REASONABLE AND FEASIBLE	FURTHER ASSESSMENT
		<ul style="list-style-type: none"> Water access point available from adjacent road, which is currently in place for truck use, reducing pressure on proposed new borehole. Worker residential camps for construction and operation period can be positioned very close due to existing available camp area with foundations lying just west of the 6.6kV substation. Possible to access site without interference to existing PPC activities 			
	Area 1	<ul style="list-style-type: none"> Area already disturbed due to historical mining. 	<ul style="list-style-type: none"> There is an existing Eskom 6.6kV OHL servitude that intersects Area 1 which would interfere with the proposed layout. Dust will be a concern for western section of the proposed solar PV plant on Area 1 due to close proximity to the limestone and additives storage shed, so would have to move plant more eastwards. Prevailing wind direction from north to south will impact Area 1 directly. Eskom interconnection line traverses the proposed site which will pose complications and shading. During the archaeological survey, no heritage receptors were noted in Site Alternative 1 	NO	NO



LEVEL	ALTERNATIVES	ADVANTAGES	DISADVANTAGES	REASONABLE AND FEASIBLE	FURTHER ASSESSMENT
	Area 2	<ul style="list-style-type: none"> Area already disturbed due to historical mining. 	<ul style="list-style-type: none"> Prevailing wind direction from north to south will impact Area 2 directly. Layout cannot be optimised for tracker blocks and may not fit required capacity. A large cemetery occurs in the footprint demarcated as Site Alternative 2 and impact is likely should this alternative be selected for development. This site alternative is not favourable for development unless required mitigation measures (avoidance, conservation buffers, grave relocation, public consultation) are implemented. Existing Eskom Holdings SOC Limited infrastructure exists on the area Access will have to be gained through the existing PPC mine 	NO	NO
Technology	Preferred Technology Solar photovoltaic (PV) panels	<ul style="list-style-type: none"> Better economic performance than CSP More cost effective than CSP meaning lower costs of capital resulting in lower tariffs. Requires less water than CSP. 	<ul style="list-style-type: none"> Additional batteries required for storage. Without batteries, only generates power during the daytime. Large area required for solar panels. 	YES	YES
	Alternative technology Concentrated Solar Power (CSP)	<ul style="list-style-type: none"> Better electrical output than PV. CSP systems can store energy in batteries that can be tapped for energy on demand, which helps the systems more consistently meet local power demands, especially during peak usage times. 	<ul style="list-style-type: none"> Very water intensive. Higher negative visual impact than PV. Large area required for solar panels. 	NO	NO



LEVEL	ALTERNATIVES	ADVANTAGES	DISADVANTAGES	REASONABLE AND FEASIBLE	FURTHER ASSESSMENT
Design or layout	Layout 3.2 (Preferred Design and Layout)	<ul style="list-style-type: none"> The preferred design ensures the highest possible project capacity of 10 MW AC in the smallest development footprint, meaning the least amount of ecological damage. Avoids the complete loss of wetland W1. Reduces loss of near-natural vegetation. Reduced edge disturbance. 	<ul style="list-style-type: none"> Loss of vegetation. Possible disturbance to wetland. 	YES	YES
	Layout 3.1		<ul style="list-style-type: none"> Complete loss of wetland W1. Greater loss of near-natural vegetation. Increased edge disturbance. 	YES	NO
No-go option	Site alternatives remain in their existing condition.	<ul style="list-style-type: none"> The environment will remain relatively undisturbed. 	<ul style="list-style-type: none"> Energy requirements of the PPC facility will not be met if the proposed solar PV plant is not developed. 	YES	YES



8 IMPACT ASSESSMENT METHODOLOGY

8.1 AIMS OF ENVIRONMENTAL IMPACT ASSESSMENT

The aim of Basic Assessments and Environmental Impact Assessments is to determine the consequences of proposed developments on the environments to better inform decision-making and the management of natural and social systems. This BA sought to assess the potential environmental impacts of the proposed development of the solar plant at PPC Slurry, North West.

8.2 IMPACT ASSESSMENT CRITERIA

CES has developed evaluation criteria for assessing impacts in accordance with the requirements outlined in Appendix 2 of the EIA Regulations (2014, as amended). This scale takes into consideration the following variables:

- Nature: negative or positive impact on the environment.
- Type: direct, indirect and/or cumulative effect of impact on the environment.
- Significance: The criteria in Table 8.1 are used to determine the overall significance of an activity. The impact effect (which includes duration; extent; consequence and probability) and the reversibility/mitigation of the impact are then read off the significance matrix in order to determine the overall significance of the issue. The overall significance is either negative or positive and will be classified as low, moderate or high (Table 8.2).
- Consequence: the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
- Extent: the spatial scale defines the physical extent of the impact.
- Duration: the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- Probability: the likelihood of impacts taking place as a result of project actions arising from the various alternatives. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- Reversibility: The degree to which an environment can be returned to its original/partially original state.
- Irreplaceable loss: The degree of loss which an impact may cause.
- Mitigation potential: The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in Table 8.1 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.



Table 8.1: Ranking of Evaluation Criteria

Nature	
Positive	Beneficial/positive impact.
Negative	Detrimental/negative impact.
Type	
Direct	Direct interaction of an activity with the environment.
Indirect	Impacts on the environment that are not a direct result of the project or activity.
Cumulative	Impacts which may result from a combination of impacts of this project and similar related projects.
Duration	
Short term	Less than 5 years.
Medium term	Between 5-20 years.
Long term	More than 20 years.
Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
Extent	
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
Study area	The proposed site and its immediate environments.
Municipal	Impacts affect the municipality, or any towns within the municipality.
Regional	Impacts affect the wider district municipality or the Eastern Cape Province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
Consequence	
Slight	Slight impacts or benefits on the affected system(s) or party(ies).
Moderate	Moderate impacts or benefits on the affected system(s) or party(ies).
Severe/ Beneficial	Severe impacts or benefits on the affected system(s) or party(ies).
Probability	
Definite	More than 90% sure of a particular fact. Should have substantial supportive data.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.
Reversibility	
Reversible	The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.
Irreversible	The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.
Irreplaceable loss	
Resource will not be lost	The resource will not be lost/destroyed provided mitigation measures are implemented.
Resource will be partly lost	The resource will be partially destroyed even though mitigation measures are implemented.
Resource will be lost	The resource will be lost despite the implementation of mitigation measures.
Mitigation potential	
Easily achievable	The impact can be easily, effectively and cost effectively mitigated/reversed.



Achievable	The impact can be effectively mitigated/reversed without much difficulty or cost.
Difficult	The impact could be mitigated/reversed but there will be some difficulty in ensuring effectiveness and/or implementation, and significant costs.
Very Difficult	The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.

Table 8.2: Description of significance ratings

Significance Rating		Description
LOW NEGATIVE	LOW POSITIVE	The impacts on this issue are acceptable and mitigation, whilst desirable, is not essential. The impacts on the issue by themselves are insufficient, even in combination with other low impacts, to prevent the development being approved. Impacts on this particular issue will result in either positive or negative medium to short term effects on the social and/or natural environment.
MODERATE NEGATIVE	MODERATE POSITIVE	The impacts on this issue are important and require mitigation. The impacts on this issue are, by themselves, insufficient to prevent the implementation of the project, but could in conjunction with other issues with moderate impacts, prevent its implementation. Impacts on this particular issue will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.
HIGH NEGATIVE	HIGH POSITIVE	The impacts on this issue are serious, and if not mitigated, they may prevent the implementation of the project (if it is a negative impact). Impacts on this particular issue would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment, and will result in severe effects or if positive, substantial beneficial effects.

8.3 ASSESSMENT OF CUMULATIVE IMPACTS

In terms of the NEMA EIA Regulations (2014), a cumulative impact is defined as:

“The past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities”.

Project induced cumulative impacts should be considered, along with direct and indirect impacts, in order to better inform the developer's decision making and project development process. Cumulative impacts may be categorised into one or more of the following types:

- **Additive:** the simple sum of all the effects (e.g. the accumulation of ground water pollution from various developments over time leading to a decrease in the economic potential of the resource);
- **Synergistic:** effects interact to produce a total effect greater than the sum of individual effects. These effects often happen as habitats or resources approach capacity (e.g. the accumulation of water, air and land degradation over time leading to a decrease in the economic potential of an area);
- **Time crowding:** frequent, repetitive impacts on a particular resource at the same time (e.g. multiple boreholes decreasing the value of water resources);



- **Neutralizing:** where effects may counteract each other to reduce the overall effect (e.g. infilling of a wetland for road construction, and creation of new wetlands for water treatment); and,
- **Space crowding:** high spatial density of impacts on an ecosystem (e.g. rapid informal residential settlement)."

Cumulative impacts are, however, difficult to accurately and confidently assess, owing to the high degree of uncertainty, as well as their often being based on assumptions. It is therefore difficult to provide as detailed an assessment of cumulative impacts as is the case for direct and indirect project induced impacts. This is usually because of the absence of specific details and information related to cumulative impacts. In these situations, the EAP will need to ensure that any assumptions made as part of the assessment are made clear. Accordingly, this includes an overview and analysis of cumulative impacts related to a variety of project actions, and does not provide a significance rating for these impacts, as was done for direct project induced impacts. The objective is to identify and focus on potentially significant cumulative impacts so these may be taken into consideration in the decision-making process. It is important to realise these constraints, and to recognise that the assessment will not, and indeed cannot, be perfect. The potential for cumulative impacts will, however, be considered, rather than omitted from the decision making-process and is therefore of value to the project and the environment.



9 IMPACT ASSESSMENT

The impact assessment identified and assessed impacts across four phases of development:

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

An impact assessment was conducted based on site visits and information provided by Sturdee Energy relating to the planning, construction and operation phases, as well as the no-go alternative, for the solar plant. A detailed impact assessment of all the identified impacts is provided in Appendix B. A breakdown of the assessment and mitigation measures is presented in the tables below.



9.1 PLANNING AND DESIGN PHASE IMPACTS

Table 9.1: Summary of impacts associated with the proposed solar plant during the planning and design phase.

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Legal and policy compliance	All Alternatives	During the planning and design phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	HIGH -	<ul style="list-style-type: none"> All relevant legislation and policy must be consulted and the proponent must ensure that the project is compliant with such legislation and policy. These should include (but are not restricted to): NEMA and Local Municipal bylaws. All relevant permits and authorisations including Water Use Licences or General Authorisations, Building Plan Approvals and plant removal permits must be in place prior to commencement of construction. 	LOW -
Infrastructure	All Alternatives	During the planning and design phase, planning and placement of structures and associated infrastructure in sensitive areas could lead to the damage and degradation of natural areas as well as to the structures themselves.	MODERATE -	<ul style="list-style-type: none"> Planning for and placement of infrastructure must be done so as to avoid sensitive areas as far as possible. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Stormwater management	All Alternatives	During the planning and design phase, inadequate planning for stormwater during the construction and operational phases within the site could result in erosion and contamination of the soil and surrounding watercourses if there are not appropriate stormwater management structures in place.	MODERATE -	<ul style="list-style-type: none"> A method statement must be developed by the project manager or contractor prior to construction, including considerations for stormwater, erosion, waste and alien vegetation management, as well as site rehabilitation and maintenance considerations. This method statement must be approved by the appointed ECO. This method statement should include stormwater management considerations to control runoff prevent erosion of the site and its surroundings, and mitigate the unnecessary loss of soil and sedimentation of watercourses during all phases of the project. Regular monitoring of implementation of this method statement for the rehabilitation of disturbed areas must be conducted. Appropriate stormwater structures, in alignment with the method statement, must be designed to minimise erosion of the surrounding environment to the extent required 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Waste management	All Alternatives	During the planning and design phase, failure to plan for the storage, handling and disposal of general and hazardous waste during the construction and operation phase may lead to littering and pollution of the surrounding environment, unsanitary conditions and health risks.	MODERATE -	<ul style="list-style-type: none"> A method statement must be developed by the project manager or contractor prior to construction, including considerations for stormwater, erosion, waste and alien vegetation management, as well as site rehabilitation and maintenance considerations. This method statement must be approved by the appointed ECO. This method statement should include waste management considerations for handling onsite general and hazardous waste during the construction and operation phases must be developed and implemented during construction. An appropriate area must be identified where waste can be stored before disposal. All hazardous substances such as paints, diesel and cement must be stored in a secure bunded area with an impermeable surface beneath them. 	LOW -
Job creation	All Alternatives	During the planning and design phase, there will be some temporary job opportunities associated with planning and design of the proposed solar park.	LOW +	N/A	LOW +



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Health and safety	All Alternatives	During the planning and design phase, failure to plan for potential health and safety risks during the construction and operation phase may result in the harm of labourers, staff, surrounding landowners and the public.	MODERATE -	A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be drawn up by and HSE officer prior to construction to ensure workers safety.	LOW -
On-site fire risk	All Alternatives	During the planning and design phase, failure to plan for accidental fires during the construction and operation phase could result in potential harm to the public and/or surrounding landowners and their property.	MODERATE -	<ul style="list-style-type: none"> Emergency preparedness must be in place for both the construction and operational phases and before these phases commence. This should form part of the method statement. Sturdee Energy must plan for and put measures in place to prevent and deal with fires including the provision of firefighting equipment. 	LOW -
Traffic	All Alternatives	During the planning and design phase, inadequate planning for the transportation of mast materials and specialist construction equipment to the site could cause traffic congestion.	MODERATE -	<ul style="list-style-type: none"> Consultation with the local Road Traffic Unit should be done early in the planning phase and if deemed necessary, road traffic permits should be obtained for transporting parts, containers, materials and construction equipment to the site to the extent required. Make provision for traffic accommodation where construction activities impact on existing roads. 	LOW -



POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Inadequate rehabilitation and maintenance		All Alternatives	During the planning and design phase, inadequate planning for rehabilitation and maintenance of infrastructure could lead to degradation of the study area and surrounding areas.	MODERATE -	<ul style="list-style-type: none"> A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO. 	LOW -
Loss of Carletonville Dolomite Grassland Vegetation	Near-natural	Preferred Alternative	The planned layout and siting of construction activities and solar PV infrastructure will directly result in the destruction and permanent loss of 17.2 ha of Carletonville Dolomite Grassland Vegetation, including 10.5 ha of near-natural, 6.6 ha of semi-natural and 0.1 ha of degraded vegetation.	MODERATE -	Minimize/reduce impact: <ul style="list-style-type: none"> During the planning and design phase, the development footprint must be designed to minimize the loss of near-natural indigenous vegetation as far as possible. The development footprint should be clearly demarcated and only vegetation within the approved footprint may be removed. Vegetation outside of these areas may not be cleared. Remediate/rehabilitate impact: <ul style="list-style-type: none"> A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO. 	MODERATE -
	Semi-natural		The consequence/severity and significance of this impact depends on the degree of the pre-construction degradation of the vegetation. Impacts associated with near-natural and semi-natural vegetation will be limited to the project footprint and occur within a vegetation type listed as Least Concern with a fairly wide distribution. As such the impact will be of moderate significance. Since the loss of vegetation is difficult to mitigate due to the permanent loss of this vegetation, this impact will remain of moderate significance even after mitigation measures are implemented.	MODERATE -		MODERATE -
	Degraded			LOW -		VERY LOW -



POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of wetland vegetation		Preferred Alternative	The planned layout and siting of construction activities and solar PV infrastructure will directly result in the destruction and permanent loss of wetland vegetation.	MODERATE -	Avoid/prevent impact: <ul style="list-style-type: none"> Optimally, a buffer of 30 m or more should be implemented around the wetland in the middle of the assessment area, with at least a 30 m corridor extending towards the nearest undeveloped terrestrial area, as discussed in Section 5.1 of the wetland impact report. Should this not be feasible, a buffer of at least 15 m around the wetland, with a 15-30 m corridor, should be considered. 	LOW -
Loss of Klerksdorp Thornveld Vegetation	Semi-natural	Preferred Alternative	The planned layout and siting of construction activities and solar PV infrastructure will directly result in the destruction and permanent loss of 2.7 ha of Klerksdorp Thornveld Vegetation, including 2.4 ha of semi-natural and 0.3 ha of degraded vegetation. The consequence/severity and significance of this impact depends on the degree of the pre-construction	MODERATE -	Minimize/reduce impact: <ul style="list-style-type: none"> During the planning and design phase, the development footprint must be designed to minimize the loss of near-natural indigenous vegetation as far as possible. The development footprint should be clearly demarcated and only vegetation within the approved footprint may be removed. Vegetation outside of these areas may not be 	MODERATE -



POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Degraded		degradation of the vegetation. Impacts associated with near-natural and semi-natural vegetation will be limited to the project footprint and occur within a vegetation type listed as Least Concern with a fairly wide distribution. As such the impact will be of moderate significance. Since the loss of vegetation is difficult to mitigate due to the permanent loss of this vegetation, this impact will remain of moderate significance even after mitigation measures are implemented.	LOW -	<p>cleared.</p> <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO. 	VERY LOW -
Non-compliance with permitting requirements		Preferred Alternative	During the planning and design phase, the inadequate planning for search and rescue operations and permitting for the removal of any SCC may result in non-compliances being issued and the unintended loss of SCC.	MODERATE -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> Planning for any search and rescue operations must be conducted prior to the commencement of construction activities. All necessary permits must be obtained for the removal of any identified SCC prior to the commencement of construction activities. 	VERY LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Disruption of Ecosystem Function and Processes	Preferred Alternative	The planned layout and siting of construction activities and solar PV infrastructure will result in the disruption of ecosystem functions and processes, including the loss of ecological connectivity and edge disturbance impacts.	MODERATE -	<p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> During the planning and design phase, the development footprint must be designed to minimize edge disturbance impacts. Preferably, the development footprint will lie adjacent to an existing developed/transformed area, so as to reduce the length of the shared edge with the surrounding near-natural and semi-natural areas. Ecological connectivity must be maintained for any isolated / island habitats, such as the onsite wetland. A 15-30 m wetland buffer and 15-30 m corridor was recommended in the Wetland Impact Assessment. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Establishment and/or spread of Alien Plant Species	Preferred Alternative	During the planning and design phase, the failure to plan for the removal and management of alien vegetation could result in the invasion of alien vegetation in sensitive areas during the construction and operational phases.	MODERATE -	<p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> An Alien Vegetation Management Plan must be developed by the Contractor prior to construction to mitigate the establishment and spread of undesirable alien plant species during all phases of the project. The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Direct ecosystem modification or destruction / loss impacts	Preferred Alternative	The planned layout and siting of construction activities and solar PV infrastructure will result in the disturbance and modification of wetlands W1 and W3.	MODERATE -	Avoid/prevent impact: <ul style="list-style-type: none"> • Optimally, a buffer of 30 m or more should be implemented on around wetland W1, with at least a 30 m corridor extending towards the nearest undeveloped terrestrial area, as discussed in Section 5.1. • Should this not be feasible, a buffer of at least 15 m around wetland W1, with a 15-30 m corridor, should be considered. 	LOW -
Alteration of hydrological and geomorphological processes	Preferred Alternative	Inappropriate stormwater planning and design may result in erosion and sedimentation during the construction and operational phases.	MODERATE -	Minimize/reduce impact: <ul style="list-style-type: none"> • An Erosion and Stormwater Management Plan should be developed during the planning and design phase and implemented during the construction and operational phases. • Appropriate stormwater structures must be designed to control run-off and minimize erosion. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Ecological connectivity and edge disturbance impacts	Preferred Alternative	The planned layout and siting of construction activities and solar PV infrastructure will result in the loss of ecological connectivity between W1 and the surrounding terrestrial environment, leading to edge disturbance impacts.	MODERATE -	Avoid/prevent impact: <ul style="list-style-type: none"> A buffer of at least 15 m around wetland W1 should be considered in the layout design. In addition to the buffer surrounding W1, the developer should allow for a natural corridor between the wetland and surrounding terrestrial environment. Alternatively, the development footprint should be shifted so that the edge of the buffer connects directly to the surrounding terrestrial environment. 	LOW -



9.2 CONSTRUCTION PHASE IMPACTS

Table 9.2: Summary of impacts associated with the proposed solar plant during the construction phase.

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Legal and policy compliance	All Alternatives	During the construction phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	HIGH -	<ul style="list-style-type: none"> All construction related conditions in the Environmental Authorisation, EMPr and other permits must be adhered to. Sturdee Energy must employ an independent Environmental Control Officer (ECO) for the construction phase to ensure that construction is implemented according to specifications in the EA and EMPr. Copies of all applicable licenses, permits and managements plans (EA, EMPr, etc.) must be available on-site at all times. Environmental Awareness Training must be included in site meetings/talks with all workers. 	LOW -
Infrastructure	All Alternatives	During the construction phase, the disturbance/clearing of vegetation and construction activities within or within close proximity to sensitive areas may result in degradation of the surrounding environment.	MODERATE -	<ul style="list-style-type: none"> Vegetation clearance must be limited to the area within the footprint of the designated area. Vegetation disturbance outside of the development footprint should be minimized. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Material stockpiling	All Alternatives	During the construction phase, inappropriate location and management of material stockpiles may result in erosion.	MODERATE -	<ul style="list-style-type: none"> Material stockpiles must be located away from sensitive areas and they must be monitored for erosion and alien vegetation. Material stockpile locations must be approved by the ECO. 	LOW -
Stormwater management	All Alternatives	During the construction phase, failure to implement effective stormwater management measures may result in increased surface soil erosion and contamination of stormwater and resulting surrounding watercourses.	MODERATE -	<ul style="list-style-type: none"> The construction site must be managed in a manner that prevents pollution to downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. Berms and swathes must be placed in areas that may be prone to erosion. Temporary cut-off drains and berms may be required to capture storm water and promote infiltration. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Waste management	All Alternatives	During the construction phase, poor management of handling, disposal and storage of general and hazardous waste may lead to the pollution of the surrounding environment.	MODERATE -	<ul style="list-style-type: none"> All general waste must be disposed of in bins/waste skips labelled "general waste". Sufficient waste bins must be provided throughout the construction site for collecting waste. All general waste collected on site must be disposed of at a licensed general waste disposal site. All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site. Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground. Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		During the construction phase, the mixing of cement on site could result in ground water contamination from compounds in the cement. In addition, a large number of cement mixing stations on site could increase the presence of impermeable areas which in turn could increase rates of run-off and thereby increase the risk of localized flooding, soil erosion, silting, gully formation, etc.	MODERATE -	<ul style="list-style-type: none"> Concrete and cement must take place on an impermeable surface, and dried waste concrete and cement must be disposed of with building rubble. No concrete mixing must take place within 32 m of any watercourse. 	LOW -
Job creation	All Alternatives	During the construction phase, there will be some temporary job opportunities associated with building of the proposed solar park.	LOW +	<ul style="list-style-type: none"> N/A 	LOW +
Health and safety	All Alternatives	During the construction phase, failure to comply with health and safety policies and protocols may result in the harm of labourers, staff, surrounding landowners and the public.	MODERATE -	<ul style="list-style-type: none"> A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be adhered to and enforced by a HSE officer to ensure workers safety. 	LOW -
Air quality and dust control	All Alternatives	During the construction phase, dust generated by construction vehicles and construction activities could result in significant dust during windy conditions.	MODERATE -	<ul style="list-style-type: none"> During windy periods un-surfaced and un-vegetated areas must be dampened down. Vegetation must be retained where possible as this will reduce dust travel. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	All Alternatives	During the construction phase poor maintenance and servicing of construction plant and vehicles may result in an increase in vehicle emissions in the areas.	MODERATE -	<ul style="list-style-type: none"> Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register. Vehicles and construction plant must be serviced regularly so as to reduce excessive vehicle emissions. 	LOW -
On-site fire risk	All Alternatives	During the construction phase inadequate attention to fire safety awareness and fire safety equipment could result in uncontrolled fires, posing a threat to animals, vegetation and the surrounding landowners.	MODERATE -	<p>In order to reduce the risk of fires:</p> <ul style="list-style-type: none"> All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. Smoking must not be permitted near flammable substances. All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. No open fires must be allowed on site. Fire extinguishers must be available onsite. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Inadequate rehabilitation and maintenance	All Alternatives	During the construction phase inadequate provision and implementation of rehabilitation measures may lead to the degradation of the surrounding environment.	MODERATE -	The rehabilitation plan must be implemented during and after the construction has been completed.	LOW -
Loss of wetland vegetation	Preferred Alternative	During the construction phase, vegetation clearance and earthworks, including excavation and infilling, will result in the disturbance and possible loss of up to 0.018 ha of wetland vegetation.	MODERATE -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> The buffer around the wetland in the middle of the assessment footprint should be demarcated, and no activities should be allowed to occur within these buffers. <p>Minimize/reduce impact:</p>	LOW -



POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
			Wetlands in the surrounding landscape have already been impacted upon due to the historical mining activities occurring adjacent to the site to the south, as well as the current operation of the PPC Plant to the east. However, the loss of the wetlands on site will have a small relative impact to wetlands in the broader area compared to the existing impacts. The additional loss of the onsite wetlands will therefore have a Low cumulative impact.	LOW -	<ul style="list-style-type: none"> Vegetation clearing must be kept a minimum and only to the site footprint. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> Disturbed areas must be monitored for erosion channels and these must be rehabilitated. <p>All trenches/excavations must be backfilled and all disturbed areas backfilled, compacted and revegetated, where applicable.</p>	LOW -
		No-go alternative	Should the project not proceed then the current land use will remain the same. The wetlands would continue to offer a few localised ecosystem services of very low to moderate importance.	LOW +	<ul style="list-style-type: none"> No mitigation measures are proposed for the no-go alternative. 	LOW +
Loss of Carletonville Dolomite Grassland Vegetation	Near-natural	Preferred Alternative	<p>The clearing of land for the construction of the solar PV plant and associated infrastructure will result in the loss of 17.2 ha of Carletonville Dolomite Grassland Vegetation, including 10.5 ha of near-natural, 6.6 ha of semi-natural and 0.1 ha of degraded vegetation.</p> <p>Again, the consequence / severity and significance of this impact depends on the degree of the pre-construction degradation of the vegetation. Impacts associated with near-natural and semi-natural vegetation will be limited to the project footprint and occur within a vegetation type listed as Least Concern with a fairly wide distribution. As</p>	MODERATE -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> Implement mitigation measures during planning and design phase. Areas of high sensitivity must be avoided. 	MODERATE -
	Semi-natural			MODERATE -	<p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> Construction activities must remain within the approved demarcated development footprint, and no vegetation clearance is to be permitted outside of the approved development footprint. 	MODERATE -
	Degraded				<ul style="list-style-type: none"> Construction vehicles and machinery must not encroach into identified highly-sensitive, 'no-go' 	VERY LOW -



POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	All categories		such the impact will be of moderate significance. Since the loss of vegetation is difficult to mitigate due to the permanent loss of vegetation, this impact will remain of moderate significance even after mitigation measures are implemented.	VERY LOW -	areas or areas outside the project footprint. <ul style="list-style-type: none"> Activities within 500 m of a wetland must obtain the necessary Water Use License or General Authorisation prior to the commencement of such activities. Lay down areas must not be located within any watercourses or drainage lines. 	
			If populations of SCC are present within the site and are impacted by the placement of infrastructure, the cumulative impact will be moderate as some SCC may have already been impacted upon as a consequence of mining that is currently occurring in the region. This impact can be reduced if a thorough botanical walkthrough of the site is undertaken during the optimum flowering season.	LOW -	Remediate/rehabilitate impact: <ul style="list-style-type: none"> Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas). Only indigenous species must be used for rehabilitation. The alien invasive management plan for the site must be implemented. 	LOW -
		No-go alternative	Disturbance from the access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	LOW -	<ul style="list-style-type: none"> No mitigation measures are proposed for the no-go alternative. 	N/A



POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of Klerksdorp Thornveld Vegetation	Semi-natural	Preferred Alternative	<p>The clearing of land for the construction of the solar PV plant and associated infrastructure will result in the loss of 2.7 ha of Klerksdorp Thornveld Vegetation, including 2.4 ha of semi-natural and 0.3 ha of degraded vegetation.</p> <p>Again, the consequence / severity and significance of this impact depends on the degree of the pre-construction degradation of the vegetation. Impacts associated with near-natural and semi-natural vegetation will be limited to the project footprint and occur within a vegetation type listed as Least Concern with a fairly wide distribution. As such the impact will be of moderate significance. Since the loss of vegetation is difficult to mitigate due to the permanent loss of this vegetation, this impact will remain of moderate significance even after mitigation measures are implemented.</p>	MODERATE -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> Implement mitigation measures during planning and design phase. <p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> Construction activities must remain within the approved demarcated development footprint, and no vegetation clearance is to be permitted outside of the approved development footprint. Construction vehicles and machinery must not encroach into identified highly-sensitive, 'no-go' areas or areas outside the project footprint. Activities within 500 m of a wetland must obtain the necessary Water Use License prior to the commencement of such activities. 	MODERATE -
	Degraded			LOW -		LOW -



POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	All categories		Portions of habitat have already been lost due to historical land use and ongoing bush encroachment. The footprint of the solar PV plant is relatively small compared to the adjacent mine and PPC facility. The additional loss of habitats will therefore have a Low cumulative impact.	LOW -	<ul style="list-style-type: none"> Lay down areas must not be located within any watercourses or drainage lines. Remediate/rehabilitate impact: <ul style="list-style-type: none"> Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas). Only indigenous species must be used for rehabilitation. The alien invasive management plan for the site must be implemented. 	LOW -
		No-go alternative	Disturbance from the dirt access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	LOW -	<ul style="list-style-type: none"> No mitigation measures are proposed for the no-go alternative. 	N/A



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of Plant Species of Conservation Concern	Preferred Alternative	<p>The permanent loss of plant species of conservation concern, such as <i>Searsia maricoana</i>, may occur. This species has a restricted range with only 3 known populations. As discussed in Section 3.1.7.2, it is unlikely that this species occurs on site.</p> <p>The likelihood of occurrence of other plant SCCs on site is low.</p>	MODERATE -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> A botanical walkthrough of the development area, by an experienced botanist with knowledge of the SCC identified as possibly occurring within the site, is recommended to be undertaken during the flowering season. If restricted range SCC populations are found, the development must be shifted to avoid these populations. The ECO must monitor for potential additional plant SCCs not found during search and rescue activities. No plant SCCs may be removed from the development footprint unless the relevant permits have been obtained. The identification of SCCs is recommended as part of the on-site induction and toolbox talk requirements. 	LOW -
		If populations of SCC with restricted ranges are present within the site and are impacted by the placement of infrastructure, the cumulative impact will be high as some SCC have already been lost as a consequence of mining that is currently occurring in the region. This impact can be reduced if a thorough botanical walkthrough of the site is undertaken during the optimum flowering season.	HIGH -		LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go alternative	Disturbance from the dirt access road and railway line, illegal dumping and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	LOW -	No mitigation measures are proposed for the no-go alternative.	N/A
Impact on faunal species of conservation concern	Preferred Alternative	<p>The loss of animal species of conservation concern may occur during the construction phase.</p> <p>With the exception of Sensitive animal species A and smaller mammals, such as the Black-footed Cat (<i>Felis nigripes</i>) and White-tailed Rat (<i>Mystromys albicaudatus</i>), all of which have extensive ranges, most faunal SCCs are unlikely to be found on site due to no or limited suitable available habitat.</p>	MODERATE -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> All clearing activities must deploy search and rescue teams in-front of clearing machinery to assist in relocating slower moving faunal species e.g. tortoises. <p>The following mitigation measures are recommended specifically for Sensitive animal species A:</p> <ul style="list-style-type: none"> Search and rescue deployed ahead of clearance, including diurnal active searches (during spring to early autumn if feasible). 	LOW -
		If populations of SCC with restricted ranges are present within the site and are impacted by the placement of infrastructure, the cumulative impact will be high as some SCC have already been lost as a consequence of mining that is currently occurring in the region.	HIGH -	<ul style="list-style-type: none"> Intact habitat patches where these species are known to occur (rocky outcrops and hillsides) should be buffered from disturbance taking into account connectivity to other similar habitat, or at least habitats that these species will utilise for migration and dispersal purposes. The minimum buffer requirement is 30 m. However, a 100 m buffer is recommended for high impact activities. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go alternative	Disturbance from the dirt access road and railway line, illegal dumping and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with habitats continuing to degrade.	LOW -	No mitigation measures are proposed for the no-go alternative.	N/A
Reduced Faunal Habitat	Preferred Alternative	During the construction phase, the construction related activities will result in the loss and/or degradation of natural habitats for fauna.	MODERATE -	Minimize/reduce impact: <ul style="list-style-type: none"> • The contractor must ensure that vegetation clearance of near-natural and wetland vegetation is restricted to the approved development footprint only. • Construction vehicles and machinery must not be permitted outside of the development footprint, as much as practically possible. • Clearing of trees should take place in winter months to the extent possible, to prevent birds and bats 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		Portions of habitat have already been lost due to historical mining activities occurring adjacent to the site to the south. However, the footprint of the solar PV plant is relatively small compared to the adjacent mine. The additional loss of habitats will therefore have a Low cumulative impact.	LOW -	<p>establishing nesting grounds and starting to breed and rear young in the spring and summer months.</p> <ul style="list-style-type: none"> Employees must be prohibited from making open fires during the construction phase. The ECO and the project manager must monitor that all construction activities are conducted within the development footprint. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> All impacted areas must be rehabilitated as per the Rehabilitation Plan, as soon as construction has been completed within each area. 	LOW -
	No-go alternative	Disturbance from the dirt access road and railway line, illegal dumping and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with habitats continuing to degrade.	LOW -	<ul style="list-style-type: none"> No mitigation measures are proposed for the no-go alternative. 	LOW -



Disruption of Ecosystem Function and Processes	Preferred Alternative	<p>Construction activities will result in the disruption of ecosystem functions and processes, including the loss of ecological connectivity and edge disturbance impacts.</p> <p>Fragmentation is one of the most important impacts on vegetation as it creates breaks in previously continuous vegetation, causing a reduction in the gene pool and a decrease in species richness and diversity. It also impacts on fauna as it separates habitats and necessitates fauna having to move across exposed areas like roads to get to another section of their habitat or territory. This impact occurs when more and more areas are cleared, resulting in the isolation of functional ecosystems, which results in reduced biodiversity and reduced movement due to the absence of ecological corridors.</p>	MODERATE -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> Implement mitigation measures during planning and design and construction phases. <p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> Ecological connectivity must be maintained for any isolated / island habitats, such as the onsite wetland. A 15-30 m wetland buffer and 15-30 m corridor was recommended in the Wetland Impact Assessment. The contractor must ensure that vegetation clearance of near-natural and wetland vegetation is restricted to the approved development footprint only. Construction vehicles and machinery must not be permitted outside of the development footprint, as much as practically possible. Employees must be prohibited from making open fires during the construction phase. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> A rehabilitation plan must be implemented during construction and operation phases. All trenches/excavations must be backfilled and all disturbed areas backfilled, compacted and 	MODERATE -
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				revegetated, where applicable.	
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POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go alternative	Under the no go alternative, habitat fragmentation has already occurred and will continue to do so while operational activities take place at the adjacent PPC Plant.	MODERATE -	No mitigation measures are proposed for the no-go alternative.	N/A
Disturbance to faunal species and potential reduction in abundance and mortality of faunal species	Preferred Alternative	<p>Faunal species will be disturbed during construction due to noise and vibrations of construction machinery. Faunal species that vacate the immediate area may return following completion of construction or new individuals or species may inhabit the area. Construction machinery may cause unintentional mortalities of faunal species.</p> <p>Even with the mitigations applied, the construction will still have an impact on faunal species.</p>	MODERATE -	<p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> Vehicles and machinery must meet best practice standards. Staff and contractors' vehicles must comply with speed limits of 40 km/hr Project must start and be completed within the minimum timeframe, i.e. may not be started and left incomplete. ECO to walk ahead of clearing construction machinery and move slow moving species e.g. tortoises 	MODERATE -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
			LOW -	<p>out of harm's way and into suitable neighbouring habitat.</p> <ul style="list-style-type: none"> Any faunal species that may die as a result of construction must be recorded (photographed, GPS coordinate captured) and if somewhat intact preserved and donated to SANBI. Any faunal species observed onsite must be recorded (photographed, GPS coordinate captured) and loaded onto iNaturalist. Staff and contractors are not permitted to capture, collect or eat any faunal species onsite. 	LOW -
	No-go alternative	Disturbance from the dirt access road and railway line, illegal dumping and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with habitats continuing to degrade.	LOW -	No mitigation measures are proposed for the no-go alternative.	N/A



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Establishment and/or spread of Alien Plant Species	Preferred Alternative	During the construction phase, the removal of natural vegetation creates open habitats that favour the establishment of undesirable alien plant species. The infestation of alien plant species will result in the displacement of indigenous vegetation and possible local extinctions of species. This pre-mitigation impact is of high significance but can easily be managed through the implementation of an alien invasive management plan.	HIGH -	Minimize/reduce impact: <ul style="list-style-type: none"> The Contractor must implement the Alien Vegetation Management Plan. The ECO must monitor for the adequate implementation of this plan. The ECO and contractor must monitor the site for the presence of alien invasive plant species and take immediate action when these are recorded. It is recommended that the ECO prepare a photo guide of all invasive plant species likely to occur on site. This will aid in the identification of undesirable species. 	LOW -
			MODERATE -	Remediate/rehabilitate impact: <ul style="list-style-type: none"> All previously infested areas must be rehabilitated as per the Rehabilitation Plan, to the satisfaction of the appointed ECO, as soon as construction has been completed within each area. 	LOW -
	No-go alternative	Disturbance from the existing alien invasive species on site will probably continue should the proposed solar PV project not go ahead. This will have a moderate negative impact on the site.	MODERATE -	No mitigation measures are proposed for the no-go alternative.	N/A



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Direct ecosystem modification or destruction / loss impacts	Preferred Alternative	During the construction phase, vegetation clearance and earthworks, including excavation and infilling, will result in the destruction and permanent loss of wetland W1.	MODERATE -	Avoid/prevent impact: <ul style="list-style-type: none"> The wetland buffers should be demarcated, and no activities should be allowed to occur within these buffers. Construction materials must not be stored within the moderate sensitivity areas. Stockpiles must not be stored within the moderate sensitivity areas. Minimize/reduce impact: <ul style="list-style-type: none"> Construction activities should be undertaken during the driest part of the year, to the extent possible, to 	LOW -
		During the construction phase, vegetation clearance, construction vehicle traffic and earthworks may result in the temporary disturbance of wetland W3.	LOW -		LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Alteration of hydrological and geo-morphological processes	Preferred Alternative	During the construction phase, the clearance of vegetation and compaction of soil may result in increased run-off and erosion, altering hydrological and geomorphological processes.	MODERATE -	<p>minimize erosion and downstream sedimentation due to excavation, etc.</p> <ul style="list-style-type: none"> • Appropriate stormwater structures must be implemented during construction to control run-off and minimize erosion. • Vegetation clearing must be kept a minimum and only to the site footprint. • Erosion controls and sediment trapping measures must be put in place. • Stockpiles must be monitored for erosion and mobilisation of materials towards watercourses. • Stockpiles must not exceed 1.5 m in height. Stockpiles must be covered during windy periods. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> • Disturbed areas must be monitored for erosion channels and these must be rehabilitated. • All trenches/excavations must be backfilled and all disturbed areas backfilled, compacted and revegetated, where applicable. 	LOW -



Water pollution impacts	Preferred Alternative	During the construction phase, accidental spillages of wet concrete and chemical / hazardous substances may result in soil and groundwater contamination, adversely affecting the aquatic ecosystems in the broader area.	MODERATE -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> No concrete mixing must take place within 15 m of any watercourse. No machinery must be parked overnight within 50 m of the rivers/wetlands. All stationary machinery must be equipped with a drip tray to retain any oil leaks. Chemicals used for construction must be stored safely on bunded surfaces in the construction site camp. No ablution facilities must be located within 50 m of any river or wetland system. Chemical toilets must be regularly maintained/ serviced to prevent ground or surface water pollution. Any hazardous substances/waste must be stored in impermeable bunded areas or secondary containers 110% the volume of the contents within it. All general waste and refuse must be removed from site and disposed and windproof temporary storage area before being disposed of at a registered landfill site. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> Emergency plans must be in place in case of spillages onto bare soil 	LOW -
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POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
				or within water courses.	
Ecological connectivity and edge disturbance impacts	Preferred Alternative	During the construction phase, vegetation clearance, construction vehicle traffic and earthworks may reduce ecological connectivity and disturb the wetland/terrestrial edge.	MODERATE -	<p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> Construction activities should be undertaken during the driest part of the year to minimize erosion and downstream sedimentation due to excavation, etc. Vegetation clearing must be kept a minimum and only to the site footprint. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> All trenches/excavations must be backfilled and all disturbed areas backfilled, compacted and revegetated, where applicable. 	LOW -
Habitat destruction for avian species	All Alternatives	During the construction and maintenance phases of this project, a certain amount of habitat destruction and alteration will take place. The nature of the proposed facility means that the majority of the development footprint (PV module) will be transformed from the current vegetation to an industrial site.	LOW -	<ul style="list-style-type: none"> The proposed facility should avoid the small identified wetland on site. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Disturbance of birds and displacement effects	All Alternatives	Disturbance of avifauna during the construction (and thereafter during maintenance and operational and decommissioning) of the facility and associated infrastructure is likely to occur. Disturbance of breeding birds is typically of greatest concern. In this regard any breeding sites of sensitive bird species would be the most important. We have not identified any such breeding sites at this stage.	LOW -	<ul style="list-style-type: none"> No mitigation required 	LOW -
Bird fatality	All Alternatives	Bird fatalities could occur at the site through a number of mechanisms, including collision with PV panels, entanglement in perimeter fence and others. Based on our data collected on bird species on site, we conclude that this impact will be of LOW NEGATIVE significance. Overall, the diversity of bird species on site is low, no regionally Red Listed species occur on site and the habitat on site is of low value for birds. The impact of collision with and electrocution on the overhead power line and within the substation is possible, but is likely to be LOW NEGATIVE significance, as threatened bird species are not likely to frequent the proposed development area.	LOW -	<ul style="list-style-type: none"> The risk of electrocution of large birds on the power line pylons must be mitigated by using a bird friendly design with sufficient phase-phase and phase-earth clearance. 	LOW -
Loss of high potential land	All Alternatives	The land is not cultivated and has never been. The land has a low potential and implementing the project will, therefore, not lead to any loss of high potential land.	N/A	<ul style="list-style-type: none"> No mitigation required 	N/A



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of grazing land	All Alternatives	The land is not used as grazing at present. Implementing the project will take 19.9 hectares of potential grazing land. This loss will affect only 2 livestock.	MODERATE -	<ul style="list-style-type: none"> Alternative grazing land can be found in the region. 	LOW -
Loss of crop production	All Alternatives	The land is not cultivated and has never been.	N/A	<ul style="list-style-type: none"> No mitigation required 	N/A
Loss of animal production	All Alternatives	It is not used as grazing, there will be no loss of income from livestock production. However, the opportunity to use the land as grazing is lost. The potential income if the land was used as grazing is R11 408.	MODERATE -	<ul style="list-style-type: none"> No mitigation required 	LOW -
Loss of agricultural infrastructure	All Alternatives	There is no agricultural infrastructure.	N/A	<ul style="list-style-type: none"> No mitigation required 	N/A
Loss of archaeological features	All Alternatives	The study did not identify any archaeological receptors which will be directly impacted by the proposed project	LOW -	No Mitigation Required	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of historically significant building and structures	All Alternatives	The study identified no buildings or structures of historical or heritage significance. For the rest of the project area, the general landscape holds varied significance in terms of the built environment as the area comprises historical farming remnants and relatively newly established industrial zones, settlements and townlands. However, no impact on built environment sites is anticipated.	LOW -	No Mitigation Required	LOW -
Alteration of cultural landscape	All Alternatives	Generally, the proposed project area and its surrounds are characterised by open fields and farmlands. Further away from the project area, the landscape is typical of the rural north North West with undulating hills with flatter plains in-between. This landscape stretches over many kilometres and the proposed project is unlikely to result in a significant impact on the landscape.	LOW -	No Mitigation Required	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Disturbance to graves/human burial sites	Preferred Alternative	No graves of human burial places were noted during the site investigation of Site Alternative 1 but a cemetery occurs in the footprint demarcated as Site Alternative 2 and impact is likely should this alternative be selected for development.	LOW -	Human remains are usually observed when they are exposed through erosion. In some instances, packed stones or rocks may indicate the presence of informal pre-colonial burials. If any human bones are found during the course of construction work, then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial, they would need to be exhumed under a permit from SAHRA (for pre-colonial burials as well as burials later than about AD 1500). Should any unmarked human burials/remains be found during the course of construction, work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA). Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	Site Alternative 2	A large cemetery occurs in the footprint demarcated as Site Alternative 2. The site, which was first documented by Coetzee (2008) as "Site 2" consists of a cemetery measuring approximately 200 x 30 metres in extent. The graveyard holds in excess of 800 graves which are mostly demarcated by packed stones, except for a few with cement bases and headstones. The graves have an east-west orientation with headstones on the western side. Most of the graves have no inscriptions on the headstones therefore their age could not be determined. The burial site, which is of high heritage significance, occurs within the Alternative 2 site proposed for the project area and impact might occur.	VERY HIGH-	<ul style="list-style-type: none"> Avoidance: 100m conservation buffers, site fencing and access control, site management plan Site monitoring: Site monitoring by the heritage consultant or an ECO familiar with the heritage of the area. Grave Relocation: Grave relocation subject to authorizations and permitting if impacted on. 	VERY HIGH-



9.3 OPERATIONAL PHASE IMPACTS

Table 9.3: Summary of impacts associated with the proposed solar plant during the operational phase.

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Legal and policy compliance	All Alternatives	During the operation phase, failure to adhere to all permits, authorisations and regulations may lead to financial penalties and closure of the proposed solar park.	HIGH -	<ul style="list-style-type: none"> The proponent must ensure that operations of the solar park is compliant with the relevant legislation and policy. These should include (but are not restricted to): NEMA, EA, EMPr and any other permits/authorisations. 	LOW -
Infrastructure	All Alternatives	During the operation phase, the solar park will provide power to the adjacent PPC facility and mine, reducing reliance and pressure on the national grid.	MODERATE +	<ul style="list-style-type: none"> Regular maintenance and inspections of all infrastructure and services must be undertaken. 	MODERATE +
Stormwater management	All Alternatives	During the operation phase, failure of the stormwater system and or lack of maintenance of the stormwater system may result in the erosion and or pollution of the surrounding environment should the stormwater be contaminated.	MODERATE -	<ul style="list-style-type: none"> Stormwater management measures such as attenuation structures, channels, etc. must be properly maintained and monitored. If the stormwater management measures put in place are deemed insufficient, a qualified engineer must be approached to assist with additional storm water attenuation mechanisms and remediation. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Job creation	All Alternatives	During the operational phase there will be some temporary and permanent job opportunities associated with building of the proposed solar park.	LOW +	<ul style="list-style-type: none"> N/A 	LOW +
Health and safety	All Alternatives	During the operational phase, failure to comply with health and safety policies and protocols may result in the harm of labourers, staff, surrounding landowners and the public.	MODERATE -	<ul style="list-style-type: none"> A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be adhered to and enforced by a HSE officer to ensure workers safety. 	LOW -
Air quality and dust control	All Alternatives	During the operational phase, dust generated by construction vehicles and construction activities could result in significant dust during windy conditions.	MODERATE -	<ul style="list-style-type: none"> During windy periods un-surfaced and un-vegetated areas must be dampened down. Vegetation must be retained where possible as this will reduce dust travel. 	LOW -
	All Alternatives	During the construction phase poor maintenance and servicing of construction plant and vehicles may result in an increase in vehicle emissions in the areas.	MODERATE -	<ul style="list-style-type: none"> Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register. Vehicles and construction plant must be serviced regularly so as to reduce excessive vehicle emissions. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
On-site fire risk	All Alternatives	During the construction phase inadequate attention to fire safety awareness and fire safety equipment could result in uncontrolled fires, posing a threat to animals, vegetation and the surrounding landowners.	MODERATE -	<p>In order to reduce the risk of fires:</p> <ul style="list-style-type: none"> All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. Smoking must not be permitted near flammable substances. All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. No open fires must be allowed on site. Fire extinguishers must be available onsite. 	LOW -
Inadequate rehabilitation and maintenance	All Alternatives	During the operation phase inadequate rehabilitation of disturbed areas and lack of maintenance of infrastructure may lead to the degradation of the surrounding environment.	MODERATE -	Disturbed areas will be rehabilitated/prepared to allow natural re-vegetation.	LOW -
Disruption of Ecosystem Function and Processes	Preferred Alternative	<p>Operational activities, such as routine maintenance, may result in the disruption of ecosystem functions and processes, including the disturbance of vegetation and faunal habitats, as well as edge disturbance impacts.</p> <p>Assuming the appropriate mitigation measures are adopted during the planning and design and construction phases, the severity of the operational phase impacts will be relatively low.</p>	LOW -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> Implement mitigation measures during planning and design and construction phases. <p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> Monitoring and maintenance vehicles must not be permitted outside of the development footprint, 	VERY LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		Portions of habitat have already been lost due to historical land use and ongoing bush encroachment. The footprint of the solar PV plant is relatively small compared to the adjacent mine and PPC facility. The additional loss of habitats will therefore have a Low cumulative impact.	LOW -	as much as practically possible. Remediate/rehabilitate impact: <ul style="list-style-type: none"> The rehabilitation plan must be implemented during operation phases. 	LOW -
	No-go alternative	Disturbance from the access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	LOW -	<ul style="list-style-type: none"> No mitigation measures are proposed for the no-go alternative. 	N/A
Establishment and/or spread of Alien Plant Species	Preferred Alternative	During the operation phase, the failure to manage alien vegetation could result in the widespread invasion of alien vegetation.	HIGH-	Avoid/prevent impact: <ul style="list-style-type: none"> Implement mitigation measures during planning and design and construction phases. Minimize/reduce impact: <ul style="list-style-type: none"> The Alien Vegetation Management Plan must continue to be implemented. 	VERY LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		Existing disturbance from the dirt access road and railway line, illegal dumping and alien invasive species will likely be exacerbated by the additional impacts of the construction of the proposed solar PV plant. This will be of moderate significance.	MODERATE -	<ul style="list-style-type: none"> The site should be monitored on a regular basis to ensure that no alien vegetation establishes on site. Remediate/rehabilitate impact: <ul style="list-style-type: none"> Any alien vegetation found during monitoring should be removed as per the Alien Vegetation Management Plan and the area should be appropriately rehabilitated in alignment with the Rehabilitation Plan. 	VERY LOW -
	No-go alternative	Disturbance from existing bush encroachment and alien species on site will probably continue should the proposed solar PV project not go ahead. This will have a moderate negative impact on the site.	MODERATE -	<ul style="list-style-type: none"> No mitigation measures are proposed for the no-go alternative. 	N/A



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Alteration of hydrological and geomorphological processes	Preferred Alternative	During the operational phase, the solar PV plant and associated infrastructure will directly and permanently alter hydrological and geomorphological processes. This may indirectly result in increased run-off, erosion and sedimentation.	MODERATE -	<p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> Adhere to stormwater management design measures provided in the 'Planning and Design Phase'. Stormwater infrastructure must be maintained and monitored for effectiveness with respect to controlling and minimising erosion and sedimentation of watercourses. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> The site must be monitored for erosion and should be rehabilitated where applicable. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Water pollution impacts	Preferred Alternative	During the operational phase, routine maintenance (e.g. the washing and servicing of panels) may lead to the introduction of chemical / hazardous substances (e.g. soaps, cement dust, oil spills from vehicles, etc.) into the watercourse, soil and/or groundwater, adversely affecting the aquatic ecosystems in the broader area.	MODERATE -	<p>Avoid/prevent impact:</p> <ul style="list-style-type: none"> No machinery must be parked overnight within 50 m of the rivers/wetlands. All stationary machinery must be equipped with a drip tray to retain any oil leaks. Any hazardous substances/waste must be stored in impermeable bunded areas or secondary containers 110% the volume of the contents within it. All general waste and refuse must be removed from site and disposed and windproof temporary storage area before being disposed of at a registered landfill site. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> Emergency plans must be in place in case of spillages onto bare soil or within water courses. 	LOW -
Ecological connectivity and edge disturbance impacts	Preferred Alternative	During the operational phase, inadequate rehabilitation of disturbed areas may lead to the reduction of ecological connectivity and degradation of the surrounding environment.	MODERATE -	<p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> Disturbed areas should be rehabilitated and re-vegetated. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Status-quo maintained	No-go Alternative	Should the project not proceed then the current land use will remain the same. The wetlands would continue to offer a few localised ecosystem services of very low to moderate importance.	LOW +	<ul style="list-style-type: none"> No mitigation measures are proposed for the no-go alternative. 	LOW +
Habitat destruction for avian species	All Alternatives	During the construction and maintenance phases of this project, a certain amount of habitat destruction and alteration will take place. The nature of the proposed facility means that the majority of the development footprint (PV module) will be transformed from the current vegetation to an industrial site.	LOW -	<ul style="list-style-type: none"> The proposed facility should avoid the small identified wetland on site. 	LOW -
Disturbance of birds and displacement effects	All Alternatives	Disturbance of avifauna during the construction (and thereafter during maintenance and operational and decommissioning) of the facility and associated infrastructure is likely to occur. Disturbance of breeding birds is typically of greatest concern. In this regard any breeding sites of sensitive bird species would be the most important. We have not identified any such breeding sites at this stage.	LOW -	<ul style="list-style-type: none"> No mitigation required 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Bird fatality	All Alternatives	Bird fatalities could occur at the site through a number of mechanisms, including collision with PV panels, entanglement in perimeter fence and others. Based on our data collected on bird species on site, we conclude that this impact will be of LOW NEGATIVE significance. Overall the diversity of bird species on site is low, no regionally Red Listed species occur on site and the habitat on site is of low value for birds. The impact of collision with and electrocution on the overhead power line and within the substation is possible, but is likely to be LOW NEGATIVE significance, as threatened bird species are not likely to frequent the proposed development area.	LOW -	<ul style="list-style-type: none"> The risk of electrocution of large birds on the power line pylons must be mitigated by using a bird friendly design with sufficient phase-phase and phase-earth clearance. 	LOW -
Nesting and other use of infrastructure by birds	All Alternatives	Certain species, in particular doves, pigeons, weavers and crows, are likely to use some of the facility infrastructure for nesting, perching and roosting.	LOW+	<ul style="list-style-type: none"> No mitigation is required for the impact of the facility on birds through nesting. For the impact of the birds nesting on the facility, nest management is recommended on a case by case basis under the supervision of an avifaunal specialist, and in conformance with all relevant national and provincial legislation. 	LOW+



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Altered run off patterns	All Alternatives	It is likely that water used to wash the panels and rainfall will fall to the bare ground and then need to runoff somewhere. If not managed correctly this could either result in water standing for long periods, which would attract birds and their prey thereby placing them at risk of collision with infrastructure, or it could result in soil erosion. This could also extend the impact of habitat destruction beyond the immediate footprint of the project.	LOW -	<ul style="list-style-type: none"> This will need to be managed through the development of a carefully considered surface water/drainage management plan for the site. 	LOW -
Chemical pollution from the cleaning panels	All Alternatives	There is a risk that if hazardous chemicals are used to clean panels and fall to the ground and enter the environment this could have secondary effects.	LOW -	<ul style="list-style-type: none"> No mitigation required 	LOW -



9.4 DECOMMISSIONING PHASE IMPACTS

Table 9.4: Summary of impacts associated with the proposed solar plant during the decommissioning phase.

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Loss of Indigenous Vegetation	Preferred Alternative	The decommissioning of the solar PV plant and removal of panels will require laydown areas and will disrupt vegetation that has re-established around the areas that were disturbed during the construction phase. The loss of vegetation will be similar to the construction phase impacts.	MODERATE -	Avoid/prevent impact: <ul style="list-style-type: none"> Implement mitigation measures during planning and design phase. Minimize/reduce impact: <ul style="list-style-type: none"> Decommissioning activities 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		<p>Portions of this vegetation type have already been lost due to historical mining activities occurring adjacent to the site to the south. However, the footprint of the solar PV plant is relatively small compared to the adjacent mine. The additional loss of vegetation will therefore have a Low cumulative impact.</p>	LOW -	<p>must remain within the approved demarcated development footprint, and no vegetation clearance is to be permitted outside of the approved development footprint.</p> <ul style="list-style-type: none"> • Vehicles and machinery must not encroach into identified highly-sensitive, 'no-go' areas or areas outside the project footprint. • Lay down areas must not be located within any watercourses or drainage lines. <p>Remediate/rehabilitate impact:</p> <ul style="list-style-type: none"> • Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas). • Only indigenous species must be used for rehabilitation. • The alien invasive management plan for the site must be implemented. 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go alternative	Disturbance from the dirt access road and railway line, illegal dumping and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	LOW +	<ul style="list-style-type: none"> No mitigation measures are proposed for the no-go alternative. 	N/A
Disturbance to faunal species and potential reduction in abundance and mortality of faunal species	Preferred Alternative	<p>Faunal species will be disturbed during decommissioning due to noise and vibrations of machinery. Faunal Species that vacate the immediate area may return following completion of construction or new individuals or species may inhabit the area. Machinery may cause unintentional mortalities of faunal species.</p> <p>Even with the mitigations applied the construction will still have an impact on faunal species.</p>	LOW -	<p>Minimize/reduce impact:</p> <ul style="list-style-type: none"> Vehicles and machinery must meet best practice standards. Staff and contractors' vehicles must comply with speed limits of 40 km/hr Project must start and be completed within the minimum timeframe, i.e. may not be started and left incomplete. ECO to walk ahead of machinery and move slow 	LOW -



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		The adjacent PPC plant has already caused an increase in ambient noise in the area. The additional noise generated from the construction of the decommissioning of the solar PV plant will be a short term impact and will be of low significance.	LOW -	<p>moving species e.g. tortoises out of harm's way and into suitable neighbouring habitat.</p> <ul style="list-style-type: none"> Any faunal species that may die as a result of decommissioning must be recorded (photographed, GPS coordinate captured) and if somewhat intact preserved and donated to SANBI. Any faunal species observed onsite must be recorded (photographed, GPS coordinate captured) and loaded onto iNaturalist. Staff and contractors are not permitted to capture, collect or eat any faunal species onsite. 	LOW -
	No-go alternative	Under the no-go alternative, some faunal populations at the study site will still be impacted by noise from the adjacent PPC Plant.	LOW -	No mitigation measures are proposed for the no-go alternative.	N/A



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Establishment and/or spread of Alien Plant Species	Preferred Alternative	During the decommissioning phase, the disturbance of natural vegetation creates open habitats that favour bush encroachment and the establishment of undesirable alien plant species. The infestation of alien plant species will result in the displacement of indigenous vegetation and possible local extinctions of species. This pre-mitigation impact is of high significance but can easily be managed through the implementation of an alien invasive management plan.	HIGH -	Remediate/rehabilitate impact: <ul style="list-style-type: none"> All previously infested areas must be rehabilitated as per the Rehabilitation Plan, to the satisfaction of the appointed ECO, as soon as construction has been completed within each area. 	LOW -
		Existing disturbance from the dirt access road and railway line, illegal dumping and bush encroachment will likely be exacerbated by the additional impacts of the construction of the proposed solar PV plant. This will be of moderate significance.	MODERATE -		LOW -
	No-go alternative	Disturbance from existing bush encroachment and alien species on site will probably continue should the proposed solar PV project not go ahead. This will have a moderate negative impact on the site.	MODERATE -	No mitigation measures are proposed for the no-go alternative.	N/A



POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Disturbance of birds and displacement effects	All Alternatives	Disturbance of avifauna during the construction (and thereafter during maintenance and operational and decommissioning) of the facility and associated infrastructure is likely to occur. Disturbance of breeding birds is typically of greatest concern. In this regard any breeding sites of sensitive bird species would be the most important. No such breeding sites were identified.	LOW -	<ul style="list-style-type: none"> No mitigation required 	LOW -



10 SENSITIVITY ANALYSIS

A site sensitivity analysis has been conducted based on specialist and general site information gathered. The site was classified into areas of low, conditional sensitivity and **NO-GO** development.

- **NO-GO** includes areas where no construction should take place.
- **High Sensitivity** areas will require considerable effort to design out, mitigate or manage negative environmental impacts. In many cases this will not be possible and in general these areas should be avoided. Only facilities that are location dependent should be permitted in these areas.
- **Moderate Sensitivity** areas can accommodate development, but there are constraints. Mitigation and management will be required to reduce significant environmental impacts to acceptable levels, and appropriate technology and design will be required to reduce impacts and ensure sustainability.
- **Low Sensitivity** areas can be easily developed, as there are only minor constraints, and little mitigation and management is required (aside from normal building design and construction restrictions outlined in the EMP).

Table 10.1 and the figures below indicate the sensitive environmental features identified by the EAP within the vicinity of the proposed development site and surrounding areas.

Table 10.1: Sensitive Features in the Study Area

SENSITIVE ENVIRONMENT	DESCRIPTION	RISK
Aquatic and wetland	<ul style="list-style-type: none"> • Delineated wetland W1 and 15-30m buffer. • Ecological linkage corridor. • Areas within 100m of natural wetlands and rivers. • Aquatic Ecological Support Areas (ESA). 	MODERATE
	<ul style="list-style-type: none"> • Artificial wetlands that do not resemble natural wetlands i.e. delineated wetland W3. • 500m buffer placed around natural and artificial wetlands (regulated by DHSWS). 	LOW
Terrestrial Biodiversity	<ul style="list-style-type: none"> • Near-natural Carletonville Dolomite Grassland. • Near-natural Klerksdorp Thornveld. 	LOW
	<ul style="list-style-type: none"> • Semi-natural and degraded Carletonville Dolomite Grassland • Semi-natural and degraded Klerksdorp Thornveld 	VERY LOW
Agricultural	The soils are shallow with a land use capability of v and vi. This is low potential land that is not arable and which has never been cultivated before. It is only suitable for animal grazing. Therefore, it was, found that the screening tool is incorrect and that the land is indeed low sensitivity.	LOW
Avifaunal	One slightly sensitive feature exists on the proposed site, a small wetland. Although this wetland does not significantly influence the avifaunal community on site, it is worth mapping as slightly higher sensitivity, and it would be ideal if the proposed infrastructure could avoid impacting on this area.	LOW

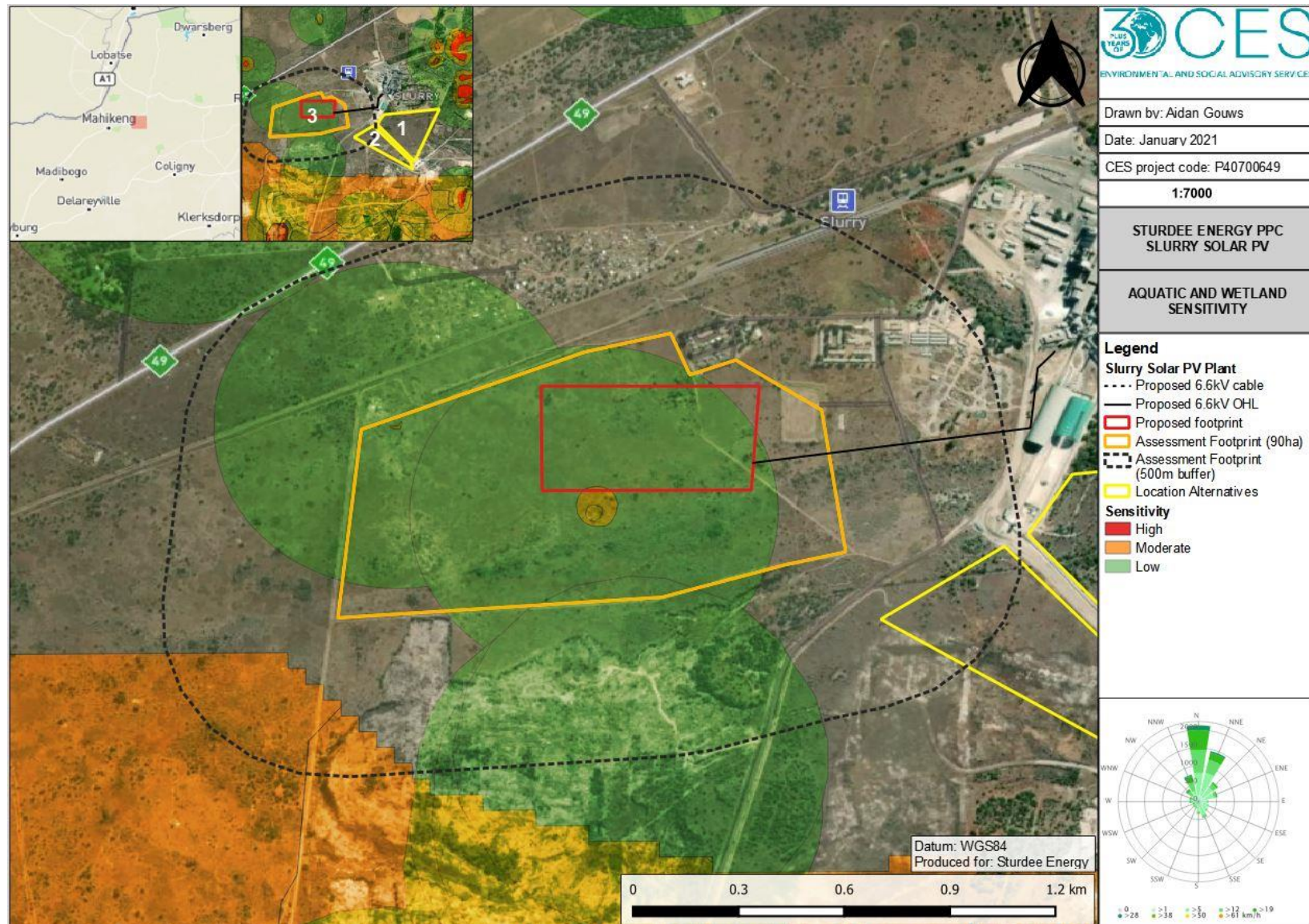


Figure 10.1: Aquatic and wetland sensitivity map for the PPC Slurry Solar Park

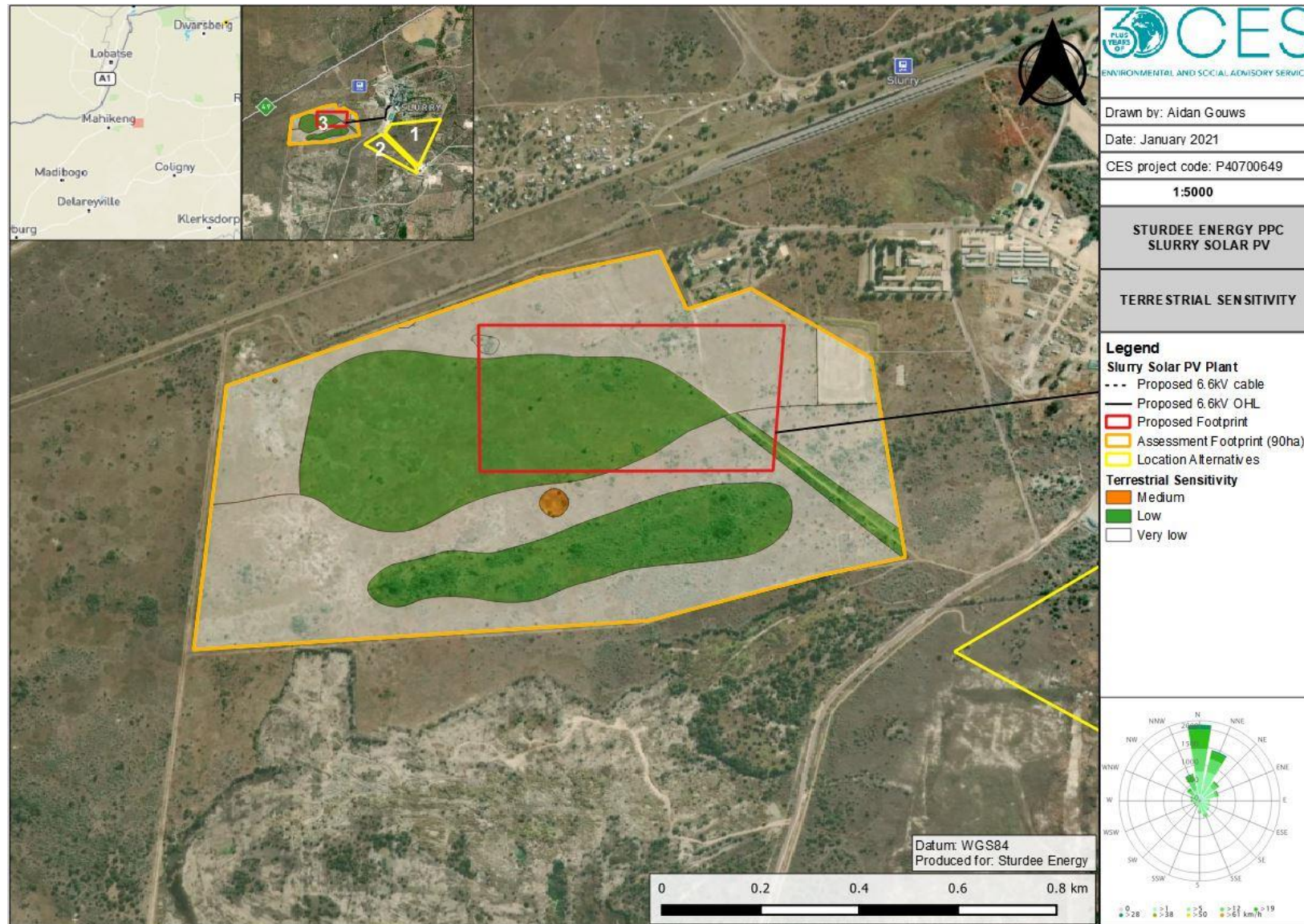


Figure 10.2: Terrestrial Biodiversity Sensitivity for the PPC Slurry Solar Park

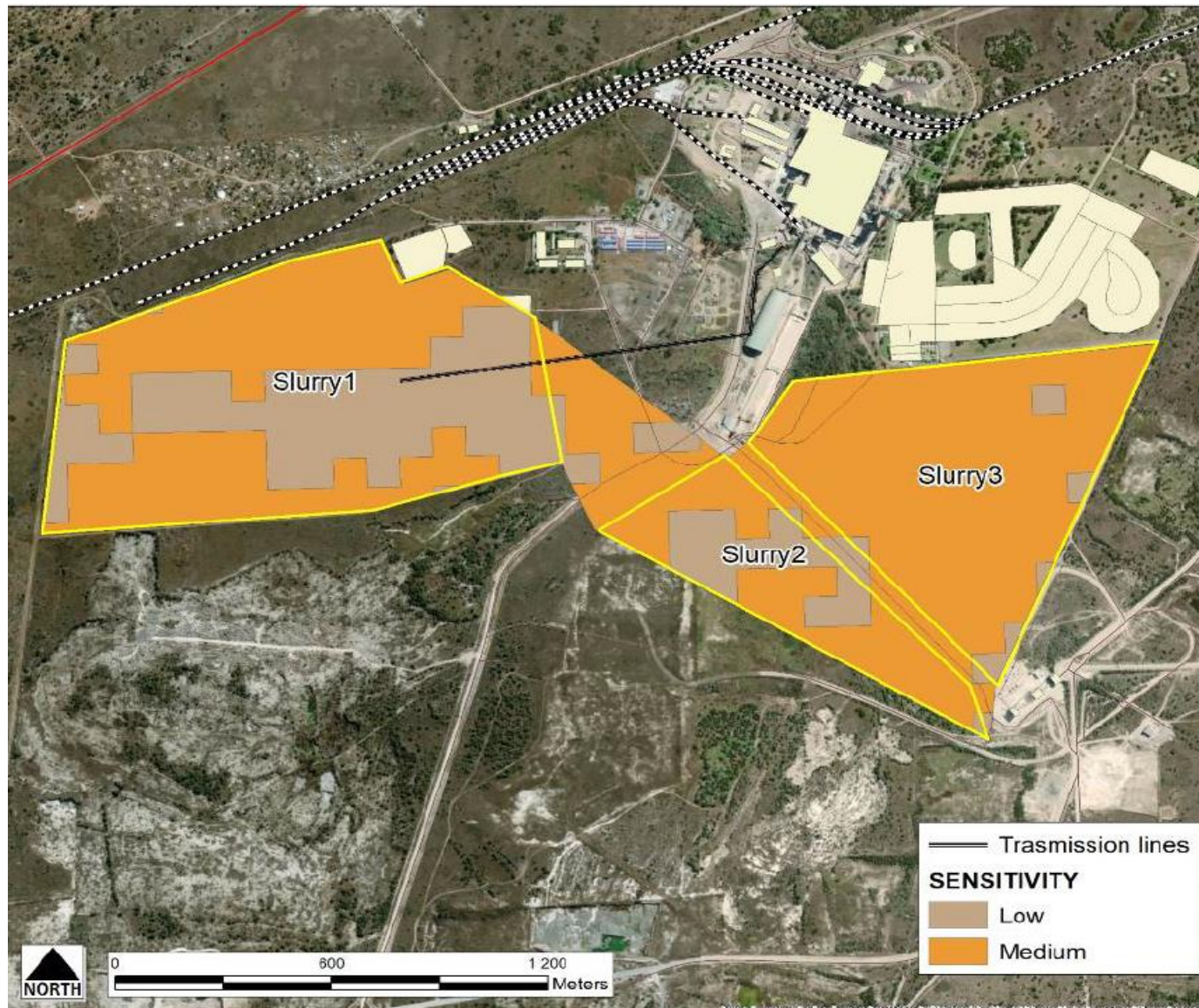


Figure 10.3: Agricultural sensitivity for the PPC Slurry Solar Park

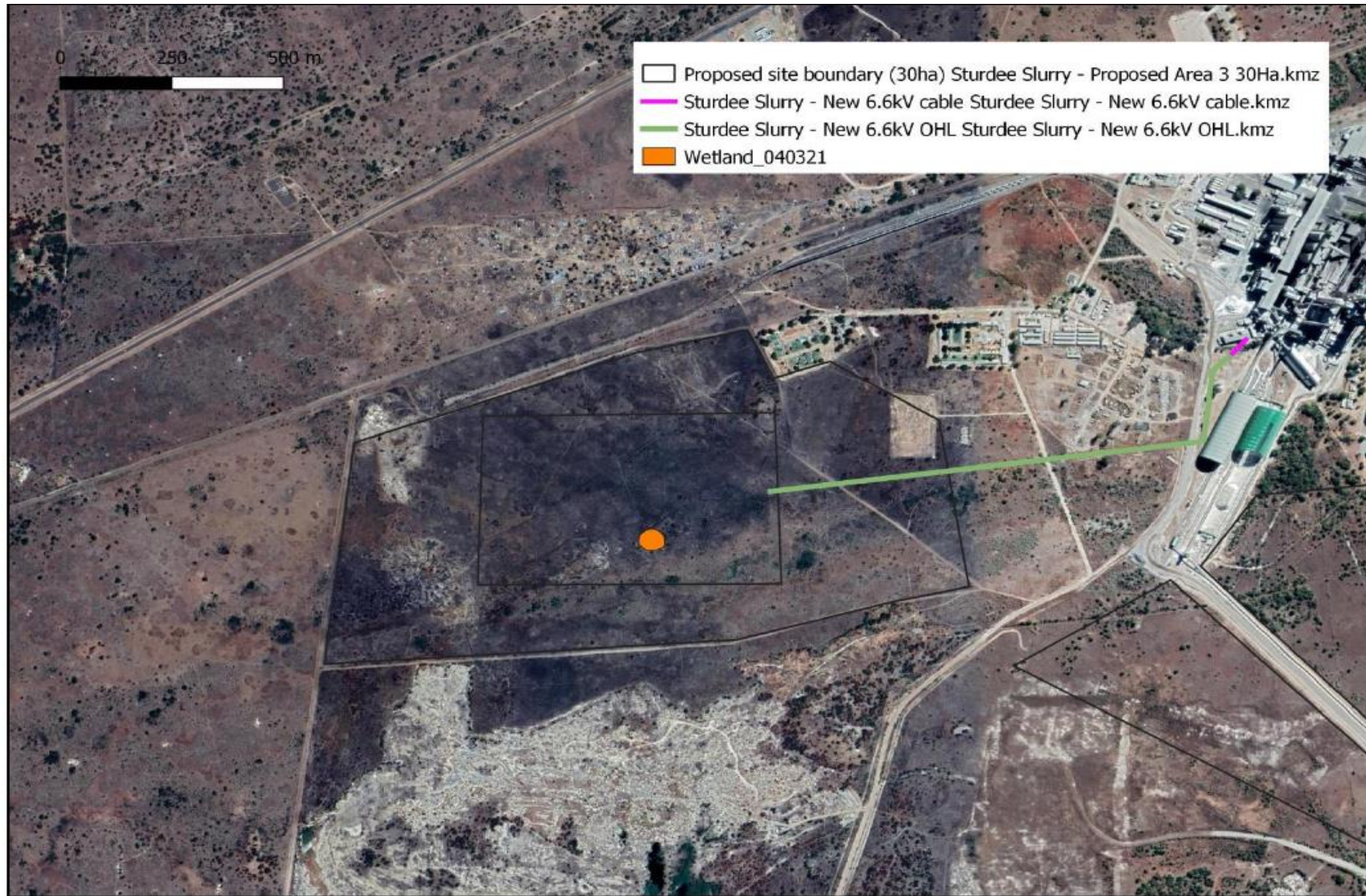


Figure 10.4: Avifaunal Sensitivity for the PPC Slurry Solar Park



11 SUMMARY OF KEY ENVIRONMENTAL FINDINGS

This section provides an overview of the environmental impacts associated with the installation of Solar PV panels at PPC Slurry, North West. Table 11.1 provides an overall summary of the negative (cost) and positive (benefit) environmental impacts associated with the proposed solar park.

Prior to mitigation, the proposed development is anticipated to have 8 impacts of HIGH and 49 of MODERATE negative significance, with 35 LOW and 1 VERY LOW impact of negative significance. Provided that the proposed mitigation measures are implemented and adhered to, the impacts can be reduced to a significance of MODERATE, LOW and VERY LOW.

Importantly eight VERY LOW, LOW and MODERATE positive impacts are anticipated.

Table 11.1: Summary of impacts before and after mitigation across phases.

Theme	Before Mitigation				After Mitigation			
	Very Low	Low	Moderate	High	Very Low	Low	Moderate	High
<i>Environmental policy</i>				-3		-3		
<i>Built environment</i>			-9 (+2)			-9	(+2)	
<i>Socio-economic</i>		+3	-11		-11 (+1)	(+2)		
<i>Rehabilitation and maintenance</i>			-3		-3			
<i>Terrestrial Biodiversity</i>	-1	-13	-21	-5	-7	-24	-9	0
<i>Aquatic Biodiversity and Wetland</i>		-1 (+1)	-9			-10 (+1)		
<i>Avifaunal</i>		-9 (+1)				-9 (+1)		
<i>Agricultural</i>			-2			-2		
<i>Heritage</i>		-4		-1		-4		-1
Total	-1	-35 (+7)	-49 (+2)	-8	-21 (+1)	-61 (+5)	-10 (+2)	-1



12 CONCLUSIONS AND RECOMMENDATIONS

This Chapter of the BAR provides a summary of the findings of the proposed solar plant and a comparative assessment of the positive and negative implications of the proposed project and identified alternatives. In addition, this Chapter provides the EAP's opinion as to whether the activity should or should not be authorised as well as the reason(s) for the opinion.

12.1 DESCRIPTION OF THE PROPOSED ACTIVITY

Sturdee Energy are intending to develop a 10MW solar PV park at the PPC Slurry facility in the Ngaka Modiri Molema DM. The solar park will be developed in 20ha including ancillary infrastructure and connect directly to the PPC electricity distribution network to provide power to their operational facilities.

12.2 ASSUMPTIONS, UNCERTAINTIES AND GAPS

12.2.1 ASSUMPTIONS

The following assumptions have been made during the BA process:

- Vegetation clearance will be kept to a minimum during the construction of the solar plant.

12.2.2 GAPS

No detailed engineering input was provided in this phase of the development. It is general engineering practice that the detailed design phase of a project is only initiated once environmental authorisation for a project (based on what is submitted as preliminary design) is secured. In this regard, the BAR considered industrial norms. This has also provided the EIA process an opportunity to guide the Planning and Design proactively rather than reactively. The Environmental Management Programme (EMPr) should therefore be viewed as a dynamic evolving document that can be adapted to specific needs and design conditions.

If the project is authorised by the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT), Sturdee Energy will be required to provide DEDECT with final layout plans (i.e. panel placement, panel designs, etc.). These plans should be informed by the BA and any other post-authorization studies or surveys as required, e.g. geotechnical investigations, ecological walk-throughs and micro siting adjustments. The final layout requirement will further serve to demonstrate to DEDECT how the relevant environmental standards and management specifications contained in the EMPr, as informed by the site specific environmental context and potential impacts, as well as the relevant conditions of authorisation, will be incorporated in the detailed design process.



12.3 CONSIDERATION OF ALTERNATIVES

12.3.1 LOCATION ALTERNATIVES

Two location alternatives were considered by Sturdee Energy and PPC Cement. The advantages of the preferred site are based on the proximity to the MV switchgear, the flat topography of the site and the ability to contain the solar park in one continuous unit.

12.3.2 TECHNOLOGY ALTERNATIVES

Two technology alternatives were considered by Sturdee Energy and PPC Cement. The preferred option (PV) is more cost effective in this location compared to CSP technology given the area of land available and the proximity to PPC's operations.

12.3.3 LAYOUT ALTERNATIVES

This relates mostly to alternative ways in which the proposed development or activity can be physically laid out on the ground to minimise or reduce environmental risks or impacts. The micro-siting of the facility has been carried out to optimise the footprint and to avoid unnecessary clearance of vegetation.

12.3.4 NO-GO ALTERNATIVE

The No-Go alternative in the context of this project implies that the solar PV plant would not be developed and the current land use would persist. If the project does not proceed the negative impacts such as loss of ecological functionality would be avoided. However, it would also mean that the project would not provide the energy requirements of the PPC facility.

12.4 OPINION OF THE EAP

It is the professional opinion of CES and specialists that:

- **NO FATAL FLAWS** are currently associated with the proposed solar PV installation as all identified impacts can be adequately mitigated to reduce the risk or significance of impacts to an acceptable level, provided mitigation measures recommended in this report are implemented and maintained throughout the life of the project.
- If any changes to these layouts are made, the input of the relevant specialist must be obtained and incorporated into any changes.
- The information in the report is sufficient to allow DEDECT to make an informed decision.

12.5 RECOMMENDATION OF THE EAP AND SPECIALIST

It is the recommendation of CES that the proposed solar park at PPC Slurry should be approved provided that the proposed mitigation measures are implemented and that the EMP is implemented, maintained and adapted to incorporate relevant legislation, standard requirements and audit reporting, throughout the life of the development. The mitigation measures for all impacts identified in the BAR must be incorporated into the EMP and must be used by the engineers during the detailed Planning & Design Phase, by the contractors during the Construction Phase and by Sturdee Energy/PPC during the Operation Phase.



13 APPENDICES

APPENDIX A – MAPS AND PHOTOGRAPHS
APPENDIX B – IMPACT TABLES
APPENDIX C – SPECIALIST IMPACT ASSESSMENT
APPENDIX D – PUBLIC PARTICIPATION PROCESS
APPENDIX E – ENVIRONMENTAL MANAGEMENT PROGRAMME
APPENDIX F – DETAILS AND EXPERIENCE OF THE EAP