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Draft Environmental Impact Report
Lephalale Solar Project

Version – Draft for Public Participation

April 2022

Applicant: K2021699383 (South Africa) Proprietary Limited

GCS Project Number: 21-0037

Client Reference: PR-CLI-001

LDEDET Reference: 12/1 /9/2-W94



GCS (Pty) Ltd. **Reg No:** 2004/000765/07 Est. 1987
Offices: **Johannesburg** (Head Office) | Durban | Gaborone | Lusaka | Maseru | Windhoek | Ostrava
Directors: AC Johnstone (CEO) | A Gunn (COO) | A Wilke | M Van Rooyen | W Sherriff (Financial) | N Marday (HR)
Non-Executive Director: B Wilson-Jones

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Report
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	Name	**Signature**	**Date**
Author	Janice Callaghan		February 2022
Unit Manager	Gerda Bothma		March 2022
Director	Magnus van Rooyen		April 2022

EXECUTIVE SUMMARY

Background

K2021699383 (South Africa) (Pty) LTD (the Applicant) proposes the development of a solar plant that will generate electricity using photovoltaic (PV) panels. The electricity produced will supplement power at the Grootegeluk Coal Mine in Lephalale, Limpopo province. The solar plant will be approximately 256 hectares (ha) in extent and will generate approximately 100MW of power. Upon completion of a site selection process, the farm Appelvlakte 448 was identified as the optimal location for the solar plant.

Project Description

The proposed Lephalale Solar Plant will make provision for the establishment of an array of crystalline solar PV modules grouped into strings of 28 modules and installed to solar tracking mounting structures, together with associated infrastructure; including a perimeter access road, evacuation powerlines, and access road. The solar plant will be approximately 256 hectares (ha) in area and will generate approximately 100MW of power.

Scoping and Environmental Impact Report Process

A S&EIR process has two distinct phases: The Scoping Phase and the Environmental Impact Reporting Phase. The Scoping Phase has been concluded with the acceptance of the Scoping Report by the Competent Authority on the 17th of February 2022.

This Environmental Impact Assessment Report illustrates the risk assessment undertaken of potential biophysical and socio-economic aspects and impacts of the discard dump and slurry void on the receiving environment. This report summarises the risks and findings of various specialist studies undertaken and outlines avoidance, mitigation and management actions which will assist in minimising the impact of the project as far as possible.

The Environmental Impact phase concludes with the submission of a Final Environmental Impact Report to the Competent Authority (CA) for consideration, thereafter the application will be granted or rejected.

Public Participation Process

All interested and affected parties are required to register as stakeholders to enable them to comment during the Public Participation Process (PPP) of the entire project. This PPP provides an opportunity to comment and raise any concerns or suggestions in respect of the project.

As per the requirements of the NEMA EIA Regulations (2014, as amended), the Draft Scoping Report (DSR) was issued for public participation in terms of GNR 326, Regulation 43.

The DSR was available for comment for 30 days from 5 November until 6 December 2021, as stipulated by the NEMA EIA Regulations (2014, as amended).

A Comments and Responses Report (CRR) was compiled to detail the process undertaken to date and updated throughout the process. The CRR will be presented to the authorities as an appendix to this report.

The availability of this Draft Environmental Impact Report (DEIR) will be announced through advertisements, emails and SMS's. The report will be placed at

- Marapong Public Library
  Address: 916 Phukubye St, Marapong
- Lephalale Local Municipality Offices
  Address: Civic Center Onverwacht; Cnr Joe Slovo | Douwater Road
- Lephalale Clinic
  Address: Cnr. Muller & Fox Odendaal Street, Lephalale

Stakeholders are requested to download the report from the GCS website and / or request electronic copies of the report by prior arrangement, should a physical copy be required.

Environmental Impact Statement

The EAP is confident that all major impacts associated with the proposed solar plant has been adequately described and mitigated. It is the opinion of the EAP that the solar plant should be authorised, provided that the proposed mitigation measures are implemented effectively and in line with the EMPr and any site specific conditions outlined within the environmental authorisation. The potential loss of indigenous vegetation and species of conservation importance, as well as the change in the landscape and socio-economic character of the area, will be outweighed by the long-term positive impacts of the proposed solar plant. Based on the findings of the Impact Assessment, the EAP sees no reason why the EA should not be granted for the proposed project to proceed.

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ABBREVIATIONS

Applicant	K2021699383 (South Africa) (Pty) LTD
AQIA	Air Quality Impact Assessment
BESS	Battery energy storage system
BID	Background Information Document
BPEO	Best Practical Environmental Option
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CRR	Comments and Responses Report
CSP	Concentrated Solar Power
DEIR	Draft Environmental Impact Report
DFFE	Department of Fisheries, Forestry and Environment
DFO	Dust Fallout
DSR	Draft Scoping Report
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
FEIR	Final Environmental Impact Report
GCS	GCS Water and Environment (Pty) Ltd
GNR	Government Notice Regulation
GPS	Global Positioning System
ha	hectares
I&APs	Interested and Affected Parties
IBA	Important Bird Area
km	kilometer
kV	Kilo volt
LDEDET	Limpopo Department of Economic Development, Environment and Tourism
m	meter
MAE	Mean Annual Evaporation
MAP	Mean Annual Precipitation
masl	Meters above sea level
mm/yr	Milimeters per year
MW	Mega watt
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEM:PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NGO	Non-Governmental Organisation
NHRA	National Heritage Resources Act, (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PM	Particulate Matter
POS	Plan of Study
POSA	Plants of South Africa
PPP	Public Participation Process
PV	Photovoltaic
S&EIR	Scoping and Environmental Impact
SANBI	South African National Biodiversity Institute
SAWS	South Africa Weather Service
SIA	Social Impact Assessment
SoW	Scope of Work
TIA	Traffic Impact Assessment
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization

VIA	Visual Impact Assessment
WMA	Water Management Area
WUL	Water Use License
WWTP	Waste Water Treatment Plant

STRUCTURE AND CONTENT OF THIS REPORT

The contents of an environmental impact assessment report are required to contain information as outlined in Table 0-1-1 below. These requirements are regulated under Appendix 3, Regulation 28 of GNR 326 (2014, as amended)

Table 0-1-1: Contents of an Environmental Impact Assessment Report

Regulation		Content of Environmental Impact Assessment Report (EIR)	Reference
A3 R3-1 (a)		**Details of:**	See below
	(i)	*The EAP who prepared the report; and*	Section 1.4
	(ii)	*The expertise of the EAP, including a curriculum vitae*	Section 1.4 & Appendix A & B
A3 R3-1 (b)		***The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:***	Section 1.2
	(i)	*the 21 digit Surveyor General code of each cadastral land parcel;*	
	(ii)	*where available, the physical address and farm name; and*	
	(iii)	*where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties*	
A3 R3-1 (c)		***A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is—***	Section 1.2: Fig 1-1 & 1-2
	(i)	*a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;*	
	(ii)	*on land where the property has not been defined, the coordinates within which the activity is to be undertaken;*	
A3 R3-1 (d)		***A description of the scope of the proposed activity, including—***	See below
	(i)	*all listed and specified activities triggered and being applied for; and*	Section 2.2
	(ii)	*a description of the associated structures and infrastructure related to the development;*	Section 4
A3 R3-1 (e)		***A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;***	Section 2.1
A3 R3-1 (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 development footprint within the approved site as contemplated in the accepted scoping report;***	Section 3
A3 R3-1 (g)		***A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;***	Section 5.6
A3 R3-1 (h)		***A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:***	See below
	(i)	*details of the development footprint alternatives considered;*	Section 5
	(ii)	*details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;*	Section 8 & Appendix C
	(iii)	*a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;*	Appendix C1-6
	(iv)	*the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;*	Section 6

	(v)	*the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—* *(aa) can be reversed;* *(bb) may cause irreplaceable loss of resources; and* *(cc) can be avoided, managed or mitigated;*	Section 9.2
	(vi)	*the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;*	Section 9.1
	(vii)	*positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;*	Section 9.2
	(vii)	*the possible mitigation measures that could be applied and level of residual risk;*	Section 9.2 & Appendix G
	(ix)	*if no alternative development footprints for the activity were investigated, the motivation for not considering such; and*	Section 5
	(x)	*a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;*	Section 5.6
A3 R3-1 (i)		***A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including—***	Section 7 & 9
	(i)	*a description of all environmental issues and risks that were identified during the environmental impact assessment 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;*	
A3 R3-1 (j)		***An assessment of each identified potentially significant impact and risk, including—***	Section 9 & Appendix F
	(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 mitigated;*	
A3 R3-1 (k)		***An environmental awareness plan describing the manner in which-***	Appendix G
	(i)	*The applicant intends to inform his or her employees of any environmental risk which may result from their work; and*	
	(ii)	*risks must be dealt with in order to avoid pollution or the degradation of the environment;*	
A3 R3-1 (k)		***Where applicable, a summary of the findings and recommendations of 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 assessment report;***	Section 7
A3 R3-1 (l)		***An environmental impact statement which contains—***	Section 11
	(i)	*a summary of the key findings of the environmental impact assessment:*	
	(ii)	*a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and*	

	(iii)	*a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;*	
A3 R3-1 (m)		***Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;***	Sections 7, 9 & 11
A3 R3-1 (n)		***The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;***	Section 5.6
A3 R3-1 (o)		***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;***	Section 11.4
A3 R3-1 (p)		***A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;***	Section 10
A3 R3-1 (q)		***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;***	Section 11.2
A3 R3-1 (r)		***Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;***	N/A Inclusive of Operational Phase
A3 R3-1 (s)		***An undertaking under oath or affirmation by the EAP in relation to—***	Section 14
	(i)	*the correctness of the information provided in the reports;*	
	(ii)	*the inclusion of comments and inputs from stakeholders and I&APs;*	
	(iii)	*the inclusion of inputs and recommendations from the specialist reports where relevant; and*	
	(iv)	*any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;*	
A3 R3-1 (t)		***Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;***	N/A
A3 R3-1 (u)		***An indication of any deviation from the approved scoping report, including the plan of study, including—***	N/A
	(i)	*any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and*	
	(ii)	*a motivation for the deviation;*	
A3 R3-1 (v)		***Any specific information that may be required by the competent authority; and***	None
A3 R3-1 (w)		***Any other matters required in terms of section 24(4)(a) and (b) of the Act.***	None
A3 R2		***Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report the requirements as indicated in such notice will apply.***	Noted

1 INTRODUCTION

1.1 Introduction to the Proposed Lephalale Solar Project

K2021699383 (South Africa) (Pty) Ltd (the Applicant) proposes the development of a solar plant that will generate electricity using PV panels. The electricity produced will supplement power at the Grootegeluk Coal Mine in Lephalale, Limpopo Province. The solar plant will be approximately 256 hectares (ha) in area and will generate approximately 100MW of power. Upon completion of a site selection process, the farm Appelvlakte 448 was identified as the optimal location for the main part of the solar plant.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the NEMA Environmental Impact Assessment (EIA) Regulations (2014, as amended), a full Scoping and Environmental Impact Report (S&EIR) Process is required for the construction of the proposed Lephalale Solar Project. GCS Water and Environment (Pty) Ltd (GCS) was appointed to undertake the environmental assessment process in order to determine the biophysical, social and economic impacts associated with undertaking the proposed activities.

The project will comprise the following main components (which are discussed in more detail in the Scope of the Project in Section 4 of this Report):

Solar Field:

- Solar PV panels
- Steel support structure and tracker system on concrete foundations
- Inverter stations as part of the PV field
- Transformers, switchgear and related equipment as part of the Substations
- Internal roads

Associated infrastructure:

- Substation complex (33/132 kV) including control rooms and grid control yards.
- Transmission lines and transmission towers
- Battery Energy Storage System
- Operations and Maintenance Buildings
- Borehole and Water Treatment Plant
- Access & Internal roads
- Perimeter fencing & Access Control (Gate & Security Building)

Temporary Infrastructure

- Concrete batching facility
- Temporary offices for the construction period
- Construction yard

- Laydown area

The table below provides a summary of the technical details associated with the proposed solar facility.

Table 1-1: Summary of Technical Details of the Lephalale Solar Facility

Component	Description / Dimensions
Height of PV Panels	<= 5m
Area of PV Array	+-250 ha
Number of Panels and Inverters	To be determines at detailed design phase
Area of Inverter/Transformer stations/substations/BESS	The inverter/transformer stations will be located within the area of the PV array, while the main HV transformers will be located within the substation complex
Voltage of Substation Complex	22kV/132kV or 33kV/132kV
Area of Substation Complex	<= 2 ha
Height of Substation Complex	<= 30m
Area occupied by laydown areas (Permanent and Construction)	<=10 ha
Area occupied by Buildings	< 1 ha for site office and O&M buildings
Length of Access Road	<=4km
Width of Access Road	5m
Length of Internal Roads	<=11km
Width of Internal Roads	4m
Proximity to Grid Connection	+- 4.0km
Height of Grid Connection	<=5m
Height of Perimeter Fencing	<= 3m
Type of Perimeter Fencing	Double fencing with electrification, CCTV cameras with 24-hour monitoring from Control room – details to be finalised in the EPC procurement process

1.2 Project Location

The proposed solar project is located in the Lephalale Local Municipality, Waterberg District, Limpopo Province, South Africa. The proposed solar project is located approximately 15km to the northwest of the town of Lephalale and immediately east of the Exxaro Grootegeluk Coal Mine (refer to Figure 1-1 for the Regional Locality Map).

The solar project is located on the Remaining Extent of Farm Appelvlakte No. 448, which is the property of Exxaro Grootegeluk Coal Mine. Ancillary infrastructure (access road, powerline and substation) is located on the following surrounding farms:

- Remainder of Appelvlakte 448 LQ
- Portion 1 of Appelvlakte 448 LQ
- Daarby 458 LQ
- Portion 1 Nelsonkop 464 LQ
- Enkelbult 462 LQ

The Surveyor-general 21 digit site information for the parent farm for the above properties are provided in the table below:

Property	**SG Code**
Remainder of Appelvlakte 448 LQ	T0LQ0000000044800000
Portion 1 of Appelvlakte 448 LQ	T0LQ00000000044800001
Daarby 458 LQ	T0LQ00000000045800000
Portion 1 Nelsonkop 464 LQ	T0LQ00000000046400001
Enkelbult 462 LQ	T0LQ00000000046200000

The Global Positioning System (GPS) coordinates of the proposed solar plant are provided in the table below.

	Latitude	**Longitude**
Site Centre point	23° 37' 56.95" S	27° 35' 57.79" E
Site Corner points	23° 37' 44.80" S 23° 37' 35.63" S 23° 37' 35.59" S 23° 38' 00.60" S 23° 38' 27.07" S 23° 38' 12.07" S	27° 35' 21.73" E 27° 35' 46.46" E 27° 36' 12.85" E 27° 36' 44.57" E 27° 35' 30.13" E 27° 35' 21.80" E
Access Road Start	23° 38' 56.68" S	27° 33' 52.70" E
Access Road Middle	23° 38' 50.07" S	27° 34' 17.15" E
Access Road End	23° 38' 24.88" S	27° 35' 28.67" E
Powerline Start	23° 39' 16.04" S	27° 34' 16.04" E
Powerline Middle	23° 38' 52.20" S	27° 34' 18.09" E
Powerline End	23° 38' 27.01" S	27° 35' 30.08" E

Figure 1-2 indicates the layout of the proposed PV plant infrastructure and the affected parent farms.

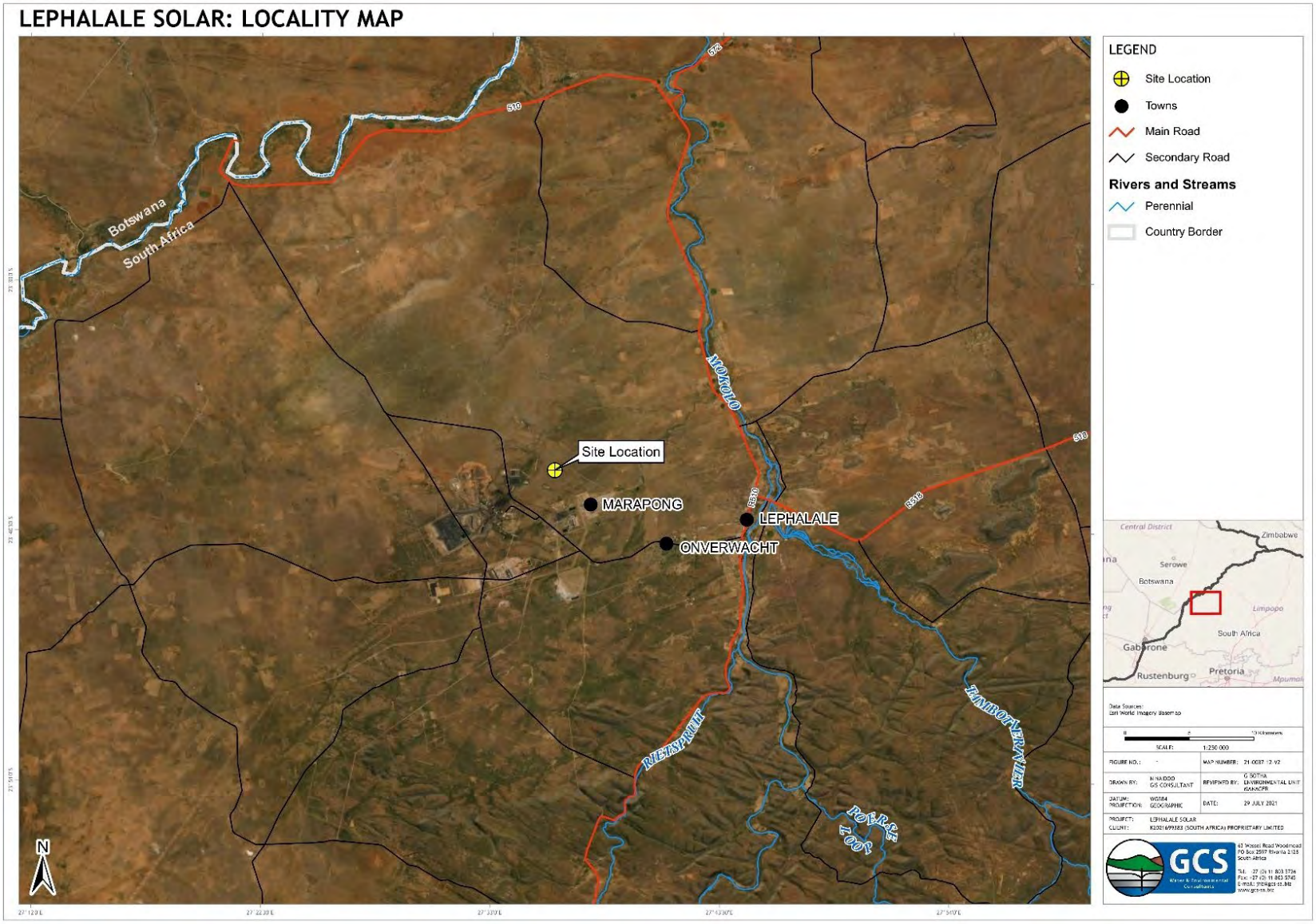


Figure 1-1: Regional Locality of the proposed site

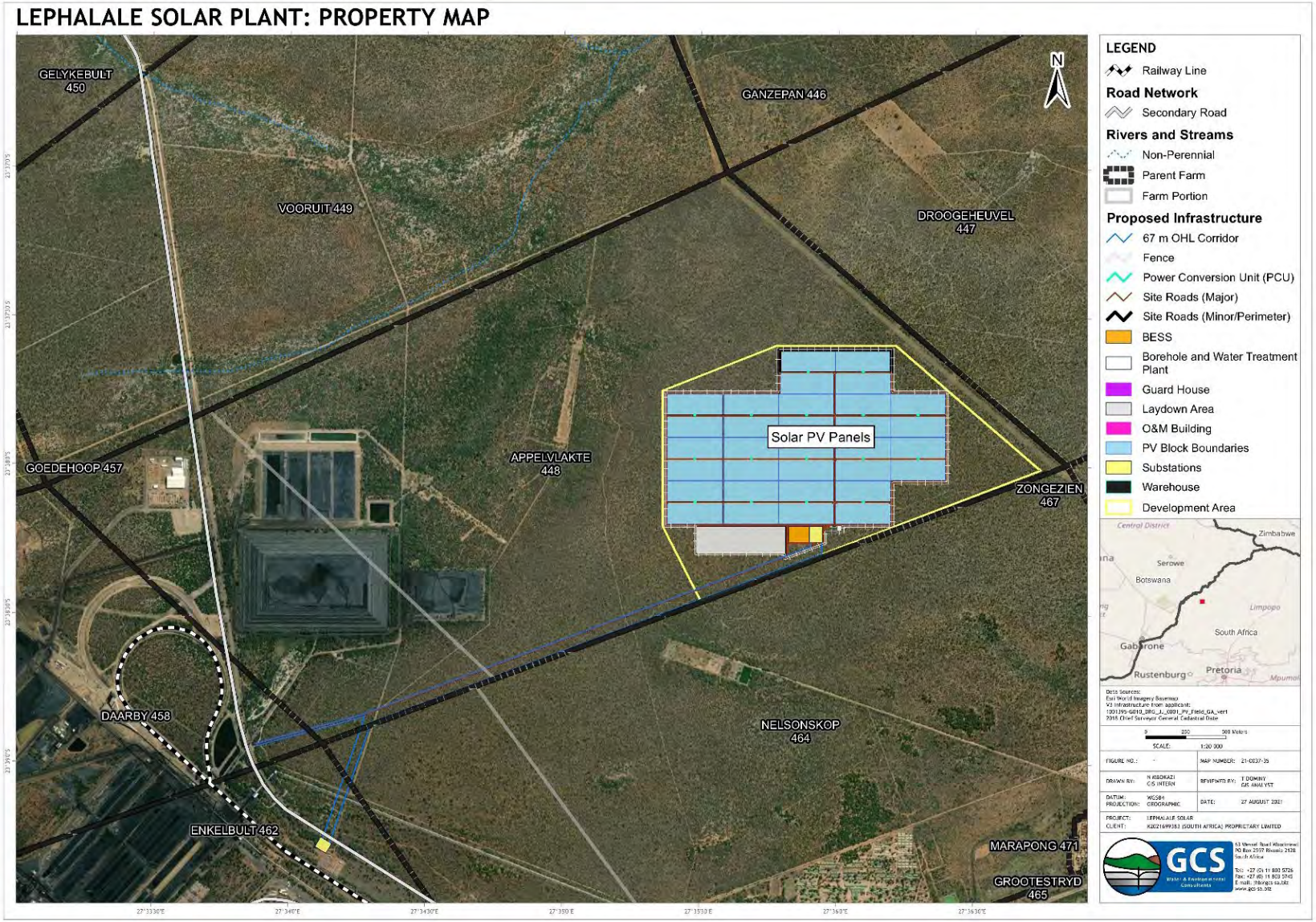


Figure 1-2: Site layout and affected properties

1.3 Details of the Applicant

The details of the applicant are provided in Table 1-2.

Table 1-2: Name and Address of Applicant

ITEM	COMPANY CONTACT DETAILS
Company Name:	K2021699383 (South Africa) Proprietary Limited
Company Representative:	Tracey Achterberg
Telephone No.:	083 609 0183
Facsimile No.:	-
E-mail Address:	Tracey.Achterberg@exxaro.com
Postal Address:	The Connexxion, 263 West Avenue, Die Hoewes, Centurion, 0157

1.4 Details of the EAP

GCS Water and Environment (Pty) Ltd (GCS) have been appointed as the independent Environmental Assessment Practitioners (EAP) to undertake the environmental processes required to obtain approval for the proposed listed activities. The contact details of the EAP are provided in Table 1-3, and the details of the people who helped prepare the report are in Table 1-4.

Table 1-3: Name and address of environmental assessment practitioner.

ITEM	COMPANY CONTACT DETAILS
Company Name:	GCS Water and Environment (Pty) Ltd
Company Representative:	Gerda Bothma
Telephone No.:	+27 (0)11 803 5726
Facsimile No.:	+27 (0)11 803 5745
E-mail Address:	gerdab@gcs-sa.biz
Postal Address:	PO Box 2597, Rivonia, 2128

Table 1-4: Details and expertise of people who helped prepare the report

Name	Education qualifications	Role in the Project	Experience (years)
Magnus van Rooyen	MPhil Pr.Sci.Nat	Technical Director	18
Gerda Bothma	BSc Hons Microbiology Pr.Sci.Nat	Senior EAP, Technical Review, Project Management.	22
Janice Callaghan	BSc Hons Environmental Science Cand.Sci.Nat	EAP, Report Compilation, Public Participation	3.5

The curriculum vitae (CV) of the relevant members of the project team can be found in Appendix A.

1.5 Objectives of the Environmental Impact Assessment Process

In accordance with the Appendix 3 Regulation 2 of GNR. 326 of the NEMA EIA Regulations (2014 as amended) the objective of the environmental impact assessment process is to, through a consultative process: -

- Identify the policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location and layout;
- Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an identification of impacts and risks inclusive of identification of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Discuss the nature, significant consequence, extent, duration and probability of the impacts occurring and the degree to which the impacts can be reversed, cause irreplaceable loss, and whether these can be avoided, managed or mitigated;
- Identify the most ideal location for the activity within the development footprint based on the levels of environmental sensitivity identified through various specialist studies in the assessment phase;
- Identify, assess and rank the impacts the activity will impose on the development footprint throughout its lifetime;
- Identify measures to avoid, manage or mitigate identified impacts; and
- Identify cumulative and residual risks that need to be managed and monitored.

2 LEGISLATIVE CONTEXT

2.1 Legislative Background

The policy and legislative context applicable to the Lephalale Solar project is summarised in Table 2-1 and penalties applicable to non-compliance to the legislation are detailed in Table 2-2.

Table 2-1: Legislation and guidelines applicable to the Lephalale Solar project

LEGISLATION/ GUIDELINES	APPLICABILITY
The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)	All developers are duty-bound to constitutional, legislative, and other measures to prevent pollution and ecological degradation, promote conservation and to develop in a sustainable manner as far as is reasonably possible. The constitutional environmental right elevates the importance of environmental protection and conservation and emphasises the significance that South Africans attach to an environment that is not harmful to their health or well-being.
Environmental Conservation Act (73 of 1989) (ECA), as amended	The ECA has now largely been replaced by the NEMA but certain provisions remain in force. Section 21 of the ECA relates to the control of activities that may have a detrimental effect on the environment, which require written authorization issued by the relevant authority. The national Noise Control Regulations (NCR) (GN R154 in Government Gazette No. 13717 dated 10 January 1992) (NCR) were promulgated In terms of Section 25 of the ECA, relating to noise, vibration and shock. The NCRs were revised under Government Notice Number R55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	NEMA provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by State Departments and to provide for matters connected therewith. These principles serve as guiding principles for a project and they are binding, enforceable and justiciable. In terms of the EIA Regulations of 2014 (as amended in 2017) published in terms of NEMA, an Application for Environmental Authorisation (EA) for listed activities is required to be submitted to either the Provincial Environmental Competent Authority, or the National Competent Authority.
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	This Act includes the use and protection of land, soil, wetlands and vegetation and the control of weeds and invader plants. In the regulations published in 1984 under the Act, which declared approximately 50 plant species as "weeds" or "invader plants". This list was further expanded on 30 March 2001 to now contain a comprehensive list of declared weed and invader plant species.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)	The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. This Act is applicable to this application for EA, in the sense that it requires the project applicant to consider the protection and management of local biodiversity.

LEGISLATION/ GUIDELINES	APPLICABILITY
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	The Act focuses on the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural land-and seascapes. The Act addresses inter alia: • The protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural land- and seascapes; • The establishment of a national register of all national, provincial and local protected areas; • The management of those areas in accordance with national standards; and • Inter-governmental co-operation and public consultation in matters concerning protected areas.
National Veld and Forest Fire Act (Act No. 101 of 1998)	The purpose of the Act is to prevent and combat veld fires in the country. The Act was amended by the National Forest and Fire Laws Amendment Act (Act No. 12 of 2001)
National Forests Act (Act No. 84 of 1998)	An objective of the Act is to provide special measures for the protection of certain forest and tree species, and to promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. In terms of Section 15(1) of the Act, forest trees or Protected Tree Species may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold – except under license granted by the relevant authority. Government Notice 44204 of 2021 provides the latest List of Protected Tree Species within the borders of South Africa.
National Water Act, 1998 (Act No. 36 of 1998) (NWA)	The NWA is the primary legislation regulating both the use of water and the pollution of water resources. A person can only be entitled to use water if the use is permissible under the Act. Water Use is defined broadly and must be licensed unless it is listed in Schedule 1 as an existing water use or is permissible under general authorization.
The National Heritage Resources Act, (Act No. 25 of 1999) (NHRA)	NHRA governs the management of heritage resources which are of cultural significance. The South African Heritage Resources Agency (SAHRA) is the national body responsible for the protection of South Africa's cultural heritage resources.
Limpopo Environmental Management Act (Act No. 7 of 2003)	This Act provides the lists for Protected and Specifically Protected Species under Schedule 2, 3 and 12 as well as the stipulation for permit application to remove these species. In addition, it gives protection measures for the terrestrial and aquatic biota and systems. Schedule 9 lists aquatic plant species that are prohibited in the province.
Limpopo Conservation Plan version 2, 2013	This conservation plan is consistent with the principles of national legislation and is designed to support integrated development planning and sustainable development by identifying an efficient set of Critical Biodiversity Area (CBAs) and Environmental Support Areas (ESAs) that are required to meet national and provincial biodiversity objectives, in a configuration that is least conflicting with other land uses and activities.

LEGISLATION/ GUIDELINES	APPLICABILITY
Limpopo Environmental Outlook Report, 2016 (LEO)	The LEO Report provides a moment to take stock of and assess the current state or condition of the environment, in general, and environmental resources, in particular. It identifies and assesses environmental issues and challenges, determines the condition and trends, and identifies priority environmental challenges and trends in resource use. It evaluates the effectiveness of environmental policies, strategies, plans, programmes, projects and actions that are in place. It also looks into the future and presents appropriate responses to improve the status quo. It highlights how a range of interrelated measures may either enhance or undermine the environmental resilience of Limpopo.
Waterberg Environmental Management Plan, 2006	This management plan provides for the protection of the environment and describes how activities that have, or could have, and adverse impact on the environment, should be managed, mitigated, controlled and monitored. The management plan is a coarse-scale planning tool that outlines strategic objectives for environmental management. All new developments in the Waterberg District Municipality should be aligned with these environmental management objectives.
Draft Environmental Management Framework for the Waterberg district, 2010	The aim of the Environmental Management Framework (EMF) is to support decision making in the Waterberg District Municipality area in order to facilitate appropriate and sustainable development. The EMF integrates policies and frameworks and aligns government mandates to streamline decision-making and to improve cooperative governance. The EMF has a number of specific objectives, which include identifying the status quo, development pressures and trends in the area and development of a decision support system for development in the area to ensure that environmental attributes, issues and priorities are taken into account.
Lephalale Draft Spatial Development Framework, 2017	The spatial development framework was compiled by the Lephalale Municipality with the purpose of guiding the form and location of future physical development within the municipal area in order to address imbalances of the past. The plan identifies environmentally sensitive areas (e.g. mountain ridges, riverine environments, etc.) and makes recommendations regarding proposed developments in these areas.

Table 2-2: Penalties applicable to non-compliances under the legislation tabulated above

LEGISLATION	SECTION	FINE
NEMA	Section 49A (1) (a), (b), (c), (d), (e), (f) and (g)	Fine not exceeding R 10 million or imprisonment for a period not exceeding 10 years, or both such fine and such imprisonment.
	Section 49A (1) (i), (j) or (k)	Fine not exceeding R 5 million, or imprisonment for a period not exceeding 5 years. In the case of a second or subsequent conviction: fine not exceeding R 10 million, or to imprisonment for a period not exceeding 10 years. Or in both instances to both such fine and such imprisonment.

LEGISLATION	SECTION	FINE
	Section 49A (1) (h), (l), (m), (n) (o) or (p)	Fine or imprisonment for a period not exceeding one year, or to both a fine and such imprisonment.
NWA	Section 15 and Item 31 of Schedule 4	First conviction: Fine or imprisonment for a period not exceeding 5 years, or both a fine and such imprisonment. Second or subsequent conviction: Fine or imprisonment for a period not exceeding 10 years, or both a fine and such imprisonment.
NEM: WA	Section 67 (1) (a), (g) or (h)	Fine not exceeding R 10 million or imprisonment for a period not exceeding 10 years, or both such fine and such imprisonment, in addition to other penalties that may be imposed in terms of NEMA.
	Section 67 (1) (b), (c), (d), (e), (f), (i), (j), (k) or (l), and Section 67 (2) (a), (b), (c), (d) or (e)	Fine not exceeding R 5 million or imprisonment for a period not exceeding 5 years, or both such fine and such imprisonment, in addition to other penalties that may be imposed in terms of NEMA.
	Section 67 (1) (m)	Fine or imprisonment for a period not exceeding 6 months or both a fine and such imprisonment.

2.2 Listed and Specified Activities

The Lephalale Solar project triggers listed activities in terms of the NEMA, as contained in the amended 2014 EIA Regulations (as amended). The activities which trigger this application are detailed in Table 2-3. and require that a S&EIR process is followed in order to obtain the necessary EA in terms of the NEMA.

Table 2-3: NEMA Listed Activities triggered by the Lephalale Solar project

LISTING NOTICE	ACTIVITY NO	ACTIVITY DESCRIPTION	PROJECT ACTIVITY WHICH TRIGGERS THE LISTED ACTIVITY:
1	11	*The development of facilities or infrastructure for the transmission and distribution of electricity—* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or* *(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more;* *excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is —* *(a) temporarily required to allow for maintenance of existing infrastructure;* *(b) 2 kilometres or shorter in length;* *(c) within an existing transmission line servitude; and* *(d) will be removed within 18 months of the commencement of development.*	• The construction of a 33/132kV substation complex including control rooms and grid control yards; ≤1 ha in extent. • The construction of a 132kV transmission line of ±4 km in length. • Upgrading the existing Grootegeluk substation complex.
1	24	*The development of a road—* *(i) [a road] for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or* *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;* *but excluding a road—* *(a) [roads] which [are] is identified and included in activity 27 in Listing Notice 2 of 2014;* *(b) [roads] where the entire road falls within an urban area; or* *(c) which is 1 kilometre or shorter.*	• The construction of ≤15 km long, ≤8 m wide gravel access road running from the main Lephalale road to the site. • The construction of ≤10 km of ≤4 m wide gravel internal service roads within the plant boundary.

LISTING NOTICE	ACTIVITY NO	ACTIVITY DESCRIPTION	PROJECT ACTIVITY WHICH TRIGGERS THE LISTED ACTIVITY:
2	1	*The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs —* *(a) within an urban area; or* *(b) on existing infrastructure.*	The construction of ±256ha Single Axis Tracker Photovoltaic Solar field; including solar module mounting structures comprised of galvanised steel and aluminium; electrical cables connecting the PV arrays to the inverter stations; access & internal roads; operations & maintenance area; collector substation; & Inverter / MV transformer stations; evacuation powerlines; battery storage facility.
2	4	*The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.*	The construction of a 100MWh Battery Energy Storage Facility with container heights of 5m (with lightning masts of 20m) and a volume of 2,700m^3 of batteries and associated operational, safety and control infrastructure.
2	15	*The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.*	The proposed activity footprint is approximately 256ha in total extent, as such, the clearance of potentially indigenous vegetation for the construction of the proposed Lephalale Solar Project will exceed 20ha.

3 MOTIVATION, NEED AND DESIRABILITY

3.1 Project Motivation

Private electricity generation is becoming more feasible, reinforced when President Cyril Ramaphosa announced on 10th June 2021 that government will lift the threshold for embedded generating electricity capacity from 1 MW to 100 MW, allowing households and businesses to privately build much bigger self-generating power facilities.

The Lephalale Solar Project proposes to take advantage of the option to supplement the electricity required and purchased by the Grootegeluk Coal Mine from Eskom, through the self-generation of electricity from the solar energy resource. This opportunity leverages the potential cost savings of such supplementary supply, while taking advantage of the reduced carbon footprint of the renewable nature of the technology.

3.2 Need and Desirability

In accordance with the EIA Regulations, the need and desirability of the solar plant has been considered while taking the strategic concept, broader societal needs and public interest into account. The tables below (Table 3-6 and Table 3-7) provide answers to a number of guiding questions as posed in the Department of Environmental Affairs' Guideline on Need and Desirability (DEA, 2017).

The answers provided below indicate that ample consideration has been given to the need and desirability of the project.

Table 3-1: Assessment of the Lephalale Solar Project in terms of securing ecological sustainable development and use of natural resources

HOW WILL THIS DEVELOPMENT (AND ITS SEPARATE ELEMENTS/ASPECTS) IMPACT ON THE ECOLOGICAL INTEGRITY OF THE AREA?		
No.	**Question**	**Answer**
1.1	How were the following considerations taken into account: • Threatened ecosystems; • Sensitive, vulnerable, highly dynamic or stressed ecosystems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure; • CBAs and ESAs; • Conservation targets; • Ecological drivers of the ecosystem; • Environmental Management Framework; • Spatial Development Framework; and • Global and international responsibilities relating to the environment.	The EIA process included detailed ecological and wetland studies, which took into account all ecological and environmental considerations. Due diligence was observed while undertaking the EIA to ensure that the process was in line with the proposed Environmental Management Programme, the area's SDF and relevant guidelines.
1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	This development will take place in an area previously disturbed and largely characterised by mining activities, providing supporting infrastructure to the mining environment in the form of renewable energy, influencing the overall carbon footprint of the activities positively. Implementation of the EMPr will ensure that negative impacts are avoided, managed, and mitigated as far as possible.
1.3	How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The development will result in the permanent and moderately irreversible transformation of the vegetation on the site. The process will involve vegetation clearing, excavations and bulk earthworks for the development. Several alternatives were explored for this development, with the proposed preferred alternative being the best strategy.-Implementation of the EMPr will ensure that negative impacts are avoided, managed, and mitigated as far as possible.
1.4	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	Waste generated during the construction phase will be mainly packaging, general construction and domestic waste; however, the majority of waste produced during operation is domestic waste. Waste generated on site will be sorted and separated into appropriate containers and or prepared areas. All waste will be collected and

		transported to licensed waste disposal sites through contracts with registered waste companies. The waste may not necessarily be stored on site during the operational phase.
1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	A change in the visual landscape to some extent, keeping in mind the existing mining and industrial activities within the area. The change of visual character of the study area within 5 Km of the site is also expected during the construction phase. The presence of cultural heritage artefacts was investigated in the Heritage Impact Assessment in order to plan the development around them- any that could not be avoided will be protected. This will also be covered by the implementation of the EMPr.
1.6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	This development do not have any impact on non-renewable resources, it is however contributing to the environment by providing energy to the industry through alternative power generation methodologies utilising renewable resources.
1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? • Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life); • Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?);	Please refer to the above.

	• Do the proposed location, type and scale of development promote a reduced dependency on resources?	
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts? • What are the limits of current knowledge? • What is the level of risk associated with the limits of current knowledge? • Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	The impacts on ecology were thoroughly investigated in the Ecological Impact Assessment. Gaps/limits/assumptions are discussed in Section 10. It is unlikely that any gaps/limitations/assumptions will result in a large increase in the risk.
1.9	How will the ecological impacts resulting from this development impact on people's environmental right in terms following: • Negative impacts: e.g. access to resources, opportunity costs, loss of amenity, air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? • Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	A comprehensive suite of specialist studies were undertaken to investigate the impacts of the solar plant on the environmental rights of the community. • The development is likely to have limited impacts in terms of land use and capability, biodiversity, air and water quality, noise, social and visual. The implementation of the EMPr will assist in minimising or managing any impacts as far as possible. • The development, a renewable (solar) energy production plant, will contribute to renewable energy goals and GHG reduction.
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	Human wellbeing in the area is mainly linked to air quality and water quality. Should the development negatively impact either of these factors, this may result in linked socio-economic impacts. However, the development is a renewable energy production plant which would have limited impacts on human wellbeing due to its nature and location.
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	It is anticipated that the proposed development will have limited negative *as well as* some positive impact on the environment as a whole, being a renewable resource energy generation plant. Limited negative impacts on the ecological integrity is expected as a result of the establishment of the development and conversely positive impacts based on the development's potential contribution to renewable energy goals and GHG reduction.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	The option that was identified as the best site (through the Site Selection Study) and most appropriate type of renewable energy generation was chosen due to its proximity to the Grootegeluk Coal Mine to which the project will mainly be supplying the electricity generated and specific requirements of different renewable energy methodologies available (lack of large water bodies and low mean wind speed).

1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Positive: • Limited potential contribution to the reduction in Grootegeluk Coal Mine's utilisation of non-renewable energy sources • Limited potential contribution to renewable energy goals and GHG reduction Negative: • During both Unmitigated and Mitigated scenarios in construction, cumulative dust fallout concentrations are below the respective residential standard • Based on predicted cumulative concentrations, construction impacts from the Solar PV facility are likely to be minimal, as the impacts are transient, and concentrations predicted are well below the respective NDCR • Loss of indigenous vegetation from the study site • Proliferation of alien invasive vegetation • The project may result in a disruption of the current open space corridor used by the species that occur on the site as well as the surrounding properties

Table 3-2: Assessment of the Lephalale Solar Project in terms of promoting justifiable economic and social development

No.	Question	Answer
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations: • The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area, • Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.), • Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and • Municipal Economic Development Strategy ("LED Strategy").	The economy of the province, as well as the district and local municipalities, is largely based on mining, agriculture and tourism. The effects of the mining and energy generation activities can clearly be seen in the relatively low unemployment figures of Lephalale (5% (Draft Lephalale SDF, 2017). Lephalale and surrounds have undergone extensive transformation and although the project will contribute towards this transformation, this will be at an insignificant level, as the project falls within what is already an industrialised area with Grootegeluk Coal Mine, Matimba and Medupi power stations and associated infrastructure all within close proximity. Thus, the development is in line with the IDP and other spatial priorities.

2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? • Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The development of the solar facility is congruent with the LED initiatives, however, it is not envisaged that there will be significant contribution towards such initiatives due to the scale of the development.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	The EIA process included a suite of detailed specialist assessments, including an Ecological Impact Assessment, Visual Assessment, Wetland Assessment, Soil Assessment, Ground- and Surface Water Assessment, Socio-Economic Impact Assessment, Heritage Assessment, Air Quality Impact Assessment and Traffic Impact Assessment. These were undertaken to assist in quantifying the impact of the project on the socio-economic environment surrounding the development. It has been concluded that, due to the scale and nature of the proposed development, the contribution towards addressing specific needs and interests of the local communities will be limited and temporary.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	The development will likely require minimal additional staff due to the nature of the operational requirements of the development, thus the impacts will be minimal.
2.5	In terms of location, describe how the placement of the proposed development will: • result in the creation of residential and employment opportunities in close proximity to or integrated with each other, • reduce the need for transport of people and goods, • result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport), • compliment other uses in the area, • be in line with the planning for the area, • for urban related development, make use of underutilised land available with the urban edge, • optimise the use of existing resources and infrastructure, • opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement), • discourage "urban sprawl" and contribute to compaction/densification,	Due to the specific nature and scale of the development, it is likely that the potential impacts (negative or positive) to the socio-economic character of the area, will be minimal. Limited, temporary employment opportunities would be available during the construction and operational phases of the development. The project will occur on mine- or private-owned land with appropriate lease agreements in pace, and thus will have negligible impacts on the layout of any settlements nearby.

	• contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs, • encourage environmentally sustainable land development practices and processes, • take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.), • the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential), • impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and • in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	
2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts? • What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? • What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge? • Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	A Socio-Economic Impact Assessment was undertaken as part of the EIA process. Gaps noted by the specialists are discussed in Section 10. Mitigation measures for any socio-economic issues are briefly discussed under Section 9 and noted in further detail in the EMPr. Additional risk is minimal due to the nature and scale of the development.
2.7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following: • Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? • Positive impacts. What measures were taken to enhance positive impacts?	Positive impacts on the social environment related to the construction phase are anticipated to include limited and temporary job creation and associated restricted local economic growth. The compilation and implementation of a site specific strategy to manage procurement during the construction phase will assist in securing the positive nature of impact of the project. Negative impacts on the social environment related to the construction phase are anticipated to include an increase in annoyance and nuisance related aspects, an influx of construction workers and the associated increase in crime, and an increase in the exposure to health and well-being hazards. Additionally, it is expected that daily living pattens and social and community infrastructure may be disrupted.

		Implementation of the EMPr will however ensure that negative impacts are avoided, managed and mitigated as far as possible.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Due to the nature and scale of the development, no resulting ecological impacts are envisaged.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Various alternatives, as required in terms of the 2014 EIA Regulations, were investigated prior to the commencement of the application process. Please refer to Section 5.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	An extensive public participation process guided the development of the Environmental Impact Report and EMPr. All relevant stakeholders were invited to provide comments and suggestions. The evaluation of alternatives culminated in the best practicable environmental option for the proposed development, no further alternatives need to be investigated.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	An extensive public participation process guided the development of the Environmental Impact Report and EMPr. All relevant impacted communities were invited to provide comments and suggestions.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	The EIA process and EMPr take all stages of the development's life cycle into account and impacts specific to each phase are addressed accordingly.
2.13	What measures were taken to: • ensure the participation of all interested and affected parties, • provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, • ensure participation by vulnerable and disadvantaged persons, • promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means, • ensure openness and transparency, and access to information in terms of the process, • ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and	An extensive public participation process was undertaken as part of the EIA process. All interested or affected stakeholders were invited to provide comments and suggestions. Notices of the development were relayed in several different formats. Refer to Section 8.

	• ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was promoted?	
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	Due to the localised nature and extent of the proposed development, intricate opportunities for different community sectors are not envisaged.
2.15	What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	The proponent will undertake all activities under the guidance of the country's labour, employment and health/safety laws. The EMPr will further provide guidance for various measures that must be implemented to ensure that employees are not subjected to adverse health conditions or dangers without the correct training, equipment and supervision.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects: • the number of temporary versus permanent jobs that will be created, • whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area), • the distance from where labourers will have to travel, • the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and • the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	These aspects have been taken into consideration in the detailed economic development strategy in line with the procurement strategy of the project.
2.17	What measures were taken to ensure: • that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and • that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	The public participation process invited comment and input from all levels of governance relevant to the development- including local municipalities and relevant government departments.
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	An intensive environmental impact process has been undertaken, including investigation into biophysical, socio-economic and human well-being factors, to ensure that the environment is protected as far as possible.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	The EMPr includes implementable and realistic mitigation measures which will allow for impacts to be mitigated and managed as far as possible. The solar facility will remain in place for the foreseeable future, however,

		rehabilitation measures will ensure that the legacy is minimised as far as possible.
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	The proponent will make financial provision based on its duty of care in accordance with accepted financial reporting and accounting standards.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The Site Selection report considered all relevant factors when assessing the various options available for the project. Refer to Section 5 for the alternative identification process followed for the EIA process.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Cumulative impacts include: • Limited potential contribution to the reduction in Grootegeluk Coal Mine's utilisation of non-renewable energy sources • Limited potential contribution to renewable energy goals and GHG reduction • During both Unmitigated and Mitigated scenarios in construction, cumulative dust fallout concentrations are below the respective residential standard • Based on predicted cumulative concentrations, construction impacts from the Solar PV facility are likely to be minimal, as the impacts are transient, and concentrations predicted are well below the respective NDCR • Loss of indigenous vegetation from the study site • Proliferation of alien invasive vegetation • The project may result in a disruption of the current open space corridor used by the species that occur on the site as well as the surrounding properties

4 9.2SCOPE OF THE PROJECT

4.1 Key Components of the proposed Lephalale Solar Project

The proposed project will make use of solar PV technology to generate electricity from the sun's energy. The project will comprise the following main components (which are discussed in more detail below):

Solar Field:

- Solar PV panels
- Steel support structure and tracker system on concrete foundations
- Inverter stations as part of the PV field
- Transformers, switchgear and related equipment as part of the Substations
- Internal roads

Associated infrastructure:

- Substation complex (33/132 kV) including control rooms and grid control yards.
- Transmission lines and transmission towers
- Battery Energy Storage System
- Operations and Maintenance Buildings
- Borehole and Water Treatment Plant
- Access & Internal roads
- Perimeter fencing & Access Control (Gate & Security Building)

Temporary Infrastructure

- Concrete batching facility
- Temporary offices for the construction period
- Construction yard
- Laydown area

4.2 Project Description

The PV solar plant will include an array of crystalline solar PV modules grouped into strings of 28 modules and installed to solar tracking mounting structures, together with associated infrastructure for the generation of 100MW of electricity. The PV tables will form and array

covering an area of approximately 236ha, surrounded by a perimeter access road and fence. Provision will be made for approximately 4km long evacuation powerlines that will follow a 67m wide corridor along the southern boundary of the fence line of the Appelvlakte Farm No. 448. This corridor will have a surface area of approximately 25ha and will contain the main access road to the facility. The combined land requirement for the project therefore is approximately 256ha.

The PV tables will be raised approximately 1.5m above natural ground level and will make provision for a single axis tracking system allowing maximization of solar energy harvesting for conversion to electrical energy. Similar solar PV arrays are depicted in Figure 2-1 below.

Figure 4-1: Single axis solar PV module tables raised 1.5m above ground level (to a maximum tilt height of 3m)

The proposed associated infrastructure includes a fenced construction staging/lay-down area (a portion of which will form the operational lay-down area), inverter-transformer stations on concrete pads, a battery energy storage system (BESS) adjacent to the substation platform, office buildings with ablutions, maintenance shed/s and a substation for connection to the power grid, all within the 236ha PV plant site.

It is proposed that the 33kV powerlines within the facility be underground/sub-surface. The 33kV powerlines will feed into a proposed tie-in substation to convert the electricity from 132kV to the existing Eskom/Grootegeluk Main 33kV Substation will occur via 132kV overhead powerlines. The Grootegeluk 33 kV substation is located approximately 4km south-west of the proposed development site.

4.3 The Solar Field

The solar panels are composed of several solar cells containing a photovoltaic material which produce direct current electric power when exposed to solar radiation. The solar cells are interconnected and encapsulated between a transparent front (usually glass) and a backing material to form a solar panel. Typically, the photovoltaic material is Crystalline Silicon, however other viable options such as Cadmium Telluride and Copper indium gallium selenide are also available. The most recent advancements in bifacial technology are becoming an industry standard for utility-scale solar PV. The final technology that will be used for the Lephalale Solar facility will be determined during the detailed engineering phase which would commence after receipt of an EA from the competent authority.

The two options of mounting structure which were considered by the applicant are fixed mounting and tracking mounting structures. Typically, in a tracking system, the panels are mounted on a steel rack and a tracking motor is placed at the end of the array to control the tilt and movement of the panel as required to track the sun. The mounting structure influences the exposure of the photovoltaic panels to sunlight with single axis tracking systems, dual axis tracking systems, and fixed tilt mounting structure. Based on the findings of the scoping phase and to ensure the most optimal use of solar energy to generate electricity, the use of tracking photovoltaic panel arrays is the preferred option for the proposed development.

The photovoltaic panels will be installed to the mounting structures and will have a height of up to 4 m above ground level at maximum tilt. The mounting structures are founded into the ground through either concrete foundations or screw or pile foundations. The photovoltaic panels will be connected to each other in strings and the strings connected to inverter stations by low voltage underground direct current cables. Power from the inverter will be transformed from low to medium voltage (22 or 33 kV) at the medium voltage transformers. Power from the inverters is collected in medium voltage transformers through alternating current cables, which may be buried or pole-mounted depending on voltage level and site conditions. The electric power is then transported to a proposed 22/132 kV or 33/132 kV onsite substation complex, via medium voltage underground cables (22 or 33 kV). Cables and trenches required for underground cables will remain along internal roads and already disturbed areas as far as possible.

4.4 Associated Infrastructure

4.4.1 Substation Complex

The onsite substations complex will cover an area of approximately 2ha with a maximum height of 30m. It is constructed to receive, convert and step up the electricity generated by the PV facility to a grid suitable power supply. The onsite substation complex will include transformers, measurements equipment, feeder bay, control rooms and grid control yards for the IPP/Owner (housing unit to control switch gears in the form of a concrete single storey building). The onsite substation complex will be divided into a medium and high voltage sides. The medium voltage side of the onsite substation complex contains collection, transformation (i.e., 22 or 33kV to 132kV) and measurement equipment. The high voltage side contains mainly measurement equipment and connection to the 132kV transmission line. In this report, the medium voltage side of the onsite substation complex is referred to as a "collector substation" as it collects and transforms the power produced by the solar PV facility and the high voltage side of the onsite substation complex is referred to as "switching substation" as it acts as a switch to evacuate the electricity into the 132kV transmission line. The approximate 4km 132KV transmission line will connect the Lephalale Solar plant via another switching substation to the Grootegeluk Coal Mine 33 KV substation. This switching substation will be located next to the existing Grootegeluk Coal Mine's substation. In this switching Substation the voltage will be stepped down from 132kV High Voltage to 33kV Medium Voltage from where it will be connected to the Grootegeluk Coal Mine substation. Where required, stormwater infrastructure will be constructed on the site and other switching substations to ensure that stormwater run-off from the site is appropriately managed. The location of the onsite substation complex is represented in Figure 1-2. It is however recommended that a development envelope is approved to allow for the micro-sitting of the associated infrastructure during the detailed engineering phase of the project (i.e., post EA).

4.4.2 Transmission Line

The power will be transmitted from the onsite substation complex into the Grootegeluk Substation via a 132kV overhead transmission line. The route for the transmission line only traverses Exxaro owned land as indicated in Figure 1-2.

4.4.3 Battery Energy Storage System

The applicant proposes to install a battery storage facility, at some point in time, of approximately 100 megawatt-hour (MWh) for storage of the electricity generated from solar energy resources in the grid which includes batteries and associated operational, safety and control infrastructure.

The battery storage system allows to balance the supply and demand of electrical energy during the day and uses the stored energy during peak demand periods (typically in the mornings and evenings).

This facility will be set up in a series of containers / buildings, with a maximum height of 5m (excluding lightning masts) and will cover an area of approximately 2ha. The battery storage facility will house an encapsulated battery solution with associated operational, safety and control infrastructure. The associated operational, safety and control infrastructure comprises the monitoring units and the plant controller. The battery storage facility will be constructed next to the onsite substation complex as illustrated in Figure 1-2. It is however recommended that a development envelope is approved to allow for the micro-sitting of the associated infrastructure during the detailed engineering phase of the project (i.e., post EA).

4.4.4 Operations and Maintenance Buildings

Additional building infrastructure is required to support the functioning of the facility and provide services to personnel that will operate and maintain the facility. These operations and maintenance (O&M) buildings, of approximately 1ha in size will be located next to the onsite substation complex and will include:

- Workshops;
- Small storage areas for materials and spare parts for use on site for maintenance activities during the operation phase;
- Single storey brick building with control room, offices, ablution facilities and kitchen for staff, security and visitors;
- Security building at the entrance of the proposed site with ablution facilities;
- Septic/conservancy tanks and sewer lines connected to the serviced ablution facilities;
- Water storage tanks;
- Small diameter water supply pipeline connecting existing boreholes or existing pipeline access points to storage;
- Central waste collection and storage area; and
- Parking facilities.

4.4.5 Borehole and Water Treatment Plant

Water will be sourced from a borehole(s) on site as well as from the mine to make up the demand during the construction and operational phases of the project.

Water from the borehole will be treated in an on-site water treatment plant (WTP), e.g., demineralization, to ensure the required water quality is reached for the washing of the solar panels.

Note that potable water will be provided separately for domestic water consumption demands by personnel.

A separate water use authorisation process in terms of the National Water Act (Act 36 of 1998) (NWA) for the various identified water uses associated with this project will be undertaken simultaneously with this environmental assessment process.

4.4.6 Roads

4.4.6.1 Access Roads

Where required access roads will be constructed with a width of, up to 15 m at some points for the transport of material and equipment. Road signage, stormwater channels and drainage controls will be provided required. The equipment and material envisaged to be transported to site include, inter alia:

- Building material (bricks, sand, aggregate, cement, gravel, sheeting, fencing, etc.);
- Construction equipment (piling rigs, rollers, graders, batch plant, etc.);
- Solar modules (modules, frames, packing material etc.);
- Electrical components (transformers, switch gear, inverters, cables, etc.);
- Substation steelwork; and
- Water.

The transportation of the above-mentioned equipment and material are based on the following assumptions:

- All bulk material required on site, shall be transported to site on vehicles, which conform with the legal limits listed above.
- Solar modules and most of the electrical components required on site, shall be transported to site on heavy vehicles, which conform with the legal limits listed above.
- Transformers are to be transported to site by abnormal load vehicles which conform with the legal limits

4.4.6.2 Internal Roads

The internal roads will have a maximum width of 4m and will be gravel and/or dirt roads. The length of the internal roads will be confirmed as the location, design and layout of the facility progresses. Road signage, stormwater channels and drainage controls will be provided required. The internal site road network will be finalised during the detailed engineering phase of the project (i.e., post EA). During the operation phase, the internal roads will provide access to the solar field and associated infrastructure for maintenance, inspections, and panel cleaning.

All road material will be sourced from local licensed suppliers and sources.

4.4.7 Fencing

4.4.7.1 Perimeter Fencing

Perimeter fencing, and internal security fencing and gates will be installed in accordance with:

- The Fencing Act (Act 31 of 1963),
- The Fencing Amendment Act, (Act 3 of 1971), and
- Government Gazette 40229 Notice 509 of 26 August 2016 prescribing the General Authorisation Regulations for water uses in terms of section 21(c): impeding or diverting the flow of water in a watercourse, and (i): altering the bed, banks, course or characteristics of a watercourse of the National Water Act 36 of 1998 (NWA).

4.4.7.2 Security fence

The entire facility will have a perimeter fence. Due to the nature and value of the components in the plant this fence will have perimeter sensor to detect any breaches. One method can be optic fibre which runs on the fence and if broken will sound an alarm. An alternative method would be where the fibre is buried and trenches and is triggered when stepped on. Other security features will include CCTV cameras motion sensors and flood lights.

4.4.7.3 Buffer area

A buffer area will be maintained between the perimeter fence and the plant infrastructure. This area will be a distance of 5m between the fence and any equipment in the plant.

4.4.8 Access Control Gate and Guard House

A 24-hour security service will be required to guard the solar PV facility during the construction and operation phases. A guard hut and access control gate will be located on the access road at the site entrance (Latitude: 28°55'9.21"S/Longitude: 19°31'19.15"E) as illustrated in the preliminary final site layout map (Figure 1-2). The security staff will be accommodated in a brick building with ablution facilities at the site entrance.

4.5 Temporary Infrastructure

Temporary structures will be installed within the proposed development area, with a combined maximum size of 10 hectares, including:

- a batching facility,
- temporary offices,
- a construction yard, and
- a laydown area.

A batching facility is typically composed of a cement bin, an aggregate bin, an aggregate conveyor and the cement and aggregate batchers. This single unit facility can be dismantled and reassembled in a few days' time and will be used at multiple construction sites as required. The construction yard will be used to perform small tasks during the construction phase including equipment preparation, cleaning activities and will include one or few container-type offices for contractors and technical staff.

5 PROJECT ALTERNATIVES

In accordance with the principles stipulated in NEMA it is required that various alternatives be investigated when considering a development which may impact significantly on the environment, in order to implement the best practicable environmental option. This means that the options will be assessed in such a manner that the alternative which has the most benefit or causes the least environmental damage to the natural environment is chosen. This option also needs to be of such a nature that the capital and social cost incurred will be of an acceptable nature to society.

Biophysical and socio-economic aspects are considered when investigating alternatives.

An alternative can be defined as an option that will meet 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 to be used in the activity;
d) The technology to be used in the activity; and
e) The operational aspects of the activity.

The "No-Go" alternative must also be assessed.

For the purposes of this Project, a rigorous Scoping level assessment was undertaken by the Professional Team, and following on from the above, the alternatives identified as applicable to assess in this Project are as follows:

1. Property/Site Alternatives
2. Activity Alternative
3. Design and/or Layout Alternatives
4. Technology/Operational Alternatives
5. "No-Go" Alternative (this is a mandatory option)

Based on the contextual information presented above, and described in detail below, there is no evidence to suggest that other alternatives should be investigated for the proposed activity.

5.1 The "Property/Site" Alternative

A site selection and ranking exercise was undertaken, and the selection process considered the following factors:

- Land availability
- Current land use and zoning
- Site accessibility
- Topography
- Biodiversity/Heritage
- Electrical constraints

Upon completion of the site selection process, the farm Appelvlakte 448 has been identified as the optimal location for the proposed solar plant. A summary of the sites investigated, and their respective suitability is provided in Table 5-1. The sites were further subjected to ranking system as illustrated in Figure 5-1.

Grootegeluk - Technical adjudication:		Scoring							Weighted Scores					
#	Metric	Nelsonskop	Appelvlakte	Onbelyk	Van der Waltspan	Steenbokpan	Theunispan	Weighting	Nelsonskop	Appelvlakte	Onbelyk	Van der Waltspan	Steenbokpan	Theunispan
1	Solar energy potential	8	8	8	8	8	8	5%	0.4	0.4	0.4	0.4	0.4	0.4
2	Space availability	10	10	10	8	10	8	5%	0.5	0.5	0.5	0.4	0.5	0.4
3	Terrain	8	8	8	8	8	8	5%	0.4	0.4	0.4	0.4	0.4	0.4
4	EIA	9	8	9	8	9	8	15%	1.35	1.2	1.35	1.2	1.35	1.2
5	Ease of expansion	5	8	10	8	8	8	0%	0	0	0	0	0	0
6	Land and rights	7	7	7	6	6	6	8%	0.56	0.56	0.56	0.48	0.48	0.48
7	Water Use Licensing	6	6	6	6	6	6	8%	0.48	0.48	0.48	0.48	0.48	0.48
8	Dust	7	7	8	8	8	8	5%	0.35	0.35	0.4	0.4	0.4	0.4
9	Electrical connection costs	10	10	7	7	6	6	25%	2.5	2.5	1.75	1.75	1.5	1.5
10	Community risk during construction	6	7	9	9	8	6	12%	0.72	0.84	1.08	1.08	0.96	0.72
11	Risk of possible community expansion	5	7	9	9	9	7	4%	0.2	0.28	0.36	0.36	0.36	0.28
12	Re-zoning	7	7	7	4	4	4	8%	0.56	0.56	0.56	0.32	0.32	0.32
	Overall Score:	88	93	98	89	90	83	100%	8.02	8.07	7.84	7.27	7.15	6.58
						Overall Weighted Score %:			80%	81%	78%	73%	72%	66%
							Rank:		2	1	3	4	5	6

Figure 5-1: Site selection rating matrix

Appelvlakte was thus selected as it was identified as particularly well suited for the proposed activity, taking due consideration of the selection factors and its proximity to the Grootegeluk Coal Mine to which the project will mainly be supplying the electricity generated.

Table 5-1: Site selection factors and site suitability

Factor	Land availability	Current land use and zoning	Site accessibility	Topography	Biodiversity/Heritage	Electrical constraints
Appelvlakte	Sufficient space available.	Zoning – Mining Use – Mining related	Gravel road up to farm. Good proximity to mine (security, length of transmission line).	Acceptable in terms of slope and shading	Falls within a CBA 1. It also falls within the 500m buffer of a wetland. Very high aquatic, heritage and terrestrial biodiversity sensitivity. Heritage site on western side. Two wetlands identified south of the site	33kV Main Grootegeluk Intake Substation congestion.
Nelsonskop	Limited due to buffer required for the WWTP on-site and informal settlement to the south.	Zoning – Mining Use – WWTP, future residential	Next to a road.	Acceptable in terms of slope and shading	Falls within a Critical Biodiversity Area 1. It also falls within the 500m buffer of a wetland.	33kV Main Grootegeluk Intake Substation congestion.
Onbelyk	Sufficient space available.	Zoning – Mining Use – part of future mine plan	Gravel roads divide farm into 3 areas.	Acceptable in terms of slope and shading	Small intersection with a wetland/drainage line to the south-east. High heritage sensitivity – small area in the same cleared area in the south-east	14km 33kV overhead line required around the northern tailings facility. Numerous infrastructure crossings.
V.D Waltspan	Sufficient space available.	Zoning – Mining Use – part of future mine plan	Gravel road up to farm.	Acceptable in terms of slope and shading	Very high aquatic, heritage and terrestrial biodiversity sensitivity. Aquatic biodiversity sensitivity is v. high because of small wetlands.	14km 33kV overhead line required around the northern tailings facility. Numerous infrastructure crossings.
Steenbokpan	Sufficient space available.	Zoning – Agric Use - Agriculture	Gravel road up to farm. Tar road connecting to the gravel road up to the farm is in bad condition.	Acceptable in terms of slope and shading	3 x Farm homesteads in the south and south-west – risk of heritage buildings (>60 years old) and graves. High aquatic biodiversity sensitivity due to a small pan in the south-western portion of the site	30km+ of 33kV line required traversing a lot of boundaries. Tie in to Eskom 132kV possible. On 132kV a single circuit option is possible. Wheeling agreement then required and line capacity to be confirmed. Possible upgrade required if not sufficient.
Theunispan	Sufficient space available, however, risk of expansion of existing small settlement in area.	Zoning – Agric Use - Agriculture	Gravel road up to farm. Tar road connecting to the gravel road up to the farm is in bad condition.	Acceptable in terms of slope and shading	Small wetlands (pans) in the north eastern portion of the site, and in the central western part of the site. Several farm homesteads in the east – possibility of graves and buildings with heritage value.	30km+ of 33kV line required traversing a lot of boundaries. Tie in to Eskom 132kV possible. On 132kV a single circuit option is possible. Wheeling agreement then required and line capacity to be confirmed. Possible upgrade required if not sufficient.

Based on the above, and the site selection requirements associated with this particular solar project and the suitability of the land available on Appelvlakte 448, **no other alternative property or site alternatives will be investigated for the purpose of this impact assessment.**

5.2 The "Activity" Alternative

Where the "activity" is the generation of renewable electricity, possible reasonable and feasible activity alternatives for the proposed site is extremely limited. For example, due to the lack of large water bodies in the vicinity of the site, the possibility of renewable energy generation from a Hydro Energy Facility is not feasible. Similarly, due to the site specific requirements of wind energy facilities, i.e., high mean wind speed which is the highest at the coastal regions in South Africa (illustrated in Figure 5-2 as provided by the Wind Atlas of South Africa (WASA)), the possibility of a Wind Energy Facility is not deemed feasible for the proposed site.

Based on the above, at this stage, there is no reason to suggest that any activity alternatives are investigated as these would not meet the general purpose and need of the proposed activity, **therefore no other activity alternatives will be investigated for the purpose of this impact assessment**.

5.3 The "Design/Layout" Alternative

The design or layout is only due to be assessed during the EIA Phase of this Project. The Scoping Phase for this Project has been used to ensure that the site is well-suited to the activity.

The aim of the EIR Phase (in terms of the layout of the proposed facility), will be to determine a buildable area for the proposed project within the development footprint of the site, which will be assessed by the specialists and considered during the EIR Phase.

Based on the above, at this stage, no layout alternative has been assessed as this is due to be assessed, in detail in the EIR Phase.

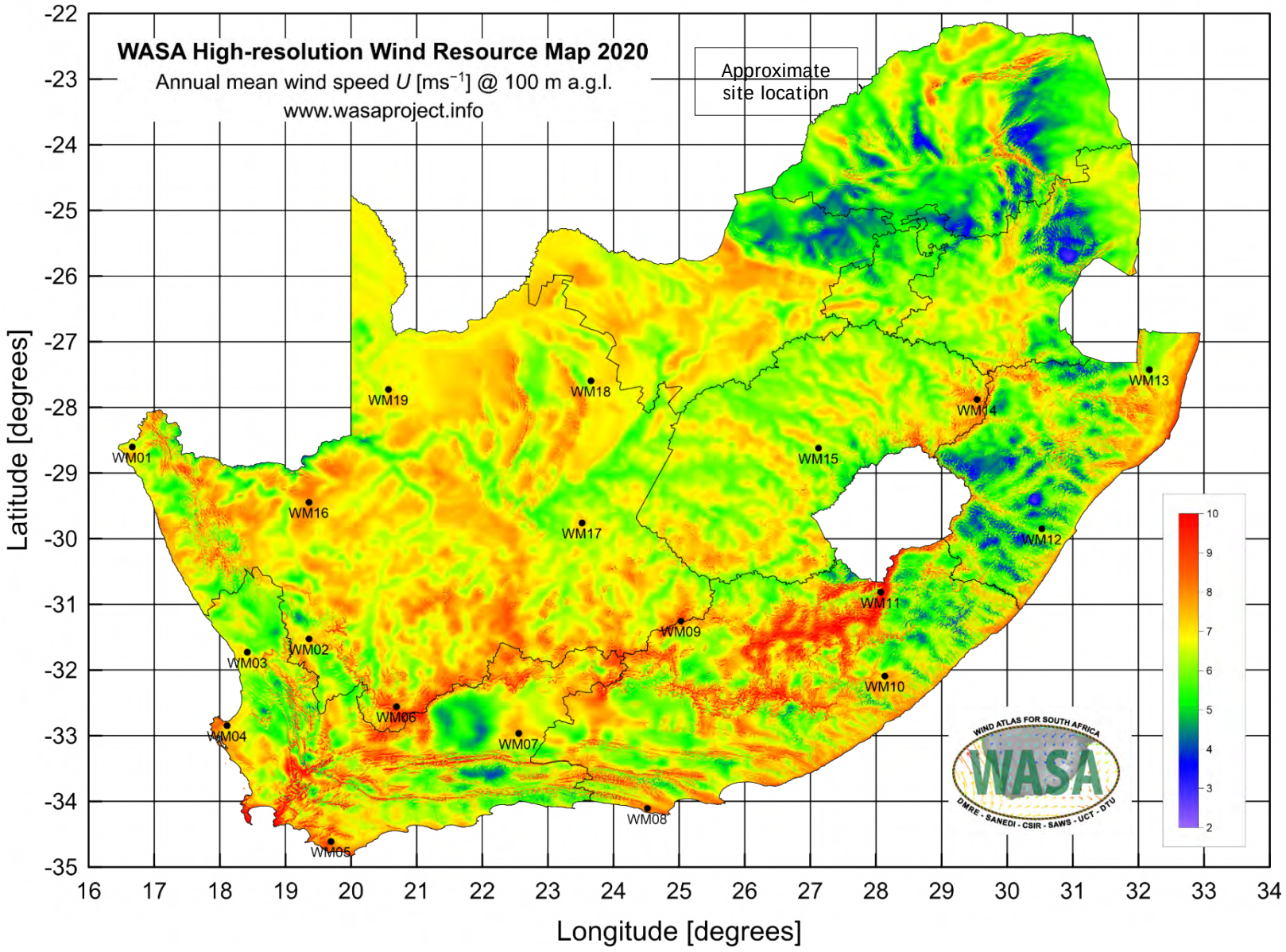


Figure 5-2: Representation of Mean Wind Speed (ms-1 at 100 m) (Source: WASA, 2020)

5.4 The "Technology" Alternative

Concentrated solar power (CSP) was originally proposed for the site. However, based on feasibility studies, this option was changed in favour of solar photovoltaic because:

- Photovoltaic technology is quicker to construct.
- PV technology is less water intense than CSP technology. PV consumes water only for washing solar modules and surfaces. As the area is a semi-arid region water is scarce and is pumped in over long distances.
- Due to the climatic conditions in the area, wind is not an option.

The most recent advancements in bifacial technology are becoming an industry standard for utility-scale solar PV. The final technology that will be used will be determined during the detailed engineering phase after receipt of an EA.

Based on the above, and the requirements associated with this particular solar project, the use of tracking photovoltaic panel arrays is the preferred option for the project and, **no other technology alternatives will be investigated for the purpose of this impact assessment.**

5.5 No-Go Option

The NEMA EIA Regulations (2014, as amended) requires that all development alternatives be included into the investigation process. The no-go option will be comparatively assessed against the above-mentioned alternatives during the environmental impact assessment phase and will act as a baseline against which all the other development alternatives are measured.

The "no-go" option would result in the proposed activity not being implemented and the status quo on the property remaining. The No Go alternative usually implies the continuation of the status quo in terms of making use of energy from coal-fired power stations and current land use practises. While the "no-go" alternative will not result in any additional negative environmental impacts; it would not achieve the general purpose and requirements of the activity, which is to provide "green energy" to the adjacent mine. It is clear that the no-go option would result in a significant opportunity loss for the site and the project's contribution to the provision of green energy. Consequently the "no-go" alternative is not currently the preferred alternative.

5.6 Concluding Statement of Preferred Alternative

The above sections are in accordance with Appendix 2 of GNR 326, of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). The Scoping Phase of the project is to enable the specialists and the EAP to identify the Best Practical Environmental Option (BPEO) for the development footprint, and to identify studies required during the EIA Phase of the project.

Appendix 2 of GNR 326, NEMA EIA Regulations, 2014 (as amended) states the following objectives of the Scoping Process:

1. The objective of the scoping process is to, through a consultative process –

a) Identify the relevant policies and legislation relevant to the activity;

b) Motivate, the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

c) Identify and confirm the preferred activity and technology alternative through an identification of impacts and risks and ranking process of such impacts and risks;

d) Identify and confirm the preferred site, through a detailed site selection process, which includes an identification of impacts and risks inclusive of identification of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographic, physical, biological, social, economic and cultural aspects of the environment;

e) Identify the key issues to be addressed in the assessment phase;

f) Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and

g) Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

Considering the above, the following was taken forward into the EIR Phase:

- No-go Alternative

- The no-go alternative assumes that the proposed project will not go ahead i.e., it is the option of not constructing the proposed Lephalale Solar Project. This alternative would result in no environmental impacts on the site or surrounding local area, as a result of the facility. It will provide a baseline against which other alternatives will be compared and considered during the EIR Phase.

- Property/Site Alternative
  - The preferred main site for the project is Appelvlakte 448;
  - The preferred development footprinting within the site was determined based on a rapid desktop screening assessment of the site and consultation with the relevant landowner identifying possible areas that should not be proposed for the development (i.e., no-go areas). These have already been excluded from the proposed development footprint.
- Activity Alternative
  - No other activity alternatives were deemed to be appropriate for the site and therefore they will not be further assessed during the EIR Phase. The implementation of a solar energy facility at the proposed project site is more favourable than other alternative energy facilities (please see reasoning in Section 3.2 above)
- Design/Layout Alternative
  - Layout alternatives for the project will be determined following the input from the various specialists. The studies will aim to identify various environmental sensitivities within the development footprint of the site that should be avoided, which will be taken into account during the determination of the proposed layout of the PV facility.
- Technology Alternative
  - In accordance with current requirements associated with this particular solar project, the use of tracking photovoltaic panel arrays is the preferred option for the project. The final technology that will be used will however be determined during the detailed engineering phase after receipt of an EA.

6 BASELINE ENVIRONMENTAL DESCRIPTION

The baseline environment, i.e., the environmental, social and economic context within which the proposed site is located, is described within this chapter. The baseline environment provides a status against which to assess the proposed project activities and potential impacts. It is necessary to understand this context in order to accurately assess the risks associated with the Lephalale Solar Project. The environmental components which could influence the site planning have been included.

6.1 Geology

The northern half of the area is dominated by gneisses, metasediments and metavolcanics of the Malala Drift Group, Beit Bridge Complex (Swazian Erathem), basalts of the Letaba Formation (Lebombo Group of the Karoo Supergroup) are also found in the northeast. Sandstone, siltstone and mudstone of the Clarens Formation (Karoo Supergroup), as well as the Matlabas Subgroup (Mokolian Waterberg Group) are found to the south and west.

The study area falls within the Ab85 land type, which is characterized by predominantly deep sandy to loam soils that are eutrophic. Soil colours vary from red through yellow-brown to bleached indicating a potential wetness gradient. Refer to Figure 6-1.

6.2 Topography

The proposed project area is reasonably flat, with a topographic high in the north-west. The elevation ranges from approximately 811 meters above mean sea level (mamsl) to 960 mamsl within 15Km of the proposed development area. The most prominent topographical features within 5Km of the proposed development is the Grootegeluk Coal Mine Dump at approximately 990 mamsl. Refer to Figure 6-2.

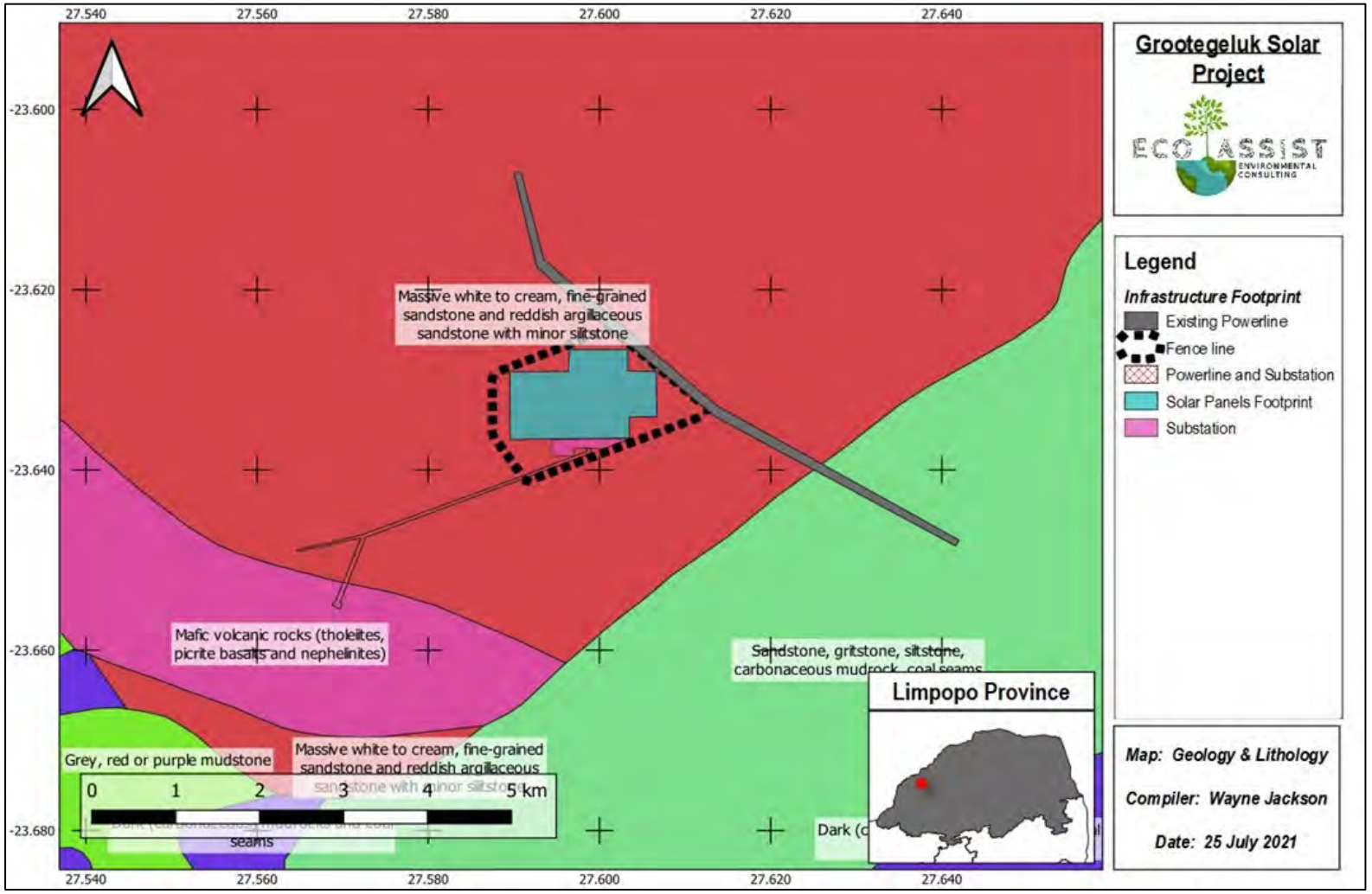


Figure 6-1: Regional geology of the proposed site (Jackson, 2021)

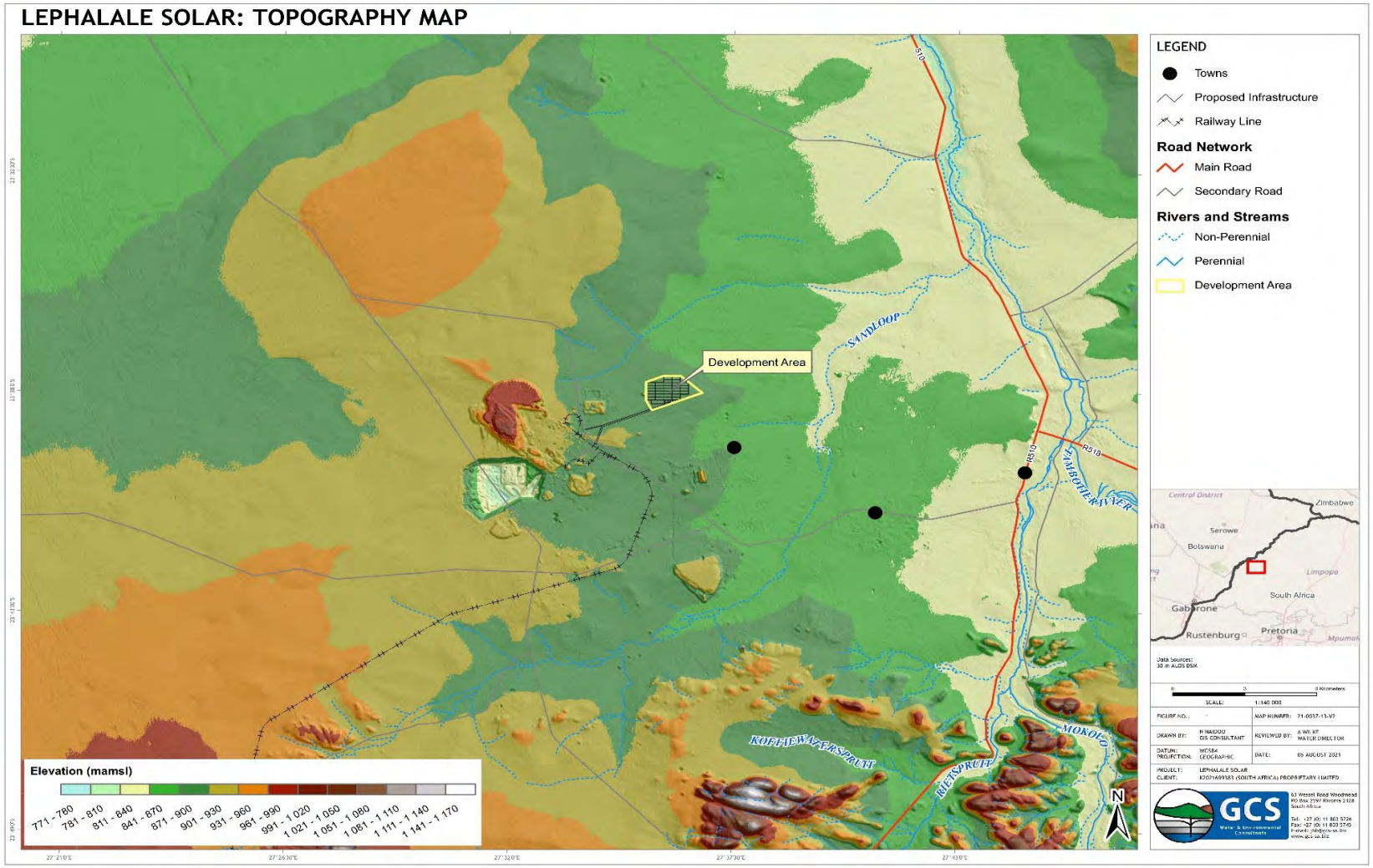


Figure 6-2: Regional topography of the proposed site area

6.3 Climate

6.3.1 Regional Climate

The climate in the Limpopo province is classified as a hot semi-arid climate (Bsh) by the Köppen Geiger system (Climate-Data.org, 2021). The rainfall is the region is generally low, ranging from as little as 200 mm/yr to 560 mm/yr. Rainfall occurs during the summer months with the highest rainfall occurring in January while June and July are the driest months. Evaporation is estimated to range from 1 600 mm/yr in the mountainous regions to as high as 3 100 mm/yr for the Water Management Area (WMA), which is many times higher than rainfall, resulting in a net loss of water, meaning that the area is arid. The Limpopo province is one of the warmest areas in South Africa with predominantly sunny conditions prevailing. Summers are hot with temperatures getting as high as 40°C and winters are mild with frost, and temperatures dropping to 0°C at night. The climate is heavily influenced by eastern wind systems, particularly tropical cyclones from the Indian Ocean coming through Mozambique (Climate of the Limpopo Basin, 2010).

6.3.2 Rainfall

Rainfall that is representative of site conditions is required to carry out a hydrological assessment and predict surface runoff flows that will enter the site during rainfall events. Quaternary catchment data was gathered from the 2012 South African Water Resources Study (WR2012) and used as an indicator against which data from South African Weather Service (SAWS) stations was cross-compared.

The site falls in quaternary catchment A42J, in the A4E rainfall zone and has a mean annual precipitation (MAP) of 428 mm/a characteristic of the arid north of the country. The catchment has a gross area of 1 812km^2 and drains to the Sandloop then Mokolo Rivers, which subsequently drain to the Limpopo River at the downstream, northern boundary of the quaternary catchment. Average monthly rainfall data for the catchment was extracted from WR2012 by multiplying the MAP of A42J with the percentage distribution for the rainfall zone and is graphed in Figure 6-3. The catchment experiences its highest rainfall during the summer months of November to March and its dry period is during winter.

Seven South African Weather Service (SAWS) stations were identified in the vicinity of the site. There parameters are summarized in Table 6-1.

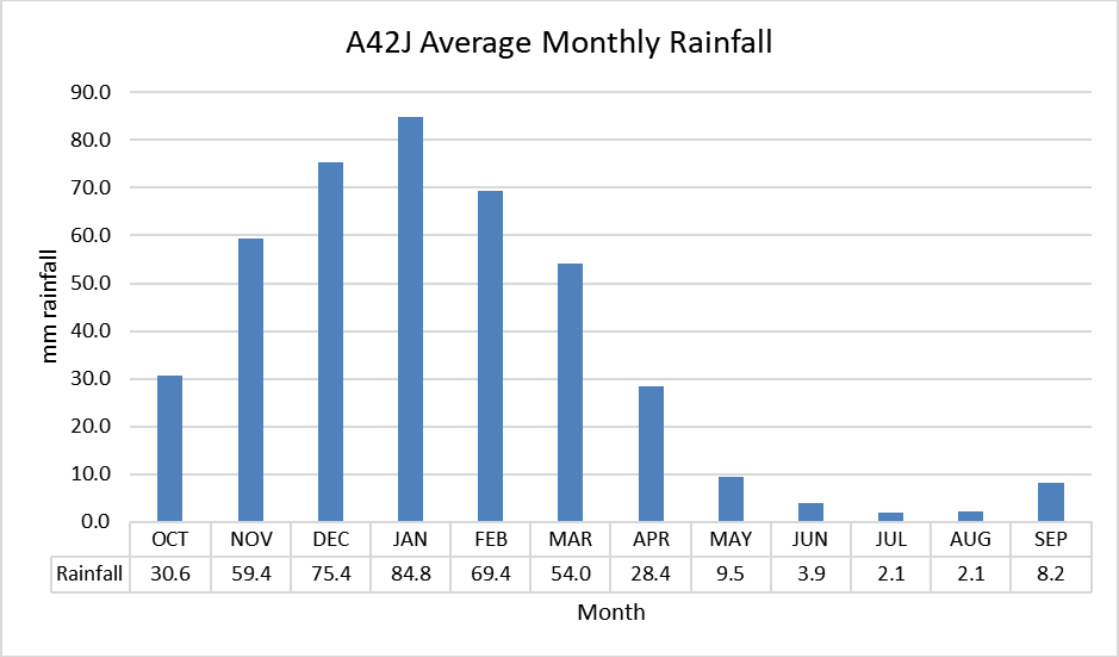


Figure 6-3: A42J average monthly rainfall

Table 6-1: SAWS stations parameters

Station name	Number	Years	MAP (mm/yr)	Altitude (mamsl)	Distance (km)	Latitude	Longitude
Site				893		23° 37’	27° 35’
Grootgeluk Mine	0674100	34	383	890	4.5	23° 40’	27° 42’
Lephalale	0674341				11.8	23° 39’	27° 33’
Ellisras Pol	0674400	31	465	820	14.5	23° 40’	27° 44’
Grootfontein	0674429	45	463	830	14.9	23° 39’	27° 44’
Tambootivlei	0673636	41	425	865	25.3	23° 36’	27° 21’
Zyferbult	0673645	43	471	945	27.5	23° 45’	27° 22’
Sterkfontein	0674207	59	519	1 060	34.4	23° 56’	27° 37’

- Grootgeluk Mine is the closest station to the site and therefore most similar in altitude. However, its MAP of 383mm/a is 10% lower than that of the quaternary catchment A42J of 428mm/a. This is possibly due to the data collected not reflecting wet years as a result of the relatively short rainfall record of 34 years. This station was therefore not considered to be representative of the site.
- Lephalale station appears to be a recent station and data was not available for it. It was therefore excluded from the study.
- Ellisras has a short rainfall record of 31 years. However, it is within close distance of the site and its MAP of 465mm/a better reflects that of the quaternary catchment of 428 mm/a.

- Grootfontein has very similar parameters to Ellisras, but with a longer rainfall record of 45 years. It is deemed to be a good representation of site conditions.
- Tambootivlei is at a similar altitude to the site and is most similar to the quaternary catchment MAP at 425mm/a. This is considered a good representation of site conditions.
- Zyferbult is at a higher altitude than the site and is quite distant at 27.5 km away but does have a suitable MAP that in within the range of the quaternary catchment MAP.
- Sterkfontein is 34.4km away from the site, sits at an altitude of 1 060mamsl which is 167m higher than the site, and has an MAP of 519mm/a, 21% higher than that of the quaternary catchment. This station was excluded from the analysis as it is unlikely to be a good representation of site conditions.

The monthly average rainfalls for Ellisras, Grootfontein and Tambootivlei were plotted and compared (Figure 6-4) (rainfall records collected from WR2012).

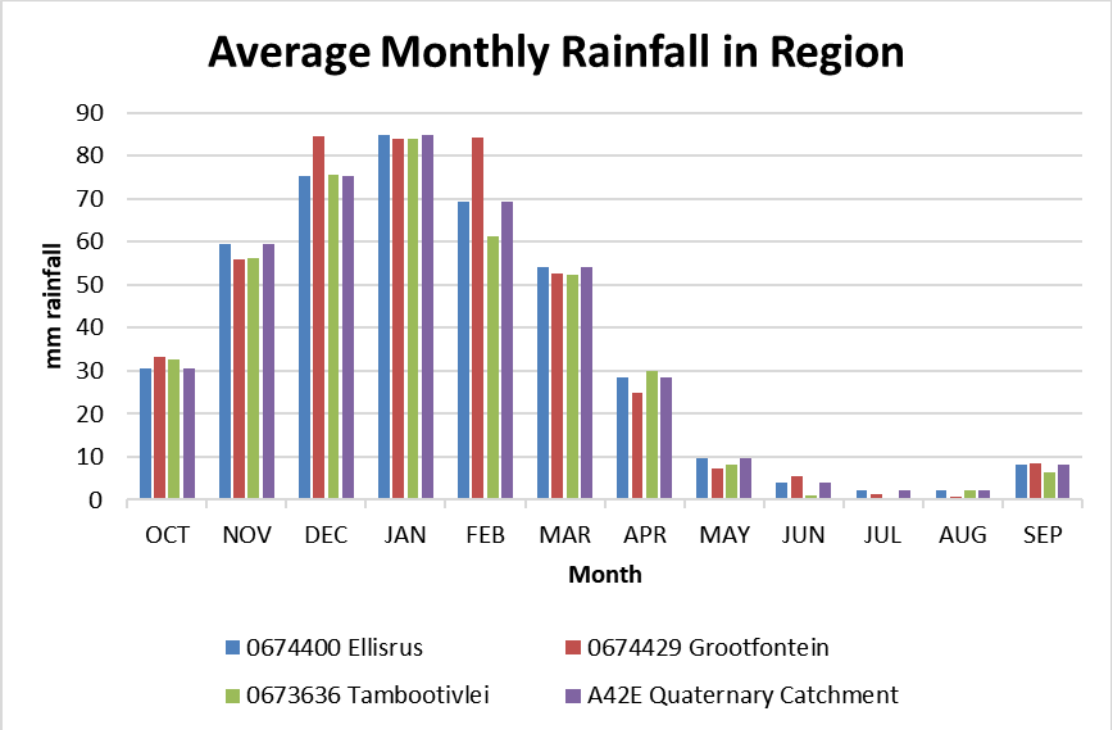
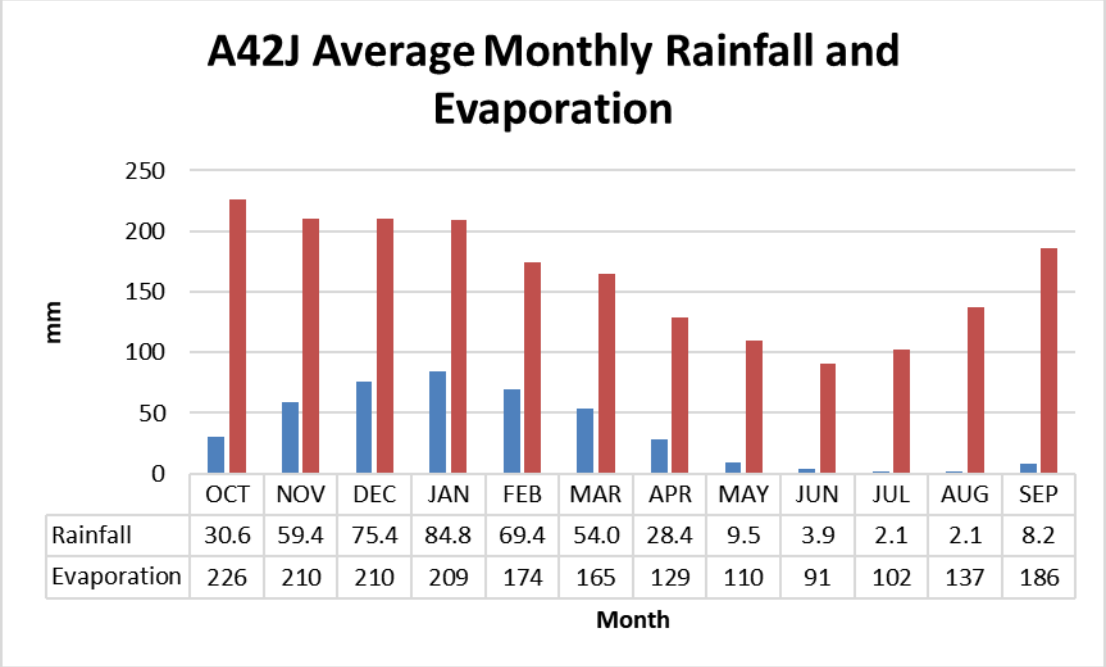


Figure 6-4: Average Monthly Rainfall in Region

6.3.3 Evaporation

The Mean Annual Evaporation (MAE) for quaternary catchment A42J is 1 949mm/a, and the catchment falls in evaporation zone 1D. This is 4.5 times more than the MAP of 428mm/a,

indicating that this is an arid region. The comparison of monthly rainfall and evaporation for the catchment is shown in Figure 6-5.



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Rainfall	30.6	59.4	75.4	84.8	69.4	54.0	28.4	9.5	3.9	2.1	2.1	8.2
Evaporation	226	210	210	209	174	165	129	110	91	102	137	186

Figure 6-5: Average monthly rainfall and evaporation for quaternary catchment A42J

6.4 Land Use

The project area has three (3) primary land uses:

- Infrastructure (Figure 11-7);
- Veld (Figure 11-8); and
- Disturbed areas.

It is further understood that the study site form part of the Manketti Private Nature Reserve, which is under ownership of Exxaro. The reserve has a size of 22 000ha and houses a number of animal species typical to the area. The land use on the study site is therefore part of the private nature reserve.

As such the study area is largely in its natural state with extensive mining activities located to the west of the site as well a densely urbanized area as well as a large coal-fired power station to the south of the site.

Refer to Figure 6-6: Land cover in the project area for a visual representation of the land cover of the study area and Figure 6-7: Land use for the project site (Eco-Assist, 2021)for the current land uses of the study site.

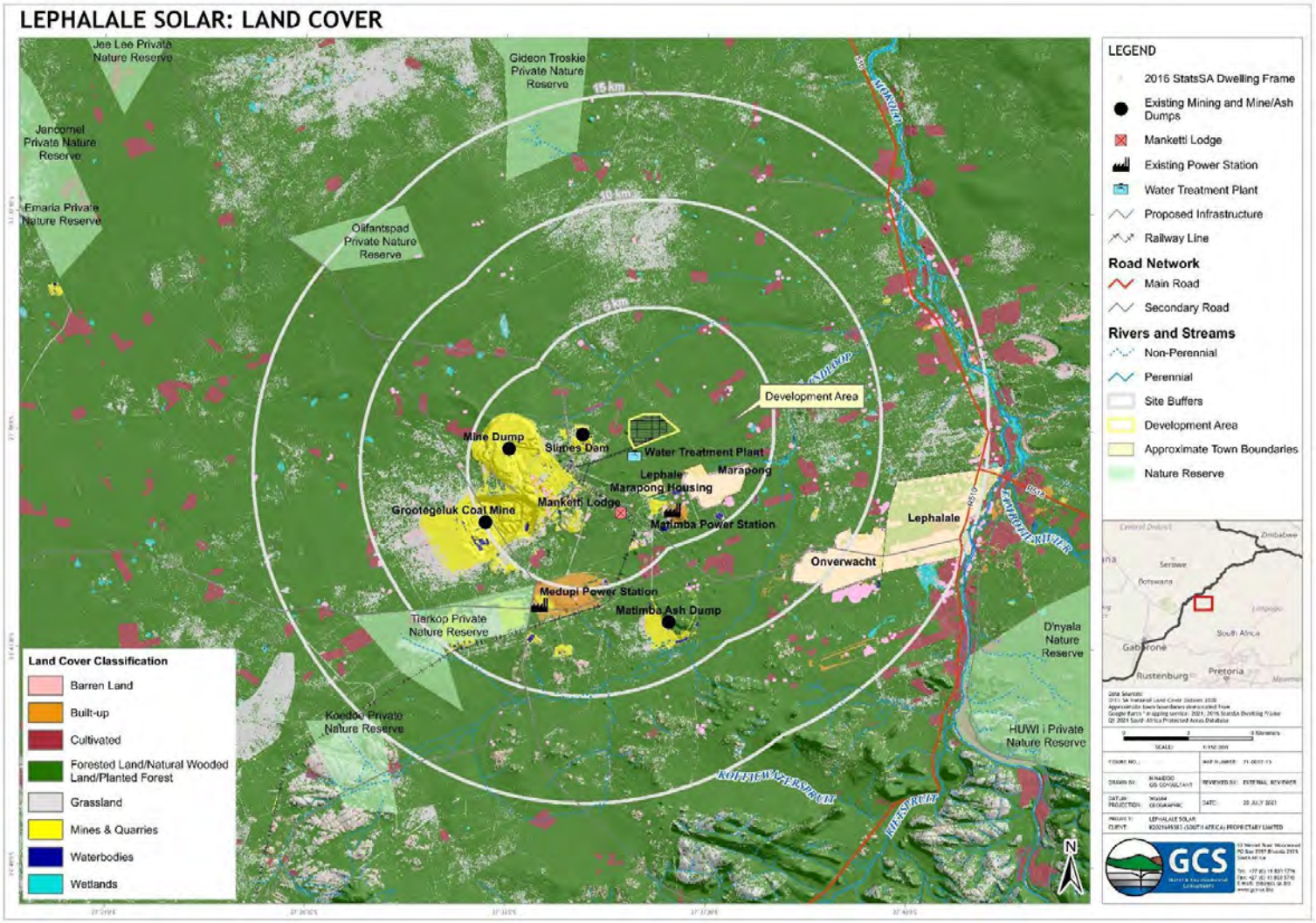


Figure 6-6: Land cover in the project area

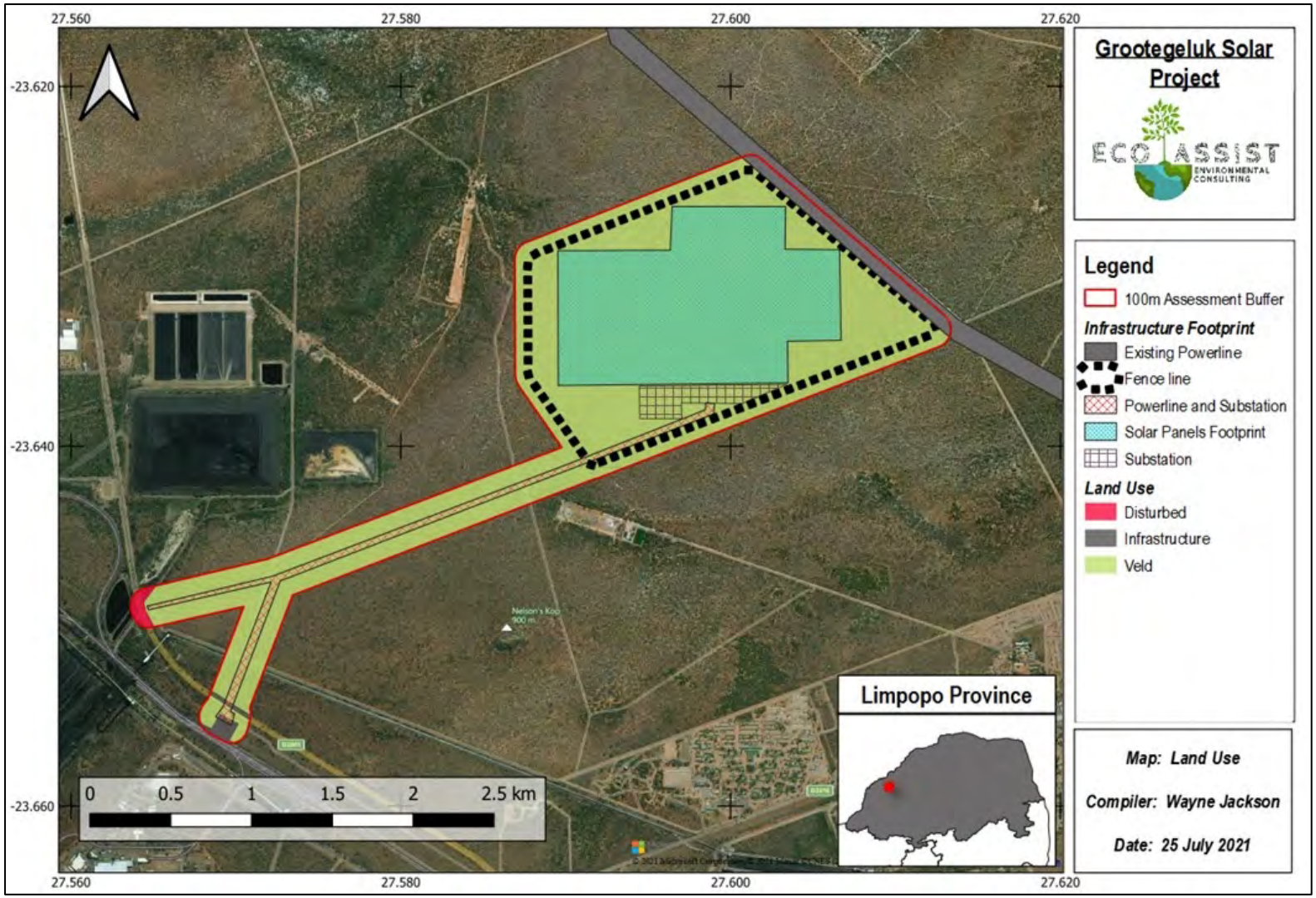


Figure 6-7: Land use for the project site (Eco-Assist, 2021)

6.5 Hydrology

6.5.1 Water Management Area

The site falls within quaternary catchment A42J in the Limpopo Water Management Area (WMA) (South Africa. Dept. of Water and Sanitation, 2016). The quaternary catchment has an area of 1 812 km^2. Refer to Figure 6-8.

6.5.2 Surface Water Hydrology

There are a number of farms surrounding the Grootegeluk mining establishment. The topography in the area is flat with very gentle undulations and low points. There are no streams. At most, depressions that may have been rivers in ancient times are identifiable. The soil is loose and sandy, with a high potential for infiltration. The vegetation is extremely dense, and made up of grasses, shrubs, and trees.

Approximately 5.3km west of the study site, the Sandloop River flows in a northerly direction towards the Mokolo River and then into the Limpopo River. There is only one clearly identifiable tributary to the Sandloop River, and it begins (as estimated from aerial imagery) some 2.7km from the site. During the site visit, the site and areas that appear to have possibly been drainage lines in the past were investigated, and no surface flow, evidence of scour or defined drainage channels were observed.

On the Appelvlakte 448 Farm, there is a slimes dam facility that rises many metres above natural ground level, and a rifle range. The slimes dam (located 1.3km west of the proposed solar project site) has no effect on the surface hydrology of the remaining extent of the farm. Immediately adjacent to the rifle range, both natural and man-made pans are present, the latter presumably constructed to provide water for game. These pans are small (no more than 10m in diameter). At the time of the site visit (April 2021), only the pan fed by an external source had water in it. There is no drainage line visible between these pans. The hydrological extent of influence of these pans is limited to approximately 250 m from the rifle range and 300m downstream from the proposed development site. Therefore, it has been assumed that these features will have no impact on the development.

Other than the abovementioned features, there is no permanent surface water or defined drainage channel on the Appelvlakte Farm.

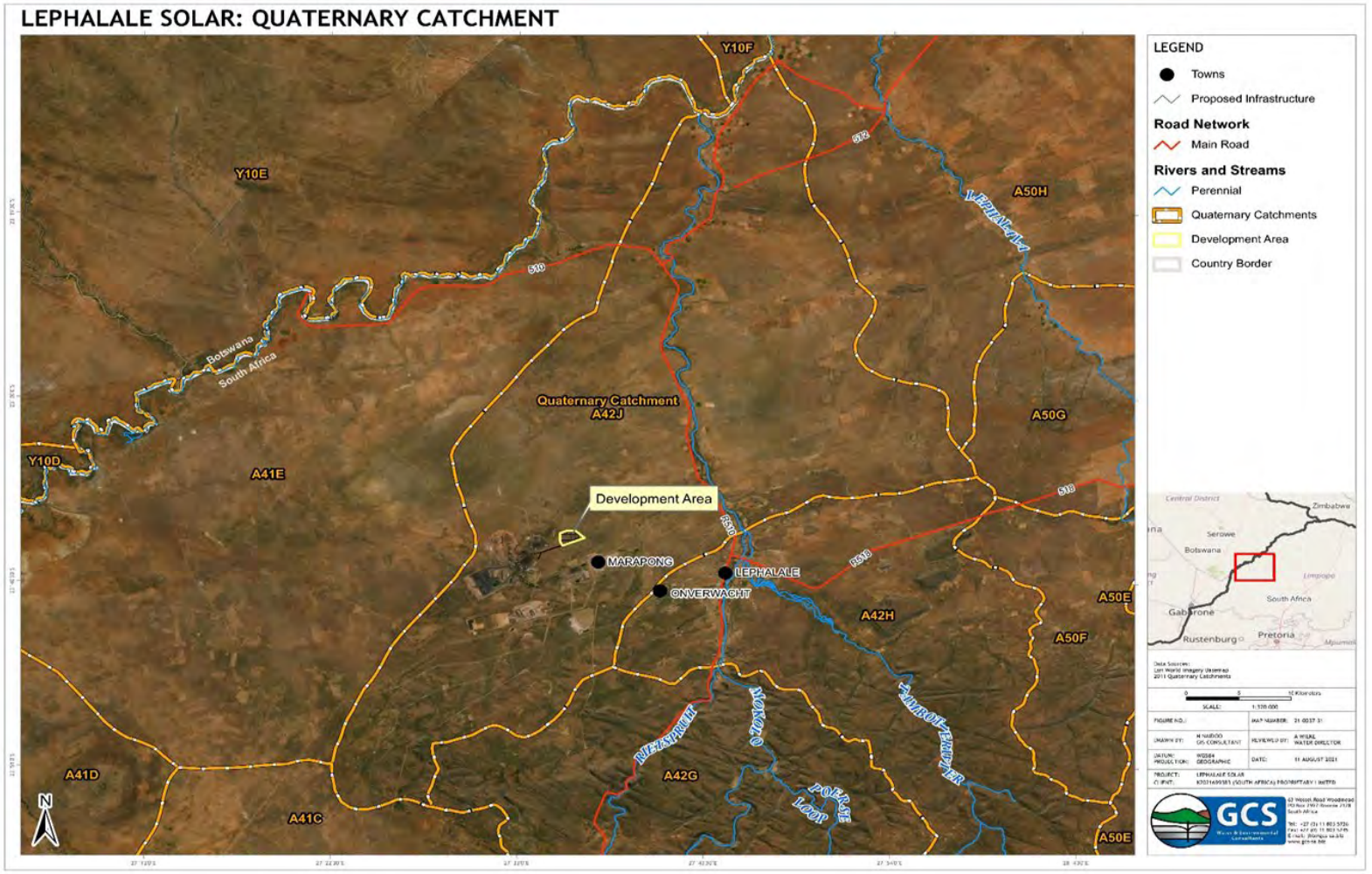


Figure 6-8: Quaternary catchment

The municipal wastewater treatment plant (WWTP) is located 500 south of the farm and the development boundary and is topographically downstream of the proposed development site. Its ponds are raised above ground level by berms, meaning that there will be no interaction between them and the surrounding environment. They are assumed to be lined. The WWTP is assumed to have no influence on its hydrology.

In conclusion, there is no surface water hydrology that needs to be designed for in the planning of the solar project, aside from direct rainfall onto the site.

6.5.3 Mean Annual Runoff

The WR2012 Pitman model estimates the Mean Annual Runoff (MAR) of quaternary catchment A42J to be 5 370 000m^3/a. This is based on calibration factors of:

- 200mm soil moisture storage capacity;
- A subsurface flow at full soil moisture capacity of 0mm/month;
- A maximum soil moisture recharge rate of 1mm/month; and
- A minimum catchment absorption rate of 25mm/month.

6.6 Ecology

6.6.1 Wetlands and Watercourses

The National Freshwater Ecosystem Priority Area (NFEPA) database identifies an artificial wetland. This artificial wetland area is directly associated with drying beds that of the WWTP mentioned above.

Furthermore, the site assessment identified a wetland area located approximately 350m to the northwest of the site boundary. This wetland area is considered artificial in nature as the water is provided by a borehole for game. This is evident by the presence of a viewing hide.

The NFEPA databases does not identify any rivers within the study area. According to the database, the closest river to the study area is the Sandloop Rivier, a tributary of the Mokolo River, approximately 5km to the east of the site.

No aquatic features were identified within the study site. No such features will therefore be impacted upon by the development of the project. As such, no further aquatic investigations or assessments are required.

6.6.2 Vegetation

The study area is located within the Limpopo Sweet Bushveld (SVcd19) vegetation type (Mucina and Rutherford, 2006). Refer to Figure 6-9 for the regional vegetation map.

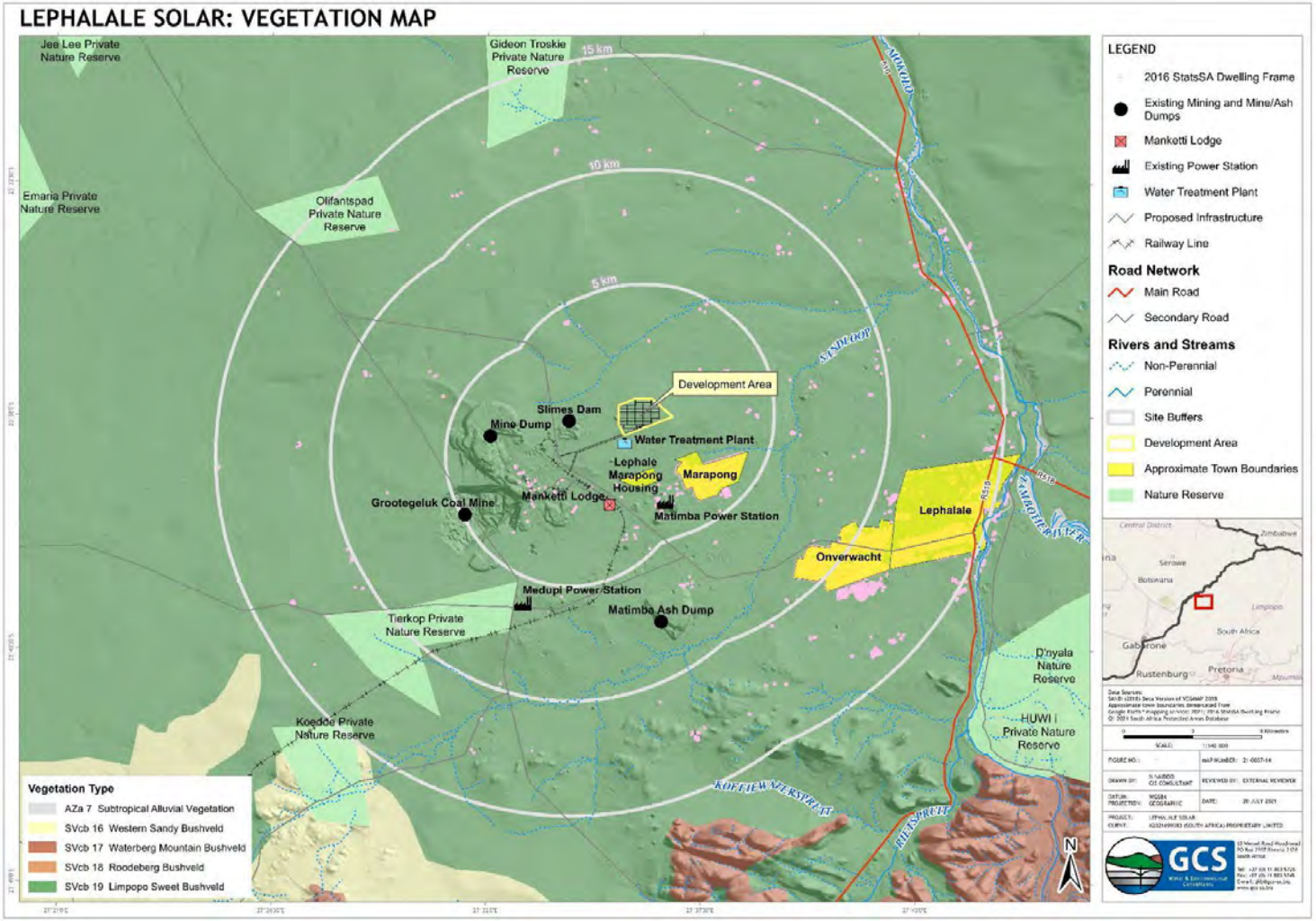


Figure 6-9: Regional Vegetation

This vegetation type occurs in the Limpopo Province from the lower reaches of the Crocodile and Marico Rivers around the Makoppa and Derdepoort, down the Limpopo River, including Lephalale, past Tom Burke to the Usutu Border Post and Taaiboschgroet area in the north (Mucina and Rutherford, 2006). It occurs on plains, sometimes undulating or irregular, traversed by several tributaries of the Limpopo River. The vegetation type is characterized by short open woodland.

The study site is understood to form part of the Manketti Private Nature Reserve which is under ownership of Exxaro. The reserve has a size of 22 000ha and houses a number of animal species typical to the area. The land use on the study site is therefore part of the private nature reserve. As such the study area is largely in its natural state with extensive mining activities located to the west of the site as well a densely urbanized area as well as a large coal fired power station to the south of the site.

The vegetation on the site primarily consists of woodland dominated by *Terminalia sericea* (Silver Cluster Leaf), *Combretum apiculatum* (Red Bushwillow) and *Dichrostachys cinerea* (Sickle bush). Other tree species of interest are *Sclerocarya birrea* subspecies *africana* (Marula), *Senegalia nigrescens* (Knob-thorn Acacia), *Vachellia erioloba* (Camel Thorn), *Senegalia burkei* (Black-monkey Thorn); *Senegalia meliffera* (Black-thorn Acacia), *Combretum imberbe* (Hardekool), *Philenoptera violacea* (Bushveld Apple-leaf) and *Gardenia volkensii* (Bushveld Gardenia).

The presence of dense stands of *Terminalia sericea* (Silver Cluster Leaf) on large parts of the site is indicative of historical overgrazing of the area. These trees are known bush encroachers and will settle in dense stands in areas of disturbance.

A site-specific vegetation classification has been conducted based on the observation of dominant species within each of these areas (Figure 6-10). The species used are all characteristic of the species that can be expected in the Limpopo Sweetveld Vegetation Type. The identified vegetation communities are as follows:

- *Combretum apiculatum* Woodland community;
- *Terminalia sericea* Woodland community; and
- Mixed Bushveld Woodland community.

The *Combretum apiculatum* Woodland community primarily consist of stands of *Combretum apiculatum* and *Dichrostachys cinerea* and forms dense stands of vegetation in places. The vegetation community is located in the eastern portions of the study area. The density of *Dichrostachys cinerea* is an indicator that the vegetation has been impacted upon by historical overgrazing. Confirmation of this is that all the individuals of this species is more or less of similar size, which indicates that they have all established at a similar time.

The *Terminalia sericea* Woodland community primarily consist of stands of this tree species inter-mixed with other typical bushveld trees. In places, the stands of *Terminalia sericea* is relatively dense and indicative of "bush encroachment" by this species.

A very small portion of the study area can be classified as a Mixed Bushveld Woodland community that consists of stands of *Sclerocarya birrea* subspecies *africana* (Marula), *Senegalia nigrescens* (Knob Thorn), *Senegalia burkei* (Black Monkey Thorn), *Vachellia karroo* (Sweet Thorn), *Vachellia tortilis* subspecies *heteracantha* (Umbrella Thorn) and *Spirostachys africana* (Tamboti).

Important plant species

From the POSA website (QDS 2327DA) and data from previous studies in the area, three Conservation Important (CI) species have been recorded in the region. The most threatened of these species recorded in the QDS is the *Eulalia aurea* (Golden Velvet Grass), which is classified as Near Threatened. This grass species is typical to seasonal swamps and vleis and in the absence of these habitats on the study is considered to be absent from the site. The other species of interest is *Corchorus psammophilus* could occur on the site based on the habitat requirement, but none of these species were identified during the site assessment.

Furthermore, Government Notice No. 44204 of 2021 provides the latest List of Protected Tree Species in accordance with the National Forests Act (Act No. 84 of 1998). The following tree species that are included in the abovementioned list was identified on the study site. These are as follows:

- *Boscia albitrunca* (Shepherds Tree);
- *Sclerocarya birrea* subspecies *caffra* (Marula);
- *Spirostachys africana* (Tamboti); and
- *Vachellia erioloba (*Camel Thorn).

As these species have been identified within the study area, any disturbance of these species must be authorised through a licence / permit issued by the DFFE in terms of the National Forests Act (Act No. 84 of 1998).

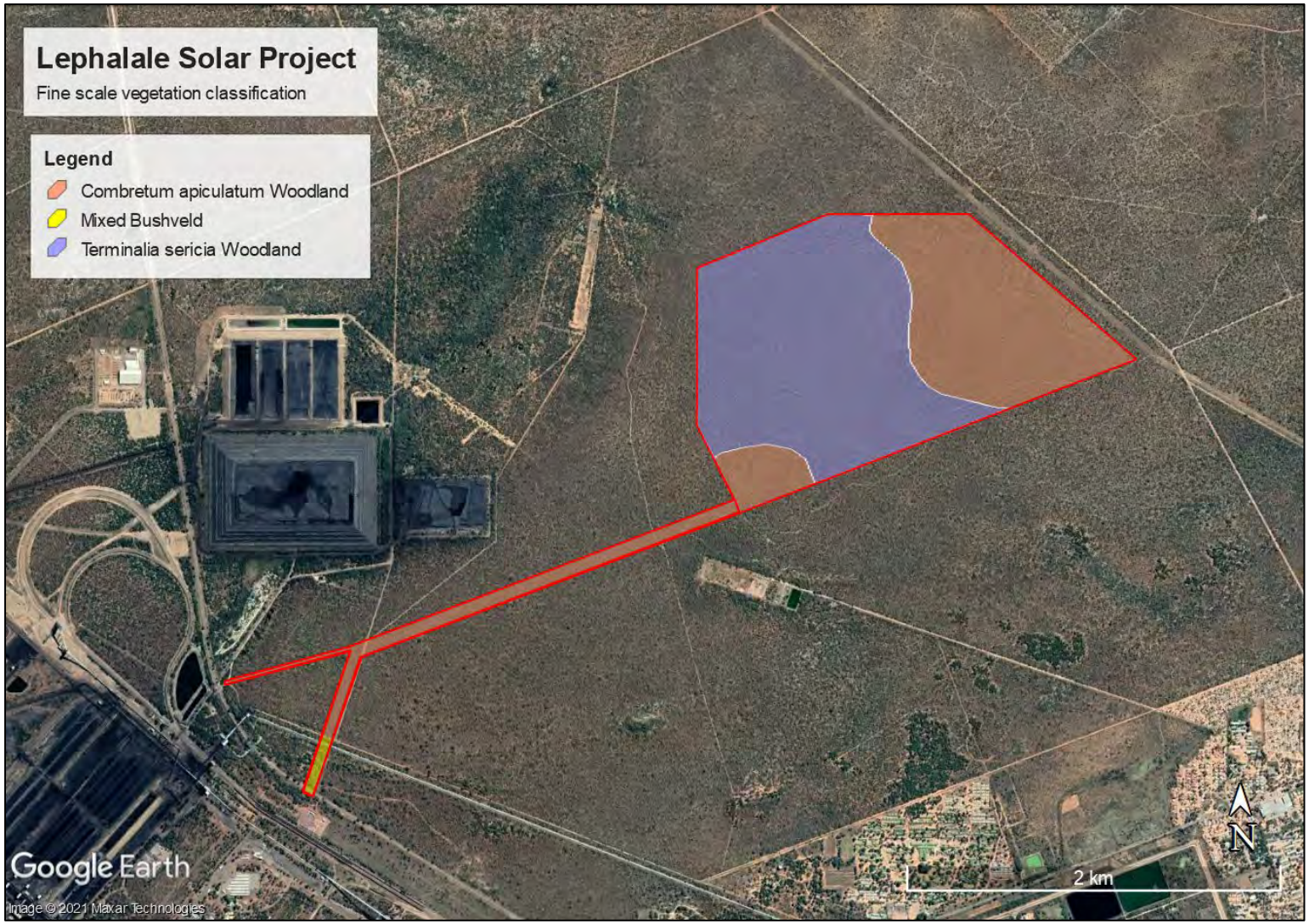


Figure 6-10: Classification of vegetation on site

Alien Invasive Species

As the study site is relatively pristine in nature, very few alien invasive plant species were encountered. However, a list of species that have been identified in the areas surrounding the study site is provided in Table 6-2. These species will need to be managed during the construction and operational phases of the development to ensure that they do not spread on to and from the study site.

Table 6-2: Alien invasive plant species identified in the surrounding areas

Family	Species	Growth form	CARA* category
AMARANTHACEAE	*Gomphrena celosioides*	Herb	Weed
ASTERACEAE	*Conyza bonariensis*	Herb	Weed
AMARANTHACEAE	*Achyranthes aspera*	Herb	Cat. 1**
ASTERACEAE	*Xanthium strumarium*	Herb	Cat. 1**
ASTERACEAE	*Verbesina encelioides*	Herb	Weed
CHENOPODIACEAE	*Chenopodium album*	Herb	Weed
SOLANACEAE	*Nicotiana glauca*	Shrub	Cat. 1**
VERBENACEAE	*Verbena bonariensis*	Herb	Weed

*Conservation of Agricultural Resources Act (Act No. 43 of 1983)

**It is a landowner's legal obligation to control all Category 1 weeds as identified in accordance to the Conservation of Agricultural Resources Act (Act No. 43 of 1983).

6.6.3 Wildlife

Historical studies that have been conducted in the area have yielded 43 mammal, 158 bird, 20 reptile, 16 frog, nine butterfly, two dragonfly and one scorpion species in the surrounding area. The presence of frogs and dragonflies on the study site is highly unlikely due to the absence of waterbodies with which these species will be directly associated. In addition to the above studies, local farmers reported the presence of Leopard, Cheetah, Pangolin (all classified as Vulnerable), African Wild Dog (classified as Endangered), Spotted Hyaena (classified as Near Threatened) and Southern African Python (classified as a Protected Species).

Mammals

The Limpopo Sweet Bushveld vegetation type and associated characteristics provide suitable habitat for a range of mammal species. Table 6-4 provides a list of the mammal species that were either observed during the site visits or of which signs were present on site.

Table 6-3: Confirmed mammal species present on the study site

Common name	Scientific name	Observed	Signs
Kudu	*Tragelaphus strepsiceros*	X	

Common name	Scientific name	Observed	Signs
Impala	*Aepyceros melampus*	X	
Blue Wildebeest	*Connochaetes taurinus*		X
Steenbok	*Raphicerus capestris*	X	
Common Duiker	*Sylvicapra grimmia*	X	
Vervet Monkey	*Cercopithecus aethiops*	X	
Chacma Baboon	*Papio ursinus*	X	
Black Backed Jackal	*Canis mesomelas*	X	
Blesbok	*Damaliscus dorcas phillipsi*	X	
Scrub Hare	*Lepus saxatilis*	X	
Porcupine	*Hystrix africaeaustralis*		X
Banded Mongoose	*Mungos mungo*	X	
Slender Mongoose	*Galerella sanguinea*	X	
Warthog	*Phacochoerus aethiopicus*	X	

The farm portion that contains the study site is more or less heavily fenced by game fencing. The total fenced off area containing this farm portion supports at least nine of the 22 regionally occurring large game species. These include Zebra, Giraffe, Nyala, Blue Wildebeest, Red Hartebeest, Blesbok, Waterbuck, Eland and Kudu.

Avifauna

As can be seen in Figure 6-11, the study site is not located in an Important Bird Area (IBA) as classified by the SANBI, however, the Waterberg System IBA is located within 30km to the east of the study site.

Of the 20 regionally occurring bird species of conservation importance, eight are likely to occur within the study area, one of which was seen flying above the site (White-backed Vulture) and another viewed along the existing access road to the site (Tawny Eagle). Both these species are classified as endangered. The presence of White-backed Vultures in the area is a key component of the inclusion of the area as a CBA1 in the Limpopo C-Plan. This bird species is generally associated with dry woodland and tall trees, which they depend on for breeding. Although no nests were detected within the boundaries of the study area, trees suitable for nesting do occur within the study area. The breeding season in South Africa is from May to June.

The single Tawny Eagle was observed perched in a large tree along the existing access road to the study site. The species inhabits mostly wooded to lightly wooded areas but is generally scarce outside of major reserves. It is likely that the individual originated from the D'Nyala Reserve to the east of the town of Lephalale.

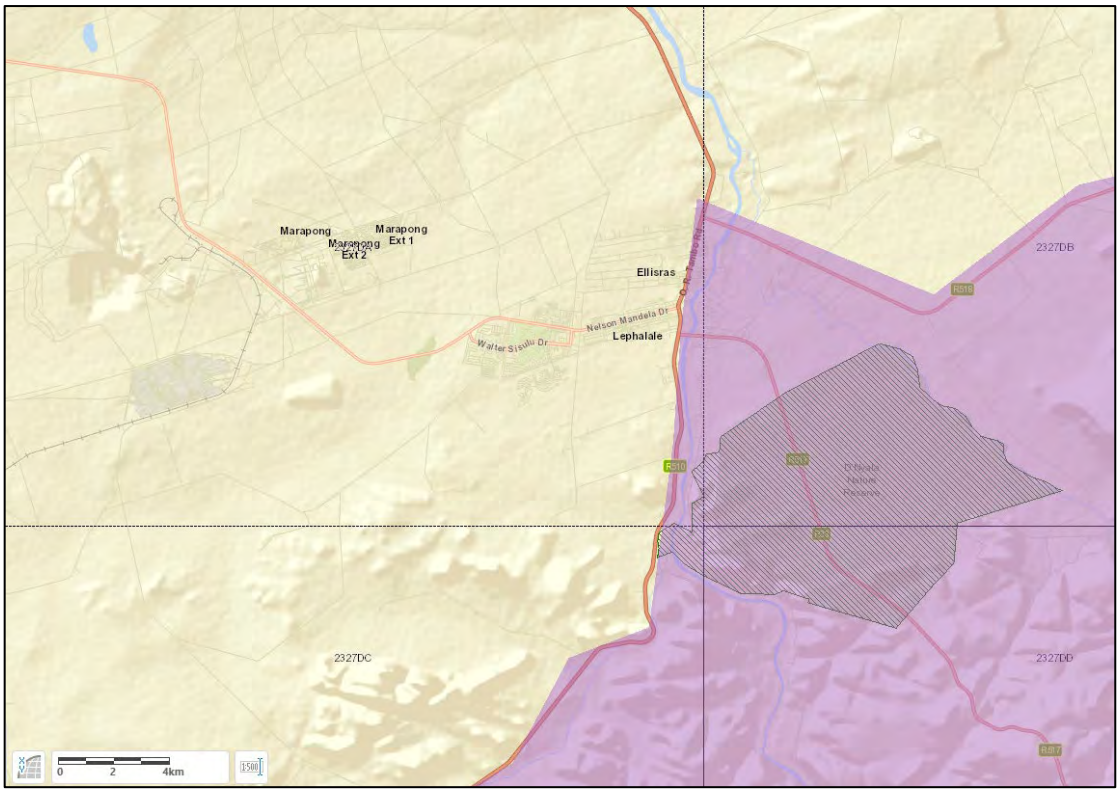


Figure 6-11: Location of the Waterberg System IBA (shown in purple) in relation to the study site

Reptiles

It is estimated that approximately 90 reptile species occur in the larger region surrounding the study site. Based on the habitat present on the study site, it is anticipated that none of the reptile species that are dependent on a permanent water source will be present on the site. As such, the number of reptiles present on the study site could be considerably less than the estimated number of regionally occurring species.

Of the two species of conservation importance that occur regionally, it is only possible that that one, the Southern African Python, may occur on the study site. No signs of this species were viewed during the site assessments, but the presence of the species has been observed on neighbouring properties around waterholes. Again, in the absence of any permanent water sources on the study site, the presence of this species is highly unlikely. The other species of conservation importance is the Nile Crocodile and with the absence of any permanent water sources, this species will not occur on the study site.

The diversity of reptiles on the study site largely consists of tortoises, lizards, geckos and snakes that are generally adapted to the soft red sands that characterise the Limpopo Sweet Bushveld. Large trees provide important habitats for geckos, skinks and larger lizards. Two tortoise species have been recorded in the area: the Leopard Tortoise and Speke's Hinged-back Tortoise.

The only snake that was observed during the site assessment conducted in March was Sundevall's Garter Snake, with no other snakes or signs of snakes recorded in any of the other visits. The presence of venomous species such as Puff Adder, Black Mamba, Boomslang, Vine Snake, Snouted Cobra, etc. are also expected, as the study site falls well within the range of distribution of these species.

Amphibians

Surveys that have been done in the area have found that approximately 20 frog species may occur in the larger area surrounding the site. Noteworthy frog species that occur within the larger area are the Giant Bullfrog and African Bullfrog. Both these species have been recorded in the area and are believed to breed in pans and depressions in the area. In the absence of any such pans / depressions within the bounds of the study site, the presence of these and other frog species within the study site is highly unlikely.

6.7 Air Quality

The proposed Lephalale Solar PV plant is located within the Waterberg-Bojanala Priority Area (WBPA). Sensitive receptors, such as residential communities, hospitals and schools, within a 10 km radium from the site were identified, as per Figure 6-12.

Ambient Air Quality (PM10 and PM2.5) data for the project site was not available for assessment. It was confirmed by Exarro that Dust fallout (DFO) is the only parameter available for assessment, as Exxaro Grootegeluk Coal Mine operates 12 single bucket monitoring stations located strategically around the mine boundary to assess the dust fallout impacts arising from mining operations. During 2020, all monitoring sites remained complaint with the National Dust Control Regulations as no exceedances of the non-residential standard were recorded.

There are presently various existing sources of pollution around the proposed site, most notably mining (the Grootegeluk Coal Mine adjacent to the site) and industrial activities (the Matimba coal-fired power station approximately 5km from the proposed site). These emission sources contribute towards the air quality status quo in the Lephalale Local Municipality, with Particulate Matter (PM) being of particular concern.

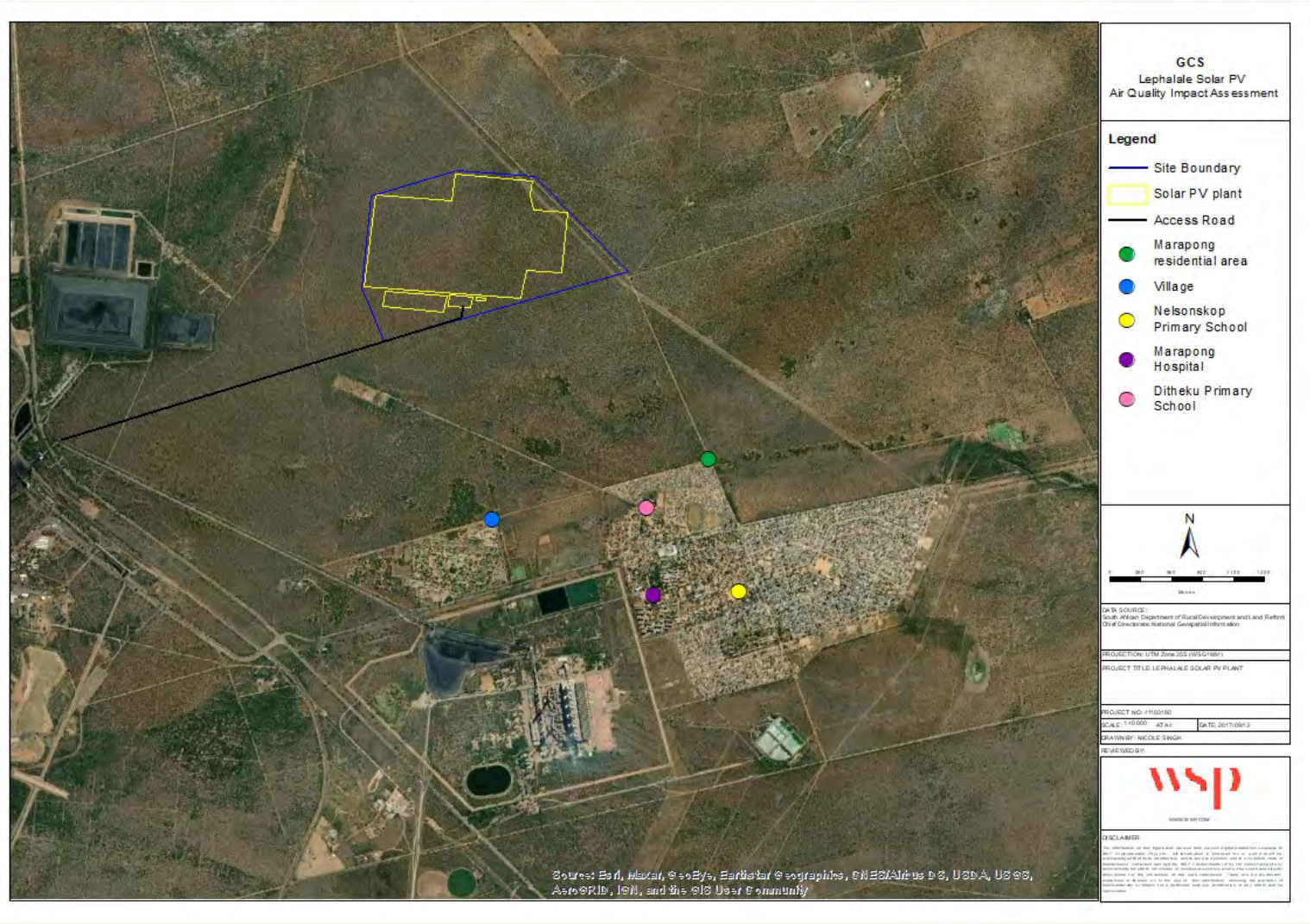


Figure 6-12: Sensitive receptors adjacent to the proposed site

6.8 Heritage Sites and Palaeontological Importance

Several heritage sites have been recorded outside of the study area, including historical buildings, Stone Age material and human graves; however, none were observed on site. Although the area is considered to be of high palaeontological importance, no features of any significance were identified during the site visit. The project will have a shallow foundation, and so there is unlikely to be any disturbance to palaeontological material. A "Chance Find Protocol" has been provided, to form part of the EMPr.

6.9 Socio-Economic Environment

Limpopo is the northern-most province in South Africa and shares international borders with Mozambique, Zimbabwe and Botswana in the north, and provincial borders with Mpumalanga, Gauteng and North West provinces in the south. The province covers a geographical area of 125 806.1 km² and a population of 5 779 090. This equates to a population density of 46.1/km^2 in 2016. The estimated population of Limpopo was 5 404 553 in 2020, therefore ranking the province 5th in terms of both surface area and population in South Africa.

Limpopo is divided into five district municipalities, which are subdivided into 22 local municipalities. The economy of the province, as well as the district and local municipalities, is largely based on mining, agriculture and tourism. Lephalale is situated approximately 280 km north-west of Pretoria and covers an area of 13 826.1 km^2. Lephalale is the largest of the local municipalities within the Waterberg district. As the district contains much of the UNESCO-designated Waterberg Biosphere, the area is considered a prime ecotourist destination with several game farms that attract international tourists.

The closest community is Marapong is located 1.5km from the border of the mine property and 12.14 km at its furthest point. Marapong covers a geographical area of 399km^2 has a population of 26 227, equating to a population density of 6 565.16 people per km². There is a significantly larger male population (62.68%) as opposed to female (37.32%), with the biggest age group being 25-29 year olds (18.64%). The largest population group is Black African (97.62%) and the most common first language is Sepedi (54.40%).

6.10 Transportation

The proposed Lephalale Solar Facility is located in close proximity to provincial roads. An existing access to the area already exists in the form of a farm access point. The access for the future development could be upgraded or moved to a new position in order to accommodate the proposed adjusted land use. The existing access position is located approximately 3.5 km east of the D2001 Provincial Road. The access road between the

development and the D2001 Provincial Road is a private gravel road and will be extended to traverse over Portion 1 of the farm Appelvlakte 448.

6.11 Visual Aspects

The visual character of an area plays a significant role in determining an area's sense of place, specifically the area's land use, topography, cultural features, landscape quality, etc. The area surrounding the study area comprises of existing industrial and mining features, built up areas, homesteads and game farming. Existing mining and industrial areas include the Grootegeluk Coal Mine and the Medupi and Matimba Coal Power Stations. The built-up areas include the town of Marapong and the Lephalale Marapong Housing Area. Marapong is made up of a formal standard township area with all amenities and the remainder of Marapong comprises of low-cost housing areas (Tekplan Environmental, 2017). During the site visit, it was noticed that Marapong and the internal roads were constantly busy with foot traffic (residents and workers) as well as vehicle movement, which contributes to the area's sense of place.

Natural vegetation cover (for the greater portion of the proposed solar plant and surrounding areas) is relatively undisturbed. However, in some areas vegetation was cleared specifically for transmission line servitudes, which increased the visibility of the transmission lines. Overall, the human impact on the surrounding area of the proposed solar plant is evident in terms of the existing coal mine, industrial areas and residential areas.

Within this region is also the presence of natural bushveld, which can be consistently seen throughout the site and the surrounding areas. This natural and dense vegetation aids in partially screen the visibility of existing industrial activities within the area.

Overall, the presence of existing industrial and mining activities and the dense natural bushveld make up the area's current sense of place. Considering aspects of existing industrial and mining areas and the vegetation of the area, the proposed solar plant's impact on the area's current sense of place is expected to be low throughout its lifespan.

The main types of sensitive receptors identified in this study are the nearby towns (Marapong, Lephalale Marapong Housing Area, Onverwacht and Lephalale), homesteads, nature reserves, main roads, secondary roads, recreational areas and places of work within 15km of the proposed activity. These identified sensitive receptors fall within the high and moderate sensitivity categories. It is assumed that the magnitude of visual impact is highest within 5km of an activity and decreases the further away an observer is from the activity. Therefore, the distance of the identified sensitive receptors from the proposed development will also be considered. Refer to Figure 6-13.

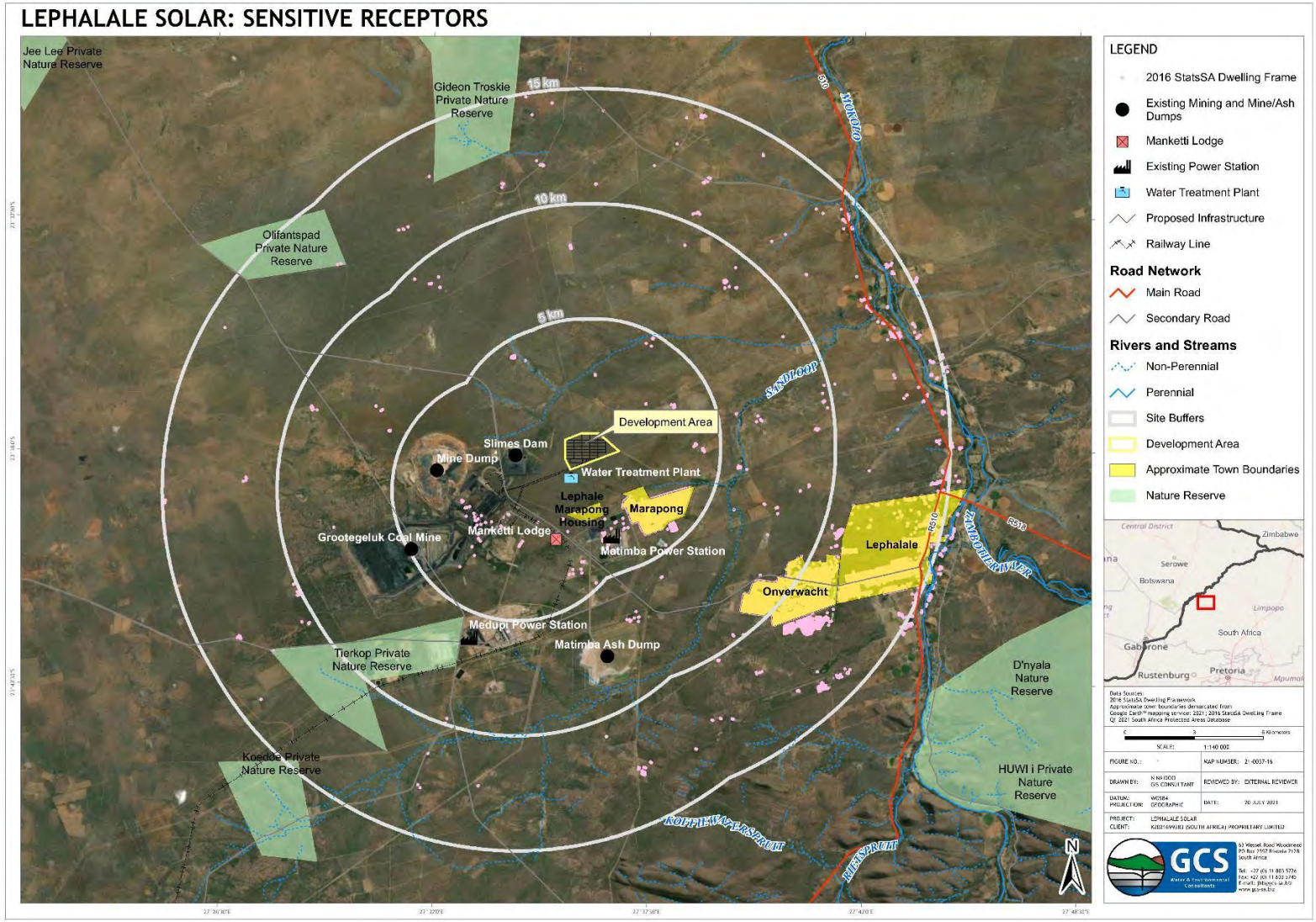


Figure 6-13: Sensitive receptors around the proposed site

7 SUMMARY OF SPECIALIST INVESTIGATIONS

This section provides an overview of the specialist studies undertaken for the project, including the following information regarding each study:

- The details of the specialist who prepared the report;
- An overview of the scope of each study; and
- An overview of each specialist's findings and the implications of those on the project.

7.1 Air Quality Impact Assessment

7.1.1 Specialist Details

An Air Quality Impact Assessment (AQIA) assessing the construction impacts associated with the proposed Lephalale Solar PV facility has been undertaken by WSP Group Africa (Pty) Ltd (WSP) (C/O Nicole Singh, dated 8 October 2021). This report is included in Appendix E-1.

7.1.2 Scope of Work

The scope of work was performed in fulfilment of the requirements of the AQIA is provided below:

Baseline Assessment

- Review of applicable air quality legislation;
- Review of the potential pollutants and associated human health effects;
- Review of available meteorological data for the area;
- Identification of neighbouring sensitive receptors, including adjacent communities and farmers;
- Residential areas within the proposed development area; and
- Identification of any neighbouring sources.

Emissions Inventory and Dispersion Modelling

- Compilation of an emissions inventory for activities undertaken during construction;
- Undertake dispersion modelling simulations (AERMOD, Level Two) to determine the air quality impacts associated with the construction of the solar facility; and
- Comparison of predicted model concentrations to air quality standards.

Air Quality Impact Assessment

- Compilation of an Air Quality Impact Assessment.

7.1.3 Findings

A baseline assessment was undertaken that included a geographic overview and a review of available meteorological data. To characterise the meteorological conditions of the site, local meteorological data was sourced from the South African Weather Services Lephalale Monitoring Station for the January 2018 -December 2020 period.

Key pollutants associated with onsite activities were identified as PM_{10} (particulate matter with an aerodynamic diameter less than 10 microns), PM2.5 (particulate matter with an aerodynamic diameter less than 2.5 microns) and dust fallout (modelled as TSP). Construction activities was estimated on an area wide footprint and the emission rate used was environmentally conservative, with results likely being higher than those that will be experienced in reality. Further, it must be emphasised that the construction activities are transient in nature.

The impact assessment comprised of an emissions inventory and subsequent dispersion modelling simulations. Five receptors (areas that may be impacted negatively due to emissions from the Lephalale Solar Project) were identified in the area surrounding the proposed project area, within a 10 km radius, and were used for this assessment. An emissions inventory was developed using site-specific data and emission factors which were sourced from the United States Environmental Protection Agency AP42 (US EPA, 1995) and the Australian Government National Pollutant Inventory (NPI, 2012) databases. This emissions inventory was input into a Level 2 atmospheric dispersion model, AERMOD, together with prognostic MM5 meteorological data, to calculate ambient air concentrations of key pollutants associated with the proposed operations.

Two scenarios were modelled, i.e., an unmitigated scenario and a scenario with mitigation.

It was found that predicted PM_{10} 24-hour average concentrations at receptor 01 (Village) will exceed the PM10 24-hour standard in the unmitigated scenario, however annual average concentrations remain compliant with the annual standard. With mitigation, both the 24-hour and annual average PM_{10} concentrations are predicted to be compliant with the relevant standards. In terms of the scenarios for $PM_{2.5}$, it was found that for both unmitigated and mitigated scenarios, ambient 24-hour (P99) and annual average $PM_{2.5}$ concentrations are predicted to be compliant at all sensitive receptors during construction of the proposed Solar PV facility.

Changes in predicted PM_{10} concentrations between unmitigated and mitigated scenarios are substantial, with a 63% decrease in average 24-hour (P99) and a 74% decrease in the annual average PM_{10} concentrations predicted with mitigation. Changes in predicted $PM_{2.5}$ concentrations between unmitigated and mitigated are also substantial, with a 55% decrease

in average 24-hour (P99) and a 50% decrease in the annual average $PM_{2.5}$ concentrations predicted with mitigation.

Both the unmitigated and mitigated scenarios highest 24-hourly and annual average fence-line PM_{10} concentrations were found to be non-compliant with the relevant standards due to the close proximity of the Solar PV access road to the boundary, however, the mitigated highest predicted annual average concentrations remain compliant with the standard. The mitigated, highest predicted 24-hour and annual fence-line $PM_{2.5}$ concentrations are compliant with the relevant standards, whilst only the highest predicted 24-hour fence-line $PM_{2.5}$ concentrations in the unmitigated scenario are non-compliant with the relevant standards due to the close proximity of the Solar PV access road to the boundary.

It must be considered that despite the non-compliance predicted on the fence-line of the Solar PV facility, all concentrations predicted at the neighbouring sensitive receptors during the mitigated scenario remain compliant with their relevant standards.

In terms of dust fallout, both mitigated and unmitigated scenarios has no exceedances of the dust fallout residential standard are predicted at any of the neighbouring sensitive receptors. Whilst the unmitigated highest predicted daily fence-line dust fallout rates are non-compliant with the non-residential standard due to the close proximity of the Solar PV access road to the boundary, the mitigated highest daily dust fallout rates remain complaint with the non-residential standard. Also, the overall levels of dust fallout anticipated to occur during construction activities potentially impacting on surrounding receptors are below the respective National Dust Control Regulations.

7.1.4 Recommendations

The following recommendations are provided to minimize air quality impacts during construction activities:

- Mitigation measures to be implemented during construction as confirmed by the proponent are:
    - Use of water sprays during construction activities, thereby limiting the dispersion of particulate emissions;
    - Continuous wetting of the access road during vehicle transport; and
    - Wetting of exposed stockpiles to limit the dispersion of wind-blown dust emissions.
- Information regarding construction activities should be provided to all local communities. Such information includes:
    - Contact details of a responsible person on site should complaints arise to reduce emissions in a timely manner;
    - Complaints register must be kept recording all events;

- General housekeeping should be implemented on site to keep PM and dust emissions to a minimum;
- All incoming and outgoing truck loads must be covered;
- Avoid dust generating works during extreme windy conditions;
- Use of chemical stabilisation on access road must be considered as its usually cost effective for relatively long term or semi-permanent unpaved roads.
- When working near (within 100 m) a potential sensitive receptor, limit the number of simultaneous activities to a minimum as far as possible; and
- Wet suppression and wind speed reduction are common methods used to control open dust sources at construction sites as a source of water and material for wind barriers tend to be readily available. General control methods for open dust sources, as recommended by the USEPA, are given in Table 6-13 within the AQIA Report.

Construction of the Solar PV plant will result in minimal air quality impacts on nearby receptors. Given the low impacts on the receiving environment, based on the findings of this AQIA, it is recommended the proposed Solar PV facility be authorised.

7.2 Ecological Assessment

7.2.1 Specialist Details

An Ecological Assessment has been undertaken by GCS (Pty) Ltd (C/O Magnus van Rooyen, August 2021) for the proposed Lephalale Solar Project in accordance with the requirements for specialist assessments as outlined within the 2014 EIA Regulations (as amended). This report is included in Appendix E-2.

7.2.2 Scope of Work

The Scope of Work to achieve the requirements of the 2014 EIA Regulations (as amended) is in brief, as follows:

- A methodology of the site visit and techniques used to assess the specific aspects of the site;
- Details of the assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives (where applicable);
- An indication of any areas that are to be avoided, including provision of buffers;
- A description of any assumptions made and any uncertainties or gaps in knowledge;
- A description of the findings and potential implications of such findings on the impact of the proposed activities;

- Any mitigation measures for inclusion in the Environmental Management Programme Report (EMPr);
- Any conditions for inclusion in the Environmental Authorisation and the Water Use Licence;
- Any monitoring requirements for inclusion into the EMPr or Water Use Licence; and
- A reasoned opinion whether the activity should be authorised based on the findings of the assessment.

7.2.3 Findings

An interrogation of the Protected Area Register indicated that no protected areas are present on the study site. The nearest conservation areas are the D-Nyala Game Reserve located 18km to the southeast of the study site and the Tierkop Private Game Reserve 10km to the southwest. Neither of these reserves will be impacted upon by the development of the project on the study site. Furthermore, no critically endangered and endangered ecosystems as identified in accordance with the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) were identified within the study site.

Although the study site forms part of the Manketti Private Nature Reserve (www.mankettilodge.co.za), the presence of mining operations, power generation facilities (and associated infrastructure) as well as residential areas in close proximity of the study site significantly detracts from the study site's potential to form part of any protected area expansion plans.

The vegetation type on the study site has been classified as Limpopo Sweet Bushveld which is considered to be "least threatened" as a result of the small area of this vegetation type that has been disturbed (approximately 5%). The loss of approximately 256ha of the vegetation type (and associated species) is therefore considered to be a negligible loss to the total distribution of the vegetation type. However, the appropriate authorisations / permits must be obtained from the relevant authorities for the clearance and removal of the special species identified in the assessment.

The mammals that were identified on the study site does not limit their range land or distribution to the site in particular. As such, they largely move freely between the surrounding properties which significantly reduces the impact of the facility on these species. The diversity of reptiles on the study site largely consists of tortoises, lizards, geckos and snakes that are generally adapted to the soft red sands that characterise the Limpopo Sweet Bushveld. It is believed that the species that are dependent on a permanent water source will not be present on the study site as there no such features on the site. Similarly, to the situation with the mammal species on the site, the reptiles will move off the study site during

construction and will move into the surrounding properties that have similar ecological conditions.

No Important Bird Areas (IBA) were found to overlap the property. However, the presence of two bird species of conservation importance were noted on the site. Provision must be made in the design of the overhead powerline to limit the amount potential bird-strikes that may occur as a result of the high number of birds of prey that is present in the area.

The study site is located in a FEPA Sub-catchment forming a part of the Limpopo Water Management Area but have no direct surface water connectivity to the catchment. Due to the high permeability of the sandy soils on the site it is considered that the site will make a contribution to the regional groundwater in the sub-catchment. Additionally, no aquatic features were identified within the study site. No such features will therefore be impacted upon by the development of the project.

The absence of any aquatic features within the study site will make the presence of any amphibians very rare on the site. As such, the impact on this animal class is considered to be negligible.

The conservation significance of the study site is greatly decreased by the wide distribution and relatively pristine Limpopo Bushveld vegetation type that is present on the study site. As such, the impact on species, ecological processes, etc. associated the vegetation type is considered to also be reduced. The site does however fall within a CBA1 as a result of its location within a Strategic Water Resource Area (Limpopo Water Management Area), however, it is believed that the contribution of the study site to the catchment is through its groundwater contribution as a result of the high permeability of the sandy soils on the site. The development of the project will have a very limited to negligible impact on this groundwater contribution.

Based on the findings of the assessment it is the opinion of the Specialist that there are no reasons that the development should not be authorised in accordance with the specifications as presented the assessment. The authorisation must make provision for the various management and mitigation measures detailed in this report (Ecological Assessment).

7.3 Soil, Land Capability and Land Use Assessment

7.3.1 Specialist Details

A Soil, Land Capability and Land Use Specialist Assessment has been undertaken by Eco-Assist Environmental Consultants (C/O Wayne Jackson, July 2021) for the proposed Lephalale Solar

Project in accordance with the requirements for specialist assessments as outlined within the 2014 EIA Regulations (as amended). This report is included in Appendix E-3.

7.3.2 Scope of Work

The scope of work was performed in fulfilment of the requirements of the assessment is provided below:

- Assess and discuss historic climate statistics;
- Assess and discuss geological information;
- Assess and discuss the terrain features using 5m contours;
- Source best recent satellite or aerial imagery and georeferenced;
- Assess and discuss current agricultural land use on site and comment on crop performance and estimated yields (if any);
- Conduct soil assessment as described in the methodology;
- Assess and discuss agricultural land potential (eight class scale);
- Discuss the impact of the proposed land use change on loss of agricultural land production (If any);
- Recommend best location for proposed development to reduce impacts;
- Compile informative reports and maps on current land use and agricultural land potential;
- Discuss the impact of the proposed land use change on loss of agricultural land production; and
- A basic soil management guideline will be completed.

The results will be mapped in GIS format and will include the following maps:

- A soil distribution map;
- A current land use map; and
- An agricultural potential map.

An Impact assessment of the proposed development will be conducted, and the recommendations can be used in the Environmental Management Plan (EMP).

7.3.3 Findings

A detailed soil survey was conducted for the Lephalale Solar site in June 2021 using a hand-held auger and a GPS to log all information in the field. The soils were classified to the family level as per the "Soil Classification: A Natural and Anthropogenic System for South Africa" (Eco-Assist, 2021).

Soil Types

The following soil forms were identified on site:

- Hutton (Orthic topsoil over a thick Red Apedal horizon);
- Ermelo (Orthic topsoil over a thick Yellow-Brown Apedal horizon); and
- Fernwood (Orthic topsoil over a thick Albic horizon).

The project area is dominated by the deep freely draining Ermelo and Hutton soil forms, which are situated in the midslopes to upper sloped landscape positions. The Ermelo/Hutton accounts for 337.72 hectares of the project area (area within the 100m assessment buffer). The soils in the midslope to footslope positions due to the macro catena effect of water movement through the landscape have become bleached. The soils were classified as deep Fernwood soils and they accounted for 85.32 hectares of the project area. Table 7-1 summarises the soil forms found on site and Figure 7-1 depicts the soil delineation for the site.

Table 7-1: Soil forms found in the project area (Eco-Assist, 2021)

Soil Form	Soil Family	Area (ha)
Ermelo	2210	337.72
Hutton	2210	
Fernwood	2110	85.32
Disturbed	N/A	5.05
Total		428.09

Land Capability

The land capability and agricultural potential of a site is determined by the soil, terrain and climate, to establish the most sustainable, intensive, long-term use of the land under natural, rain-fed conditions. This also provides an indication of the limitations of the area.

The desktop land capability rated the project area as Low-Moderate whilst the desktop soil capability rated the project area as Low. The land capability of this site is therefore classed as light cultivation/intensive grazing (i.e., Class IV in accordance with "The farming handbook" (Smith, 2006), with restricted soil potential due to the soil forms present (Figure 7-2).

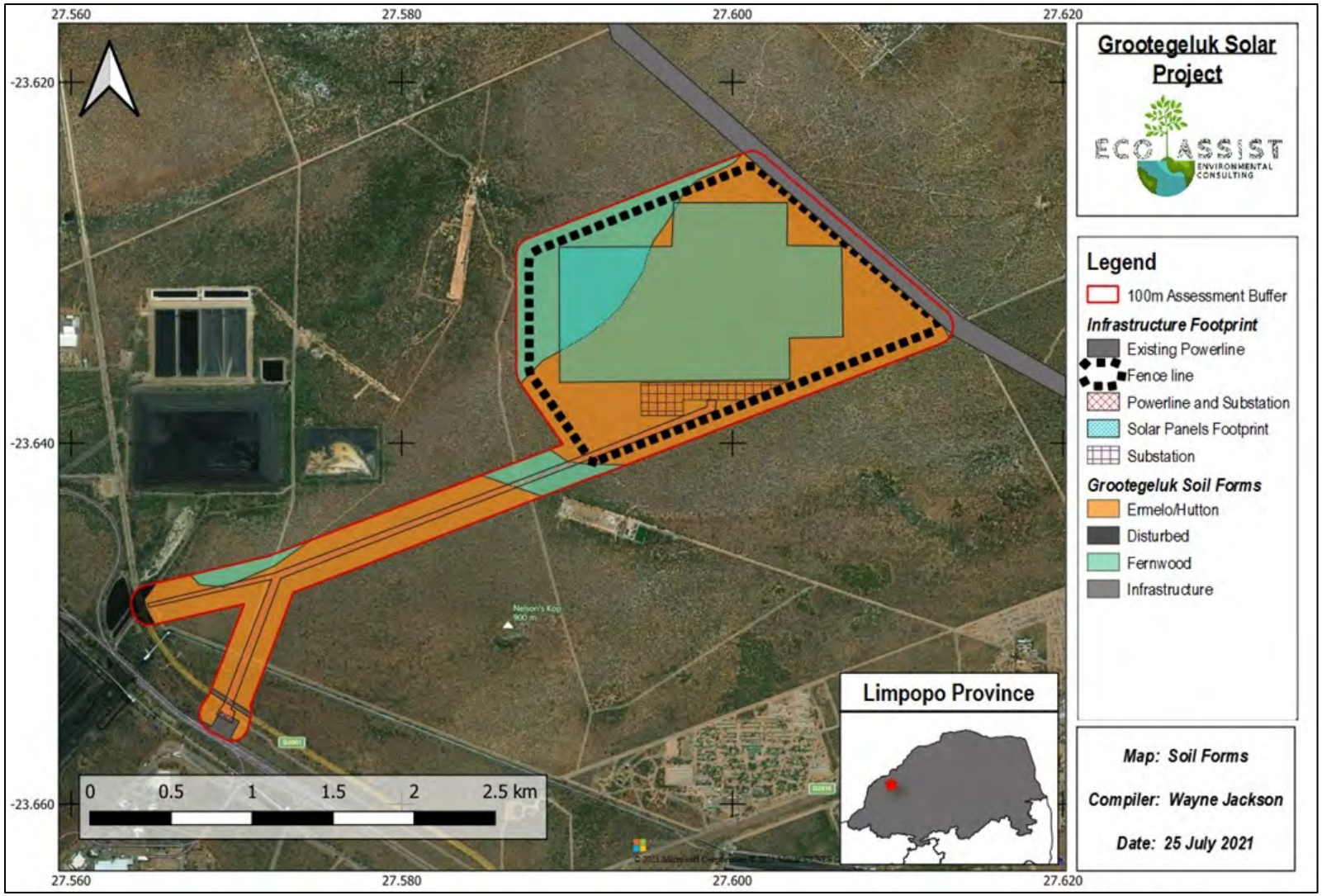


Figure 7-1: Soil delineation of the project area (Eco-Assist, 2021)

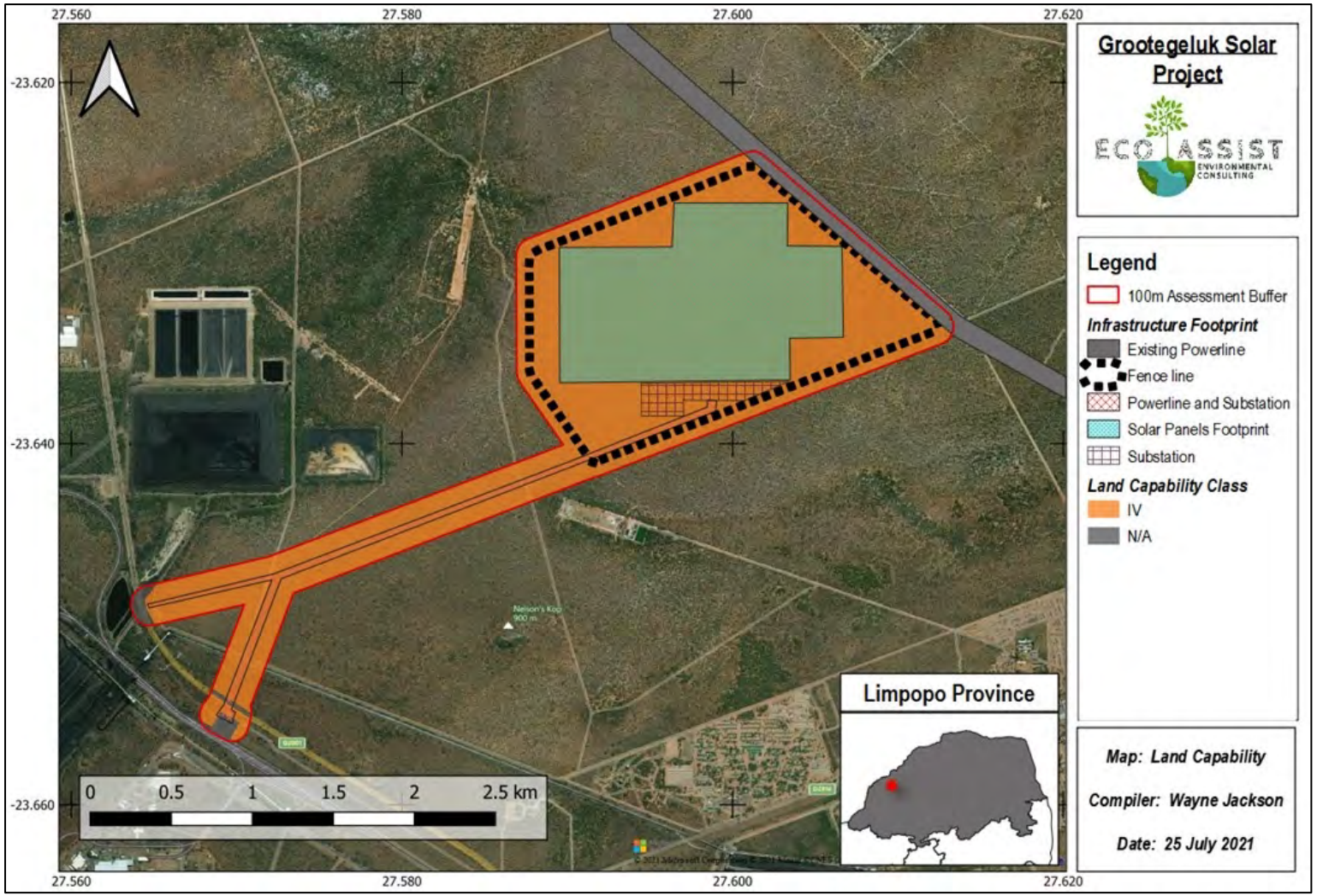


Figure 7-2: Land capability of the project area (Eco-Assist, 2021)

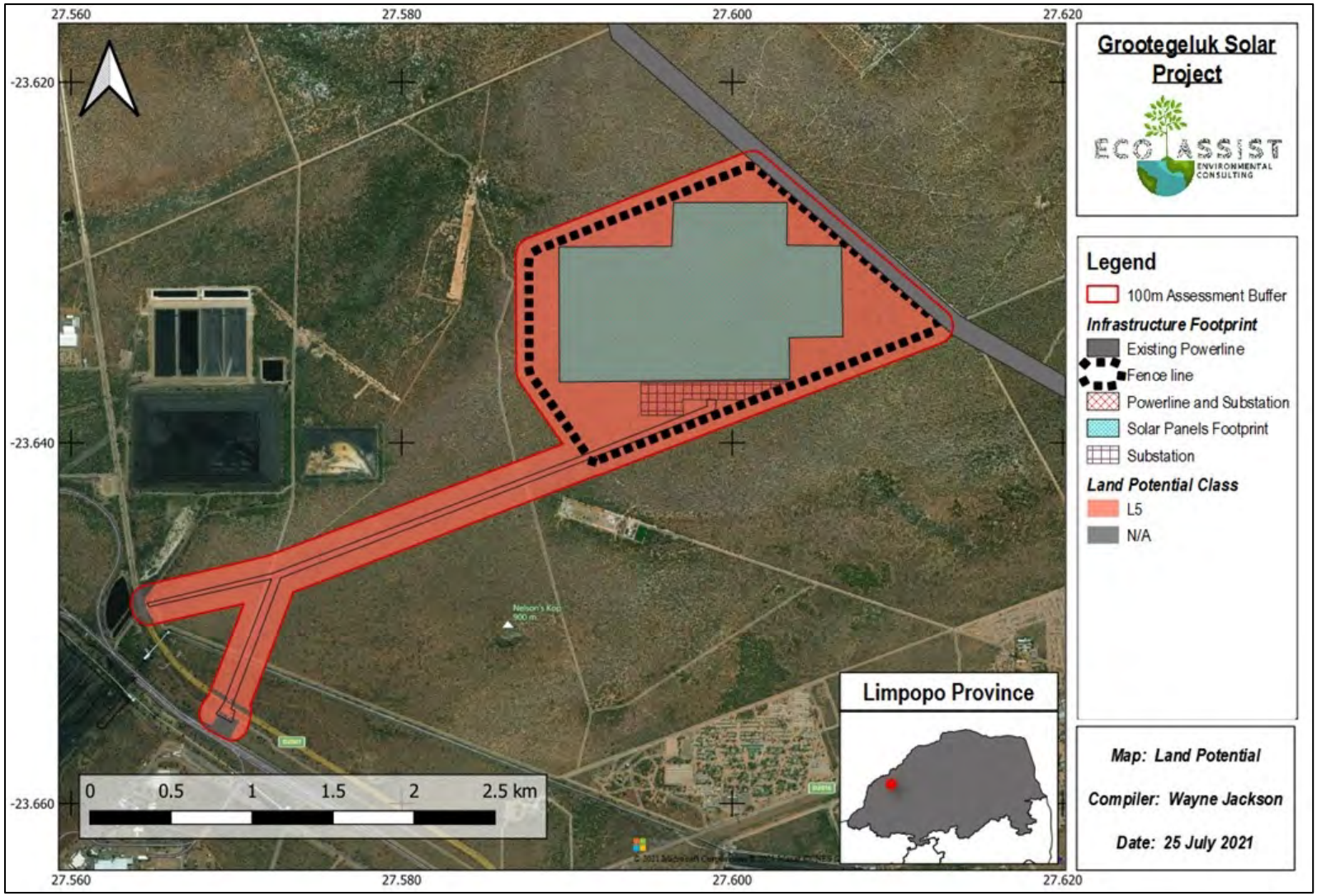


Figure 7-3: Land potential in the project area (Eco-Assist, 2021)

Agricultural Potential

The Land potential / Agricultural potential of the project area is shown in Figure 7-3 and the breakdown of the areas is shown in Table 7-2. The class IV land capability was determined to be class L5 (Restricted potential), accounting for 423.04 ha.

L5 - Restricted potential: Regular and/or moderate to severe limitations due to soil, slope, temperatures or rainfall.

Table 7-2: Land potential within the project area (Eco-Assist, 2021)

Land Potential	Area (ha)
L5	423.04
N/A	5.05
Total	428.09

Site Sensitivity

The sensitivity analysis has identified the project area to have a medium sensitivity and as such an Agricultural Compliance Statement will be required. The assessment has also determined that the development falls within the allowable limits as described in GN320. The project area is in a medium agricultural sensitivity and is not located within any crop boundary.

The desktop results as well as the field verification and detailed soils assessment have determined that the agricultural potential is rated as medium to low based on the climatic restrictions that are limiting the potential for sustainable yields.

The specialist opinion is that the proposed project be considered favourably as the DEA screening tool value of medium sensitivity was verified by confirming the project was not within any crop farming boundaries and that the proposed development of the Solar project was therefor within the allowable limits stated in GN 320. This was further strengthened by the detailed in-field survey confirming the land potential to have a restricted potential.

7.3.4 Recommendations

The potential impacts described in (Terra Soil Science, 26 September 2011) was confirmed for this project. These aspects are to be managed to minimise any potential impacts:

- Erosion was not considered a large risk; however, stormwater mitigation should be considered to mitigate and manage any risks;
- Risks from oil/hydrocarbon spills from vehicles should be mitigated; and
- Dust control measures should be put in place.

7.4 Geohydrological Investigation

7.4.1 Specialist Details

A Geohydrological Investigation assessing the abstraction boreholes for the proposed Lephalale Solar PV facility in support of the Water Use License Application (WULA) has been undertaken by GCS (Pty) Ltd (C/O Lukas Marais, dated August 2021). This report is included in Appendix E-4.

7.4.2 Scope of Work

The following components were accepted as the scope of work:

- A detailed desktop study of the project area.
- Drilling supervision and hydrogeological logging of the hard rock conditions;
- Aquifer testing of the newly drilled boreholes
- Groundwater quality sampling of the newly installed boreholes;
- Pump specification recommendations and recommended abstraction schedule;
- Compilation of a hydrogeological report with the findings of the study as well as detailed recommendations for resource development, management and monitoring with relevant information for inclusion within the WULA.

7.4.3 Findings

Figure 7-4 represents the hydrogeological characterisation across the greater project area, consisting of fractured or potentially fractured arenaceous rocks (sandstone, feldspathic sandstone, Arkose, shale and grit) which do not have a high primary permeability or inconsistent permeability. The aquifer underlying the study area may be classified as a minor aquifer system (Parsons et al, 1995), of an intergranular and fractured type with a d2 borehole yield class of 0.1-0.5 l/s. The aquifer extent may be restricted with a variable water quality. Although these types of aquifers do not often produce large quantities of water, they are crucial both for local supplies and in providing river base flow.

According to the available NGA and WARM data regional groundwater levels range between 1.12 and 150 mbgl whereas locally water levels range between 16.76-27.43 mbgl.

The regional spatial distribution of the existing boreholes around the site can be seen in Figure 7-5.

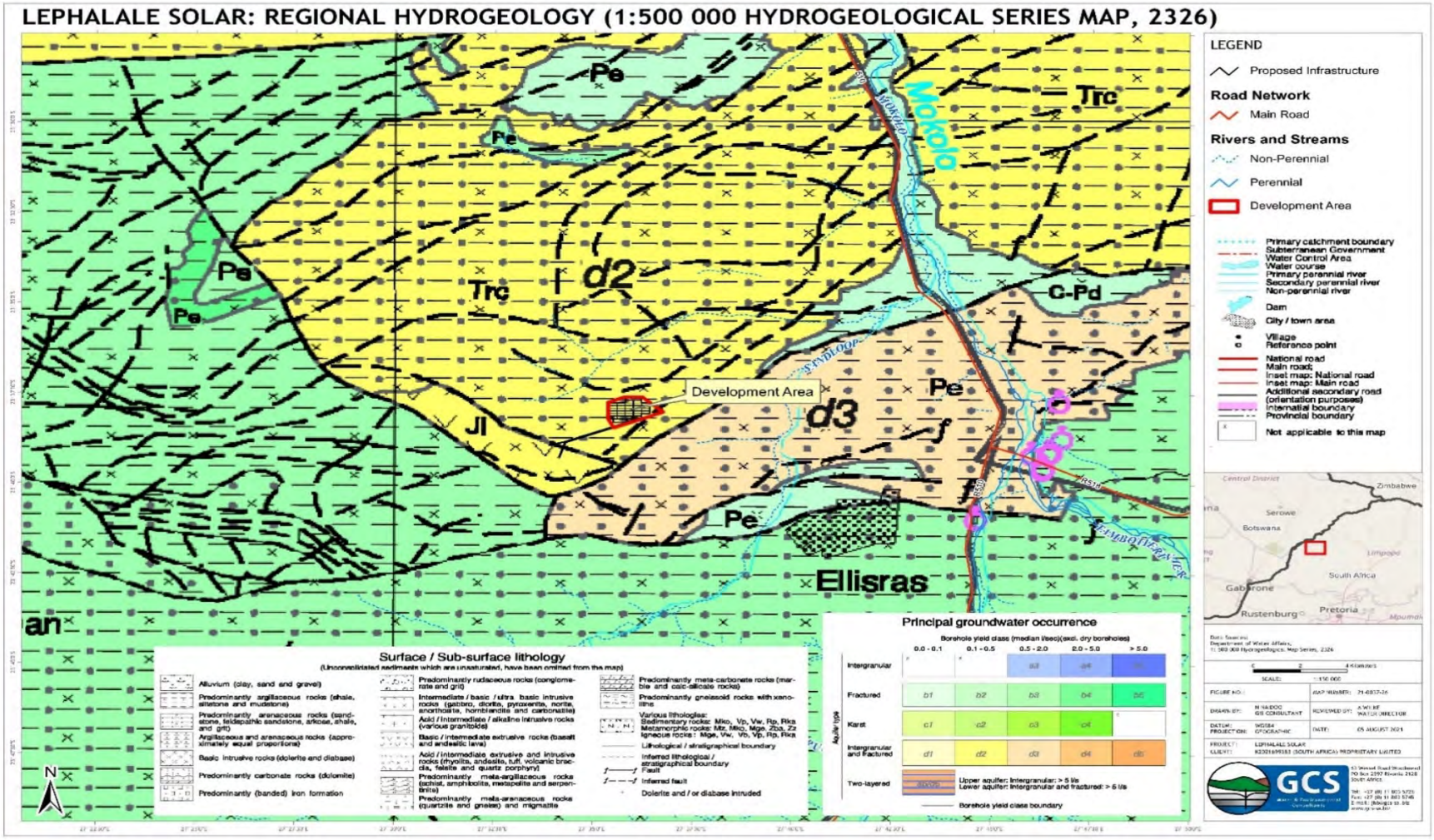


Figure 7-4: Regional hydrogeology

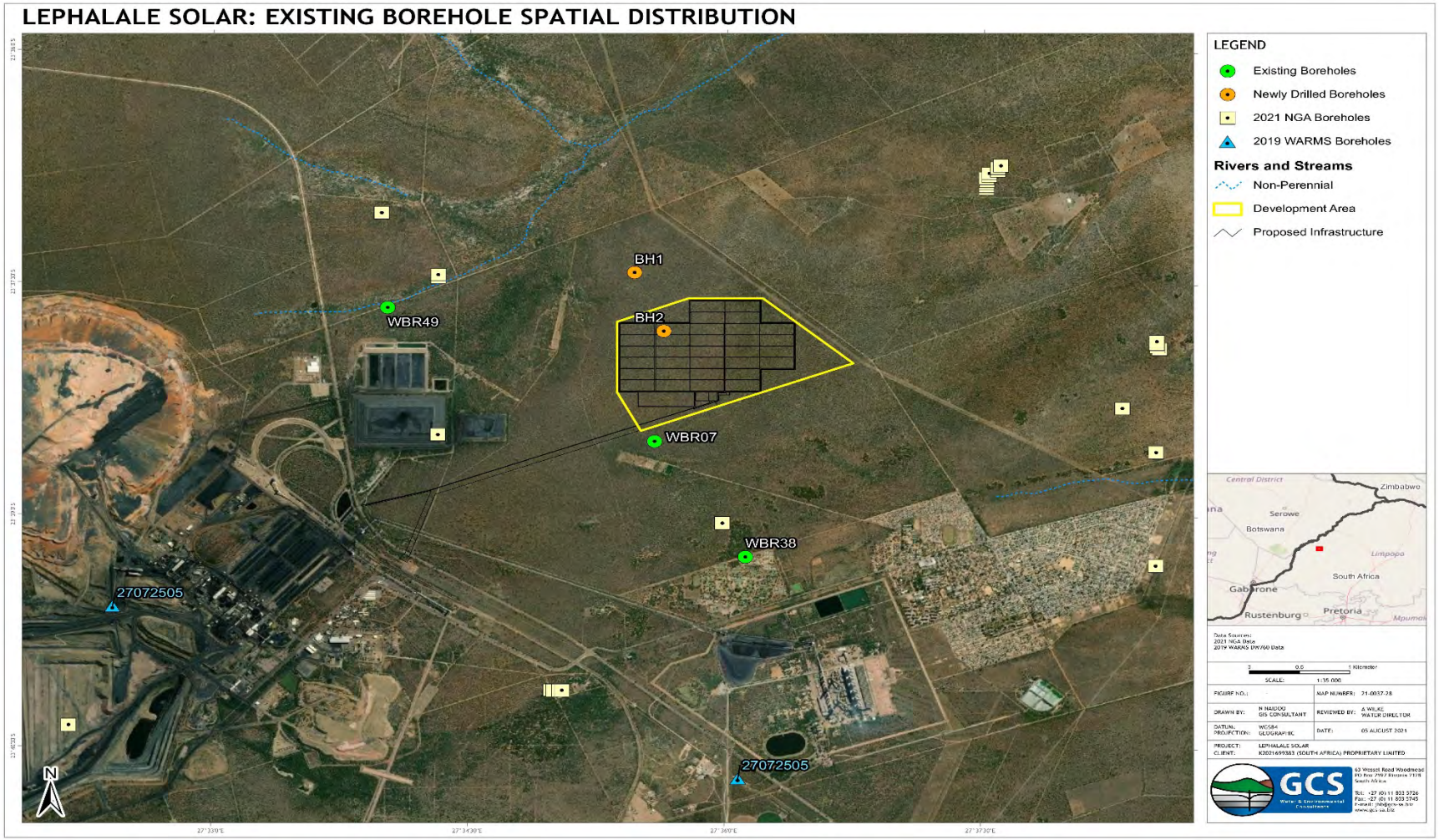


Figure 7-5: Borehole spatial distribution

A groundwater balance was prepared for the sub-catchment, which evaluated all major resource input and outputs. The theoretical groundwater reserve indicates that sufficient water is available for abstraction to meet the water requirement of 2920 m^3/annum.

The impact of abstraction by lowering of regional groundwater levels within the aquifer may be mitigated by keeping to the recommended pumping schedule.

7.4.4 Recommendations

The following is recommended:

- It is recommended that the groundwater levels and hydrochemistry of the boreholes are monitored as per the groundwater management plan
- Water should be used sparingly, and all leaks and faulty reticulation should be attended to as soon as detected.
- The data collected from monitoring must be interpreted by a hydrogeologist in order to assess long-term impacts of abstraction.
- It is imperative that drawdown within BH2 does not exceed 20 m (with a static water level of 44 mbgl), in order to reduce the likelihood of dewatering the fractures in the aquifer and only at the prescribed pumping rate or lower.
- It is recommended that the abstraction (pumping) schedule be re-evaluated on an annual basis
- It is recommended that an additional backup borehole be sited, drilled and commissioned as a single water supply borehole will leave the project vulnerable to failure of the production borehole due to aquifer dewatering or mechanical breakdown.

7.5 Hydrological Investigation

7.5.1 Specialist Details

A Surface Water Study for the proposed Lephalale Solar PV facility in support of the Water Use License Application and the Environmental Impact Assessment has been undertaken by GCS (Pty) Ltd (C/O Jennifer Meneghelli, dated August 2021). This report is included in Appendix E-5.

7.5.2 Scope of Work

The Scope of Work (SoW) is comprised of the following tasks:

- Desktop study and project initiation: review previous studies done on the site, review client information and identify applicable legislation.
- Catchment characterisation and baseline hydrology assessment.
- Conceptual stormwater management plan for the site.
- Water balance for proposed infrastructure.
- Surface water monitoring program is to be specified if deemed necessary.
- Surface water impact assessment of all infrastructure including run-off impacts. The Department of Human Settlements, Water and Sanitation (DHSW&S) risk assessment matrix as per Department of Water and Sanitation (DWS) 2015 publication: Section 21 c) and i) water use Risk Assessment Protocol was adapted to be used for hydrological impacts.

7.5.3 Findings

A conceptual SWMP was designed for the site. It was found that the site is located on a ridge and therefore has no upstream catchments draining towards it. Thus, only rainfall from the site itself requires management. This site will be made up of solar modules with vegetation re-established between them after construction in order to make the site as pervious as possible. All runoff from the site will be clean. It is proposed that the runoff be allowed to free drain off the site over the natural topography as this will have less hydrological impacts than concentrated flow in a collection system.

Water balances were carried out based on water demands supplied by the Client for construction and operational phases. All water will be supplied via borehole abstraction. During operations, a WTP will treat the borehole water to potable standards. Sewage from domestic water use will be directed to a buried tank. Effluent will be collected by tanker and disposed of off-site at an appropriate facility. Water required for cleaning of the solar panels will be sent from the WTP to a demineralization process. It is assumed that water from washing the panels will runoff to the environment.

The surface water risk assessment found that there would be slightly detrimental impacts to the site based on proposed activities, and that the implementation of mitigation measures would reduce these risks to negligible. The entire site is considered a clean water catchment as there are no chemical processes occurring or mining activities. The only threats to the environment include compaction of the site soils, increased run-off, erosion, and sedimentation all of which can be managed to protect the surrounds by the SWMP.

As there are no streams on or near the site, surface water monitoring is not feasible and therefore no program was recommended. Grootegeluk Coal Mine is going to be approached regarding their current water monitoring programs to see if these can be used to monitor the impacts of the site's development.

7.6 Wetland Assessment

7.6.1 Specialist Details

A Wetland Assessment has been undertaken by GCS (Pty) Ltd (C/O Magnus van Rooyen, July 2021) for the proposed Lephalale Solar Project in accordance with the requirements for specialist assessments as outlined within the 2014 EIA Regulations (as amended). This report is included in Appendix E-6.

7.6.2 Scope of Work

The Scope of Work to achieve the requirements of the 2014 EIA Regulations (as amended) is in brief, as follows:

- A methodology of the site visit and techniques used to assess the specific aspects of the site;
- Details of the assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives (where applicable);
- An indication of any areas that are to be avoided, including provision of buffers;
- A description of any assumptions made and any uncertainties or gaps in knowledge;
- A description of the findings and potential implications of such findings on the impact of the proposed activities;
- Any mitigation measures for inclusion in the Environmental Management Programme Report (EMPr);
- Any conditions for inclusion in the Environmental Authorisation and the Water Use License;
- Any monitoring requirements for inclusion into the EMPr or Water Use License; and
- A reasoned opinion whether the activity should be authorised based on the findings of the assessment.

7.6.3 Findings

The NFEPA database indicates the presence of a single area that shows wetland characteristics and identifies this feature as artificial in nature (refer to Figure 7-6) while the SANBI wetland database does not indicated any wetland features within the study area. The extent of the study area has been indicated in the figures with a yellow outline.

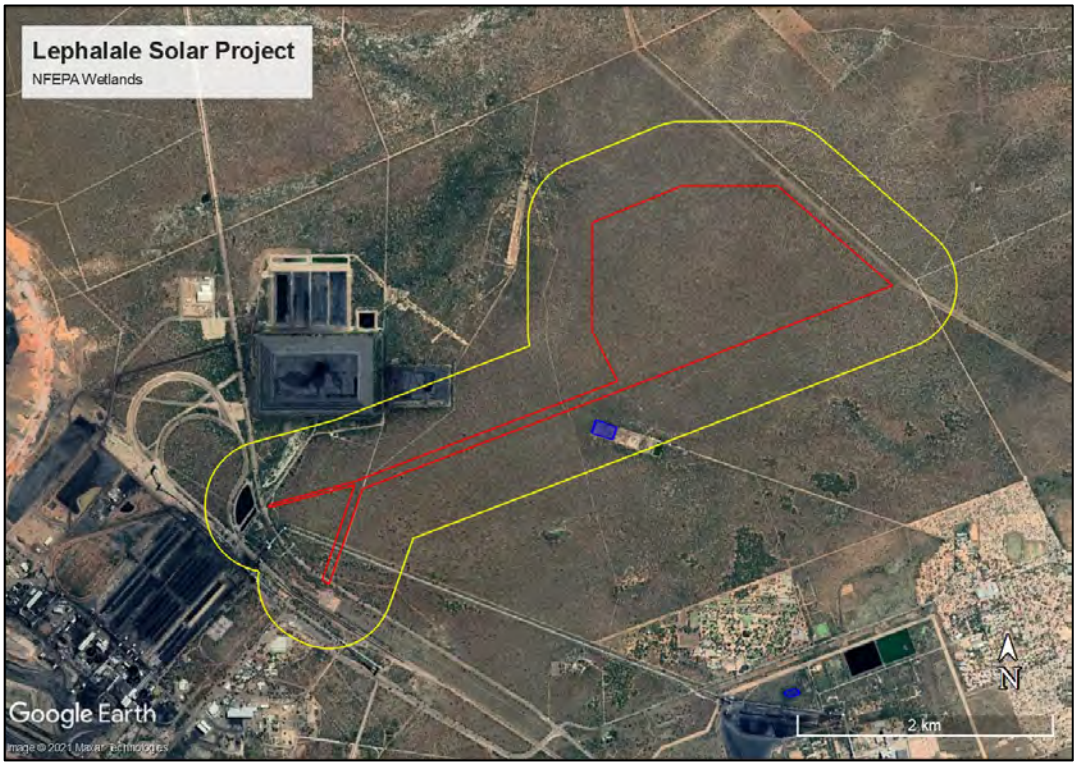


Figure 7-6: Locality of the NFEPA wetlands (shown in blue) in the study area

The site assessment confirmed the presence of the artificial wetland area that has been identified by the NFEPA database. This artificial wetland area is directly associated drying beds that are associated with the Waste Water Treatment Works that services the residential area of Marapong to the southeast of the site.

Furthermore, the site assessment identified a wetland area located approximately 350m to the northwest of the site boundary. This wetland area is considered artificial in nature as the water supply is provided by a borehole. The feature is considered to be an artificial watering hole for game and is/has been used for game viewing purposes which is evident by the presence of a viewing hide (refer to Figure 7-7).

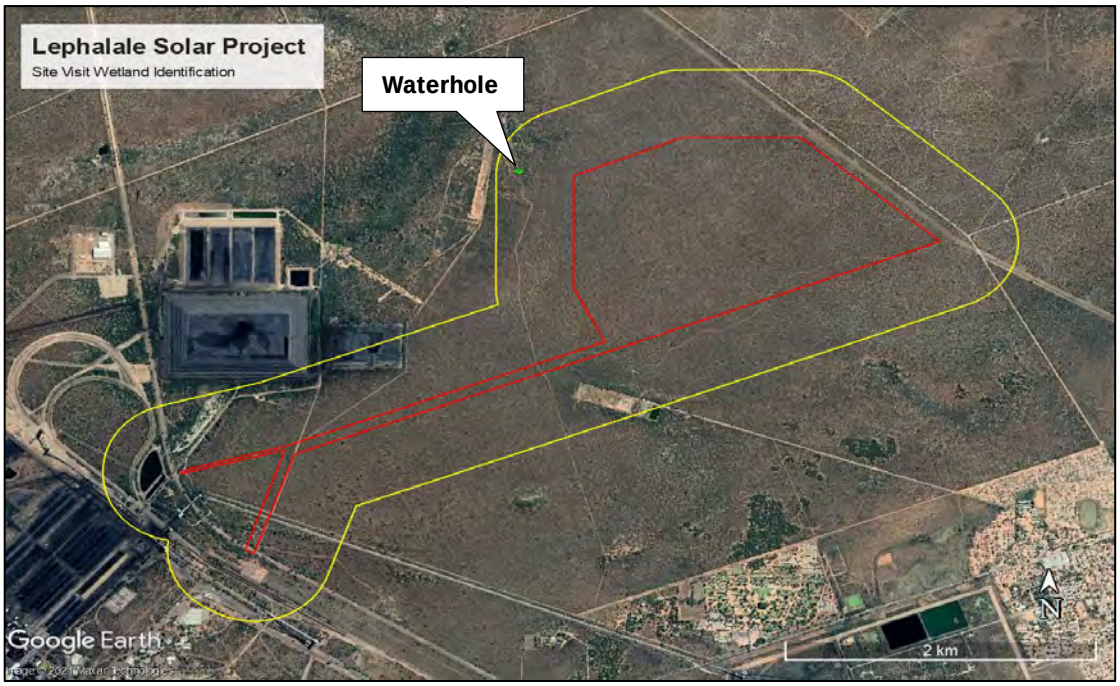


Figure 7-7: Location of the watering hole in relation to the site boundaries

No natural wetland features were identified within the study area during the site assessment so no further assessment will be conducted in this regard. In the absence of any wetland areas or watercourses within the study area, the development of the Lephalale Solar Project will not have any impact on any such features.

Based on the findings of the assessment it is the opinion of the Specialist that there is no fatal flaws relating to the presence of any wetland areas or watercourses that should prevent the development to proceed.

7.7 Socio-Economic Impact Assessment

7.7.1 Specialist Details

A Social Impact Assessment has been undertaken by Dr Neville Bews & Associates (C/O Dr Neville Bews, May 2021) for the proposed Lephalale Solar Project in accordance with the requirements for specialist assessments as outlined within the 2014 EIA Regulations (as amended). This report is included in Appendix E-7.

7.7.2 Scope of Work

The terms of reference for this study were to undertake an SIA in respect of the proposed, Lephalale Solar Project near Lephalale, Limpopo Province and to consider the extent of the proposed project and its likely effect on the social environment within which the project will be placed.

- Adherence to all appropriate best practice guidelines, relevant legislation and authority requirements;
- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
- Identification of sensitive areas to be avoided (if any);
- An assessment and impact significance ratings of the impacts with regard to pre-construction, construction, operational and the decommissioning of the project;
- Cumulative impact identification and assessment as a result of other projects in the area;
- An assessment of the significance of the cumulative impacts;
- Comparative assessment of alternatives;
- Recommend mitigation measures to minimise the impacts of the proposed development and note any specific mitigation measures for a particular phase.

7.7.3 Findings

The social impact variables considered across the project are in accordance with Vanclay's list of social impact variables clustered under the following main categories as adapted by Wong (Vanclay, 2002; Wong, 2013) and include: Health and social well-being; Quality of the living environment (Liveability); Economic; and Cultural aspects.

The health and social wellbeing impacts investigated included: Annoyance, air quality and noise; Increase in crime; Increased risk of HIV infections; An influx of workers and job seekers; Hazard exposure; Glint and glare. The quality if the living environment impact investigated included: Disruption of daily living patterns; Disruptions to social and community infrastructure; and Transformation of the sense of place. The economic impacts investigated included: Job creation and skills development; and Socio-economic stimulation.

Regarding the negative impacts associated with the project, it was evident that most apply over the short-term construction phase of the project. Of these impacts, all can be mitigated to within acceptable ranges and there are no social fatal flaws associated with the construction or operation of the project. Although over the operational phase, the project will be visible and is likely to alter the sense of place of the area, this should be limited to the extent that the PV facility and infrastructure is placed within an industrialised setting.

On a cumulative basis, considering a range of developments that have occurred over an extended period in the area; Lephalale and surrounds have undergone extensive transformation. Although the project will contribute towards this transformation, this will be at an insignificant level, as the project falls within what is already an industrialised area with Grootegeluk Coal Mine, Matimba and Medupi power stations and associated infrastructure all within close proximity.

On the positive front the project clearly fits with policy and legislation and the Presidential announcement to increase the threshold for generation license exemptions for embedded generation projects from 1 MW to 100 MW. In this regard the project will not only ensure that the mine enjoys a more reliable, available and sustainable electricity supply but will also contribute towards reducing CO2 emissions. On a cumulative basis, considering other renewable energy initiatives across the country and the opportunity of wheeling surplus energy to the grid, the project could also have a positive effect on the security of the National Electricity Grid.

Considering all social impacts associated with the project, it is evident that the positive elements outweigh the negative, and that the project carries with it a significant social benefit and as such is supported and should proceed. In addition, the project fits with the Government's requirement for the urgent generation of electricity by means of renewable energy initiatives.

7.8 Heritage and Paleontological Assessment

7.8.1 Specialist Details

A Heritage Survey has been undertaken by Umlando: Archaeological Surveys and Heritage Management (C/O Gavin Anderson, June 2021) for the proposed Lephalale Solar Project. This report is included in Appendix E-8.

7.8.2 Scope

The following terms of reference were provided:

- A desktop and field assessment to gather information on heritage resources within the proposed development area;
- Identify possible archaeological, cultural and historic sites within the proposed development area;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance; and
- Identifying key uncertainties and risks.

7.8.3 Findings

Several HIA studies have been undertaken in the surrounding areas (Pistorius 2007, 2010; van der Walt 2012, 2014, 2016; Huffman and van der Walt 2008a, 2008b, 2011, 2012; van Schalkwyk 2005a, 2005b, 2006, 2007, 2008. Van der Walt (2016) surveyed parts of the Farm Appelvlakte. No sites were recorded in the current study area and the dense vegetation was noted. Figure 7-9 shows the location of known heritage sites in the general area. No national monuments, battlefields, or historical cemeteries are known to occur within the study area. From the review of available survey information and historical maps, the study area is undeveloped and there are no indication of any buildings. The desktop study suggests that there will have a low occurrence of archaeological and historical sites.

The palaeontology of the area is considered to be of high significance (Figure 7-8). A desktop study was undertaken by Dr. Alan Smith. The palaeontology desktop notes that this site is underlain by Clarence Formation which is part of the Karoo Sequence. The Lower Jurassic aged Clarence Formation comprises predominantly fine-medium-grained sandstone and forms spectacular cliffs. The Formation is interpreted as an Aeolian deposit (desert dunes). This was a continent-scale desert.

COLOUR	SENSITIVITY	REQUIRED ACTION
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 7-8: Palaeontological sensitivity of the study area

Figure 7-9: Known heritage sites in the area

The project will have a shallow foundation, and so there is unlikely to be any disturbance to palaeontological material.

The archaeological and historical record for this specific study area is of low significance, whilst the palaeontology of the area is considered to be of high significance, however, the probability of finding palaeontological material in the upper weathered deposits is very low. The field survey confirmed that there are no heritage sites in the area, although isolated artefacts would probably occur. If any artefacts are noted, the "Chance Find Protocol" is to be implemented. ***These Chance Finds would not hinder the proposed development.***

No further mitigation is required for the photovoltaic plant.

Based on the findings of the investigations, there is no reason for the proposed solar plant not to be authorised.

7.9 Visual Impact Assessment

7.9.1 Specialist Details

A Visual Impact Assessment to investigate any visual impacts that may be caused by the proposed Lephalale Solar PV facility has been undertaken by GCS (Pty) Ltd (C/O Nakéla Naidoo, dated August 2021). This report is included in Appendix E-9.

7.9.2 Scope of Work

- **Assumptions and Limitations –** Description of the assumptions and limitations associated with this report.
- **Description of the Receiving Environment-** Description of the following criteria that will determine the current status of the surrounding visual environment, including brief descriptions of the visual character, landscape quality, sense of place and quality of visual resource of the immediate and surrounding proposed solar plant.
- **Impact Identification and Description –** Identification of any major impacts associated with the proposed activity on surrounding receptors (residents, motorists, and tourists). These impacts are based on visual modelling results and factors including the Visual Absorption Capacity, Visibility and Visual Exposure, Sensitive Receptors and the Visual Distance of Sensitive Receptors from the proposed activity; and the Magnitude/Intensity of Visual Impact.
- **Mitigation of Impacts** – Identification of the most feasible and practical way of mitigating any potential impacts on sensitive receptors. There are two categories of mitigation that will be identified in this section of the report.

1. General (Generic) mitigation measure used to limit the visual impact of the activity; and
2. Mitigation for specific critical receptors identified.

- **Proposed Environmental Management Programme (EMPr) Control and Monitoring Plan –** Description of a necessary plan that needs to be adopted to mitigate potential impacts resulting from the proposed activity and the associated ways in which the effectiveness of such measures can be monitored.

7.9.3 Findings

The evaluation of the receiving environment indicated that the area surrounding the study area comprises of existing industrial and mining features, built up areas and homesteads. This region is characterised by natural bushveld which can be consistently seen throughout the site and the surrounding areas. The presence of existing industrial and mining activities and the natural bushveld make up the area's current sense of place. Considering these aspects, the proposed solar plant's impact on the area's current sense of place is expected to be low throughout its lifespan.

The area was categorized as an area of moderate VAC due to the partial screening by existing vegetation as well as the presence of mining and industrial activities. The Visual Intrusion expected from the proposed development was categorized as low as the proposed solar plant is expected to blend in with the existing surroundings.

Sensitive receptors within the receiving environment were also identified and grouped as high and moderate sensitivity receptors. The high sensitivity sensitive receptors are considered the key receptors due to the type of receptor and their proximity to the study area. They key sensitive receptors identified for this study were the surrounding towns, homesteads, private nature reserves and the surrounding road network.

A visibility analysis was conducted on the proposed infrastructure which were considered to be the most visually intrusive components of the project namely the PV Panels, the onsite and tie-in substations and the proposed transmission line. The resulting cumulative viewshed indicated that the visibility of the proposed solar plant will be restricted mostly to the eastern areas of the development, the town of Marapong, the Lephalale Marapong Housing area and the secondary road. However, it remains important to note that the moderate VAC levels of the existing vegetation and the presence of the existing mining and industrial activities within the area will partially screen the proposed development from the sensitive receptors.

The potential visual impacts from the proposed development were rated using a standard impact rating system for use in the overall EIA. The potential impacts were rated for each phase of the proposed project. The rating of each impact also took into consideration the

current sense of place of the study area as well as the study area's VAC. Suitable recommendations were thereafter made to help mitigate the identified potential impacts.

Overall, the impact assessment indicated that the proposed development will be of medium negative significance before mitigation is implemented for the construction, operational and parts of the decommissioning stage. These potential visual impacts relate to the potential change in visual character, landscape visual change, dust creation and light pollution. Once the recommended mitigation measures are implemented, these impacts can be lowered to a low negative impact. However, it is difficult to mitigate the visual impact of the proposed PV Panels due to their surface area and colour however, the recommended mitigation measures (if adhered to) can lower these impacts.

At decommissioning, it is expected that all main infrastructure will be removed, and the area will be rehabilitated appropriately. The visual impacts caused by the decommissioning stage with regards to rehabilitation is seen as a positive impact and it is recommended that the area be returned to its natural state as far as possible. Dust suppression and monitoring of revegetated/rehabilitated areas should also be conducted at least quarterly for a one-year period after the closure of the facility. This will ensure that sensitive receptors experience limited exposure to any dust until the areas are completely rehabilitated.

Mitigation measures relating specifically to the impacted sensitive receptors i.e. the Lephalale Marapong Housing area, Marapong town, specific homesteads and the secondary road included; a visual berm to be constructed on the border of the proposed firebreaks along the entire proposed perimeter fence in order to partially screen and soften the potential visual impacts of the solar plant on these high sensitive receptors.

Overall, the VIA demonstrates that the proposed Lephalale Solar project can be successfully accommodated and assimilated into the surrounding landscape without causing significant harm to the landscape character or visual amenity of the area, provided that the recommended mitigation measures are adhered to. Furthermore, the proposed project keeps in line with the development plan of the area which is to facilitate economic and mining development processes within the municipality and create the potential to be the national pioneers in the Green Economy.

Based on the findings of the investigation and implementation of proposed mitigation measures, there is no reason for the proposed solar plant not to be authorised.

7.10 Traffic Assessment

7.10.1 Specialist Details

A Traffic Transportation Study to determine the impact/s of the proposed development on the area with respect to transportation has been undertaken by SiVEST SA (Pty) Ltd (C/O Merchandt Le Maitre, dated August 2021). This report is included in Appendix F.

7.10.2 Scope of Work

The scope of works consists of the following:

- A site investigation which was completed the 6th July 2021.
- Consultations with the relevant authorities and / or stakeholders which includes the collection of traffic data and information.
- Desktop analysis of traffic data and information from the various authorities and / or stakeholders. Analysis to include the evaluation of the capacity of the road network (if available)
- Evaluate the impact of the proposed development on the existing road network / traffic volumes and populating of a suitable 'Impact Rating System'
- Determine specific traffic needs during the different phases of implementation.
- Conclude & propose possible mitigation measures
- Identify the position and suitability of the preferred access road alternatives.
- Confirm the associated clearances required for the necessary equipment to be transported from the point of delivery to the various sites.
- Confirm freight and transport requirements during construction, operation and maintenance period.
- Propose origins and destinations of equipment
- Determine abnormal load requirements (if any)

7.10.3 Findings

The construction phase of this development will typically generate the highest number of additional vehicles. It will however be temporary, and impacts are minimal/low. During the operation phase, it is expected that the facility will accommodate ±15 employees which will generate an additional ±10 trips/day in the morning and afternoon peak period. This impact is minimal / low. The existing access from Road D2001 has sufficient sight distance in both directions and hence an upgrade of the existing access will be required from the Roads Agency Limpopo. A wayleave application will be required from the agency prior to work commencing. A new gravel road between the access position on Road D2001 and the development will be required in accordance with TRH20. No fatal flaws or preferences were identified for any of the proposed site alternatives for construction laydown areas or substation locations. No

environmentally sensitive areas are required and therefore no areas are to be avoided from a Transportation perspective.

With reference to the transportation report, associated assessment and the findings made within, it is SiVEST's opinion that the Lephalale Solar Project and associated infrastructure will have a nominal impact on the existing traffic network. The project is therefore deemed acceptable from a transport perspective, provided the recommendations and mitigations measures in this report are implemented, and hence the Environmental Authorisation (EA) should be granted for the EIA application.

8 PUBLIC PARTICIPATION PROCESS

This section of the report documents the process, which was and will be followed with respect to consultation of Interested and Affected Parties (I&APs)/stakeholders and government authorities.

8.1 Purpose of Public Participation

The most important objective of public participation is to provide sufficient and accessible information to potential I&APs in an objective manner and to provide a platform for constructive participation in the application process, thereby assisting I&APs to:

- Gain an understanding of the project, the various components and the potential impacts (positive and negative);
- Raise issues of concern and suggestions for enhanced benefits;
- Comment on reasonable alternatives;
- Verify that their issues have been recorded in the Comments and Responses Report (CRR) and considered in investigations; and
- Contribute relevant local information and traditional knowledge to the process.

8.2 Competent Authority Consultation

The CA (LDEDET) will be consulted at the following key stages:

- A pre-application meeting has already been held with LDEDET on 26 August 2021 to discuss the details of the project.
- A possible site meeting and site visit with LDEDET will be held during the EIR phase, dependent on the requirements of the Department.
- A consultation meeting may be held with LDEDET approximately two weeks after the distribution of the DEIR to discuss any additional comments from I&APs as well as the outcome of the specialist studies. An indication of the LDEDET's satisfaction with the

process undertaken to that stage should also be clear after the meeting, should such a meeting be required by the Department.

- The FEIR will be submitted to the LDEDET once all outstanding issues have been resolved.
- The CA may convene a meeting post-submission of the FEIR should it be deemed necessary.

8.3 Public Consultation Process

This section provides a summary of the various activities of the public consultation process to be undertaken in support of the application process.

8.3.1 Stakeholder database

A stakeholder database or list of I&APs was compiled and will be updated as the process unfolds and as more I&APs register. The database was compiled: a) using lists of contact details of previous applications in the area; b) using information provided by the applicant's community liaison officers; and c) including responses from I&APs.

The current I&AP database is attached as Appendix C7 to this Report *(Note that this database is not inclusive of personal details of the I&APs in compliance with the Protection of Personal Information Act, No. 37067 of 26 November 2013)*. The I&AP database is the means through which information will be conveyed to stakeholders as part of the announcement of the applications and the availability of the consultation and final reports as these become available for public review. For this project, I&APs typically include the following:

- Owners or persons in control of the land where the proposed project activities are to be undertaken (Project Area);
- Occupiers of the property where the activities are to be undertaken;
- Owners and occupiers of land adjacent to the project area;
- Provincial (Limpopo) and local government (Lephalale Local Municipality and Waterberg District Municipality);
- Organs of state, other than the competent authorities having jurisdiction over any aspect of the proposed activities, including the Limpopo Department of Economic Development, Environment and Tourism (LDEDET), the Department of Mineral Resources and Energy, etc.;
- Relevant residents' associations, agricultural unions, community based organisations, water user associations, and any catchment management authority and Non-Governmental Organisation (NGOs);

- Environmental organisations, forums, groups and associations; and
- Private sector organisations (businesses, industries) in the vicinity.

8.3.2 Announcement of the application process

The integrated application process was announced to I&APs by means of the following:

- An advertisement was placed in the Mogol Post on the 4th of November 2021;
- A Background Information Document ("BID") was compiled and distributed to all I&APs on the stakeholder database and copies were available on request and at the Public Open Days;
- Site Notices were placed all around the project area;
    - On the perimeter of the proposed project site;
    - Lephalale Clinic;
    - Marapong Public Library;
    - Mogolo Academy;
    - Mogol Club;
    - Lephalale Local Municipality – Municipal Offices; and
    - Chieftaincy office.
- Radio adverts were undertaken twice per day from 12th to 15th November 2021;
- Placement of all notices and the BIDs on the GCS website (http://www.gcs-sa.biz/documents/). The GCS website is used to make documents electronically available to stakeholders. The website address was published in the advertisement, BIDs, site notices and all other communication; and
- A Registration and Comment Sheet was distributed with every BID, inviting stakeholders to register as I&APs and to provide their comments on the proposed application.

The announcement included details pertaining to the proposed project, how I&APs can participate in the process, the availability of the DSR for comment and how it can be accessed, as well as an invitation to attend one of the two Public Open Days held. Refer to Appendix C3 and C4 for copies of the above notification documentation.

8.3.3 Comments and Responses Report

All comments received during the application process will be captured in a Comments and Responses (CRR). The CRR will be updated on a continuous basis and will be presented to the authorities and other I&APs together with the consultation and final reports as a full record of issues raised, including responses on how the issues were considered during the application process. The Scoping CRR, which captures all the comments and issues raised during the scoping phase PPP is included in Appendix C7.

8.3.4 Review of the Draft Scoping Report

The Draft Scoping Report (DSR) was available for public comment for 30 days from 5 November 2021 until 6 December 2021. The DSR was available for review at the following public venues:

- Marapong Public Library
  Address: 916 Phukubye St, Marapong
- Lephalale Local Municipality Offices
  Address: Civic Center Onverwacht; Cnr Joe Slovo | Douwater Road
- Lephalale Clinic
  Address: Cnr. Muller & Fox Odendaal Street, Lephalale

The report was also available electronically via the GCS Website (link provided above) or a CD/USB was available upon request.

Two Public Open Days (PODs) were held to provide an opportunity to I&APs to engage regarding the proposed project, one on the 16th of November at the Mogolo Academy and one on the 17th of November at the Mogol Club.

Refer to Appendix C4 for proof of delivery of the DSR to the public places listed above and Appendix C5 for posters on display at the PODs.

8.3.5 Public Participation during the EIA Phase

The review of the Draft EIR/EMPr will take place from 22 April to 23 May 2022. The main objectives of public participation during this phase are:

a) to verify that stakeholder issues have been considered by the EIA Specialist Studies and in the reports which will be compiled; and

b) to provide stakeholders the opportunity to comment on the findings of the EIR/EMP Report and other associated reports, including the measures that have been proposed to enhance positive impacts and reduce or avoid negative ones. The public participation activities during the EIA phase includes:

- email notifications to stakeholders to inform them of the opportunity to review the Draft EIR/EMP;
- The draft EIR/EMPr will be made available for review. A hard copy will be placed at the following venues:
  - Marapong Public Library

    Address: 916 Phukubye St, Marapong
  - Lephalale Local Municipality Offices

Address: Civic Center Onverwacht; Cnr Joe Slovo | Douwater Road

- Lephalale Clinic

  Address: Cnr. Muller & Fox Odendaal Street, Lephalale

Stakeholders will be requested to download the report from the GCS website and / or request electronic copies of the report by prior arrangement;

- advertisements to notify stakeholders of the availability of the draft reports were published in the same newspaper used during the scoping phase, the Mogol Post as well as the Nsthebele – Rural Rhythm. Advertisements will be published as follows:
  - Mogol Post on the 21st of April 2022
  - Nsthebele – Rural Rhythm on the 28th of April 2022
- two Public Open Days will be held as follows:
  - On the 4th of May 2022, between 9:00 and 12:00 at the Mogolo Academy;
  - On the 4th of May 2022, between 13:00 and 17:00 at the Mogul Club; and
  - On the 5th of May 2022, between 10:00 and 16:00 at the Hervormde Kerk Ebeaneser.
- the EIA process, availability of the DEIR and the two envisaged Public Open Days will further be advertised on Waterberg FM 99.3.

The Final EIR/EMP report will be available to stakeholders for their review on the GCS website. A notification letter will be sent to all stakeholders informing them of the submission of the report to the competent authority and their opportunity to comment on the report directly to the competent authority.

8.3.6 Public Participation during the Authorisation Phase

Once the Competent Authority provided information with regards to their decision in terms of the integrated application process, their decision and the detail thereof will be communicated to I&APs according to the conditions stipulated. I&APs will be made aware of their rights to appeal the decision and the proposed process to follow in such regard. The legislative and required public participation activities will end once the appeal periods have lapsed.

9 EIA PROCESS AND APPROACH

A Scoping and Environmental Impact Assessment (S&EIR) process has two distinct phases: The Scoping Phase and the Environmental Impact Reporting Phase. The Scoping Phase has been concluded with the acceptance of the Scoping Report by the Competent Authority on the 17th of February 2022.

This Environmental Impact Assessment Report illustrates the risk assessment undertaken of potential biophysical and socio-economic aspects and impacts of the discard dump and slurry void on the receiving environment. This report summarises the risks and findings of various specialist studies undertaken and outlines avoidance, mitigation and management actions which will assist in minimising the impact of the project as far as possible.

The Environmental Impact phase concludes with the submission of a Final Environmental Impact Report to the Competent Authority (CA) for consideration, thereafter the application will be granted or rejected.

9.1 Impact Assessment Methodology

Possible impacts were identified through comments from I&APs, specialist reports, and from the EAP's experience. The assessment of potential impacts was addressed in a standard manner to ensure that a wide range of impacts were comparable. The ranking criteria and rating scales were applied to all specialist studies for this project. To enable a scientific approach to the determination of the environmental significance (importance), a numerical value is linked to each rating scale.

Clearly defined rating and rankings scales (**Table 9-1 - Table 9-7**) were used to assess the impacts associated with the proposed activities. The impacts identified by each specialist study and through public participation were combined into a single impact rating table for ease of assessment.

Table 9-1: Severity or magnitude of impact

Not applicable/none/negligible	0
Minor/insignificant/non-harmful (no loss of species/habitat)	2
Low/small/potentially harmful (replaceable loss with minimal effort)	4
Moderate/significant/slightly harmful (replaceable loss of species/habitat with great effort and investment)	6
High/highly Significant/harmful (impact to human health or welfare/loss of species/habitat)	8
Very High/extremely significant/extremely harmful/within a regulated sensitive area (loss of human life/irreplaceable loss of Red Data species/conservation habitat)	10

Table 9-2: Spatial Scale of activity

Not applicable/none/negligible	0

Site only	1
Local (within 5km)	2
Regional/neighbouring areas (5 km to 50 km)	3
National	4
International	5

Table 9-3: Duration of activity

Not applicable/none/negligible	0
Immediate (immediately reversible with minimal effort)	1
Short-term (0-5 years - reversible)	2
Medium-term (5 to 15 years – difficult to reverse with effort)	3
Long-term/life of the activity (very difficult to reverse with extensive effort)	4
Permanent/beyond life of the activity (not reversible)	5

Table 9-4: Frequency of activity (how often activity is undertaken)

Not applicable/none/negligible	0
Improbable /almost never/annually or less	1
Low probability/very seldom/6 monthly	2
Medium probability/infrequent/temporary/monthly	3
Highly probable/often/semi-permanent/weekly	4
Definite/always/permanent/daily	5

Table 9-5: Frequency of incident/impact (how often activity impacts environment)

Almost never/almost impossible/>20%	1
Very seldom/highly unlikely/>40%	2
Infrequent/unlikely/seldom/>60%	3
Often/regularly/likely/possible/>80%	4
Daily/highly likely/definitely/>100%	5

Table 9-6: Legal Issues – governance of activity by legislation.

No legislation	1
Fully covered by legislation	5

Table 9-7: Detection (how quickly/easily impacts/risks of activity on environment, people and property are detected)

Immediately (easier to mitigate)	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered (more difficult to mitigate)	5

Each impact identified must be assessed in terms of probability (likelihood of occurring), the consequence of the impact (spatial scale, severity and duration) and the associated risk (impact significance).

Consequence was then determined as follows:

CONSEQUENCE = Severity + Spatial Scale + Duration

The probability or likelihood of occurrence of the activity was then calculated based on frequencies of the activity and impact, whether the activity is governed by legislation and how easily it can be detected:

LIKELIHOOD = Frequency of Activity + Frequency of Impact + Legal issues + Detection

The significance or risk of each identified impact was then based on the product of consequence and likelihood:

Environmental Significance/Risk = Consequence x Likelihood

Impacts were rated as either of high, medium or low significance on the basis provided in **Table 9-8**. Each impact was also assessed in terms of the level to which there is an irreplaceable loss of resources and its degree of reversibility. The ratings as described in Table 9-9 and Table 9-10.

Table 9-8: Impact significance ratings.

SIGNIFICANCE	ENVIRONMENTAL RISK RATING	COLOUR CODE
High (positive)	>240	H
Medium (positive)	120 to 240	M
Low (positive)	<120	L
Neutral	0	N
Low (negative)	>-120	L
Medium (negative)	-120 to -240	M
High (negative)	<-240 (max = 400)	H

Table 9-9: Irreplaceability of resource caused by impacts

No irreplaceable resources will be impacted (the affected resource is easy to replace/rehabilitate)	**Low**
Resources that will be impacted can be replaced, with effort	**Medium**
Project will destroy unique resources that cannot be replaced	**High**

Table 9-10: Reversibility of impacts

Low reversibility to non-reversible	**Low**
Moderate reversibility of impacts	**Medium**
High reversibility of impacts	**High**

The significance of an impact gives one indication of the level of mitigation measures required in order to minimise negative impacts and reduce environmental damage during the construction, operational and decommissioning phases. Suitable and appropriate mitigation measures were identified for each of the potential impacts based on specialist recommendations and GCS expertise.

9.2 Environmental Impact Assessment – Construction Phase

The potential impacts identified for the construction phase are discussed below and the significance rating for each impact is presented in Appendix F.

9.2.1 Potential Impacts on Air Quality and Climate

Localised impacts on ambient air quality are anticipated through the generation of inhalable particulate matter (PM10) and (PM2.5) and larger total suspended particulates (TSP) through the following activities:

- Construction of the solar plant and associated structures and the movement of heavy construction vehicles, equipment and personnel along gravel roads/ tracks and subsequent compaction and erosion of soil;
- Excavation using heavy machinery/ vehicles; and
- Transportation of construction materials.

The impact of dust generation can be mitigated through the implementation of dust control measures, avoidance of dust generating works during the most windy conditions and dust suppression. Mitigation measures to be implemented during construction as confirmed by the proponent are:

- Use of water sprays during heavy construction activities, thereby limiting the dispersion of particulate emissions;
- Continuous wetting of the access road during vehicle transport; and
- Wetting of exposed stockpiles to limit the dispersion of wind-blown dust and particulate emissions.

Additional mitigation measures recommended include:

- Information regarding construction activities should be provided to all local communities. Such information includes:
    - Contact details of a responsible person on site should complaints arise to reduce emissions in a timely manner.
    - Complaints register must be kept to record all events.
- When working near (within 100 m) a potential sensitive receptor, limit the number of simultaneous activities to a minimum as far as possible;
- Wet suppression and wind speed reduction are common methods used to control open dust sources at construction sites as a source of water and material for wind barriers tend to be readily available;
- Frequent wetting of the Solar PV access road; and
- Use of chemical stabilisation on access road must be considered as its usually cost effective for relatively long term or semi-permanent unpaved roads.

Based on the scale of the development, the impact on local air quality associated with construction activities is anticipated to be **Low**, and with the implementation of the proposed mitigation measures and the EMPr (Appendix G), will remain **Low**.

Greenhouse gases (GHGs), which contribute to global climate change, will be generated throughout the construction phase of the project. Direct GHG emissions include exhaust fumes from equipment, vehicles and backup generators (when required). Indirect sources include those of supplier/services related activities such as commercial electricity generation, materials manufacturing and logistics. The use of non-renewable electricity on site for operation of machinery, lighting and general construction activities would increase the overall carbon footprint during the construction phase.

The anticipated impact of the construction activities on GHG emissions and climate is anticipated to be low **Medium** and can be reduced to **Low** with the implementation of the proposed mitigation measures.

Fuel-saving and energy efficiency measures should be implemented, including optimal vehicle and equipment use scheduling, servicing and maintenance, use of fuel-saving technology and high-efficiency generators, and use of low carbon and sulphur fuels will reduce this impact. Waste management through reuse and recycling will additionally reduce the projects overall carbon footprint.

9.2.2 Potential Impact on Vegetation

The proposed clearing and excavation of the footprint areas will result in the clearing of vegetation. This impact refers to the direct physical destruction and/or modification of terrestrial habitat and includes habitat loss impacts, habitat and vegetation degradation impacts (e.g., petrochemical and waste contamination, species composition and abundances changes), loss of floral species of conservation importance, loss of catchment area and decreased water inputs and invasive alien plant invasion.

The development will result in the permanent and moderately irreversible transformation of the vegetation on the site. The process will involve vegetation clearing, excavations and bulk earthworks for the development.

The anticipated impact of the construction activities on the site's vegetation is anticipated to be **Medium** and can be reduced to **Low** with the implementation of the proposed mitigation measures outlined in the EMPr (Appendix G).

9.2.3 Potential Impact on Wildlife

Impacts on wildlife and wildlife habitats are linked to the proposed footprint and clearing as well as general disturbance levels during construction. Noteworthy is the fact that the endangered White-backed Vulture was seen to fly over the study area. Several suitable large nesting trees are present within the study site and as such, the removal of these trees during the construction phase will decrease the nesting habitat for these vultures.

Given the aforementioned, the impact on wildlife is anticipated to be within the high range of **Medium** significance. Should clearing and activities be restricted and appropriately managed, and allowance be made for pre-construction vegetation and wildlife surveys to guide the activities, the impact on wildlife can be mitigated and the impact will be **Low**. Additional measures to limit disturbance are detailed in the EMPr (Appendix G).

9.2.4 Potential Impact on Soils, Land Capability and Land Use

Given the flat topography, there is a low risk of soil erosion associated with the construction activities. However, most of the impacts can be mitigated through the implementation of the EMPr (Appendix G). The impact of the proposed development on soil erosion is considered of **Medium** significance pre-mitigation. Through effective soil erosion prevention measures (terracing, operations on contour), the impact can be reduced to **Low**.

During construction, erosion control measures must be implemented in areas sensitive to erosion such as exposed soil, trenches cut for construction, etc. These measures include but are not limited to – the use of sandbags, hessian sheets, silt fences and retention or replacement of vegetation.

Soil loss and contamination could occur due to improper stormwater management, erosion control, vegetation stripping, poor management of construction activities, poor waste management, spillages and uncontrolled maintenance of vehicles and machinery.

The impact of soil contamination due to construction activities is anticipated to be **Medium** and can be reduced to **Low** if the development footprint area is restricted to the works area, clearly demarcated, and the movement of construction activities outside of this area is restricted. Edge effects of construction activities need to be carefully and actively managed through ensuring good housekeeping and strict management of activities, with specific consideration to erosion control and alien floral species management.

If any spills occur, they should be immediately cleaned up and in the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practised preventing the ingress of hydrocarbons into the topsoil. All hazardous materials should be stored within a bund capable of containing 110% of the stored capacity to prevent potential spillages and soil contamination. Maintenance should not be conducted on site, and bunds and spill kits should be available, particularly during refuelling. Appropriate sanitary facilities must be provided during the construction phase and all waste must be removed to an appropriate waste facility.

The current land use on the site comprises infrastructure, veld, and disturbed areas. The proposed construction activity will have a short-term, negative impact due to the temporary change in land use from open veld to construction due to the restriction on access through fencing and securing of the Works area, an influx of construction staff, machinery, equipment and the establishment of a site office, construction camp/s and laydown area/s.

Vehicle and employee movement should be restricted to within the construction footprint. Working hours should be limited and an open channel of communication with surrounding residents and landowners must be ensured, mitigate all intrusive impact and complaints. A complaints register should be available on site to ensure that all complaints are addressed.

The proposed construction activities may impact on existing land use, and the impact is anticipated to be **Medium** given the scale of the footprint of the works area. The works area will be rehabilitated to pre-construction specifications. With the implementation of the proposed mitigation measures, the impact on land use will be **Low**.

9.2.5 Potential Impact on Water Quality

Water quality impacts during construction will likely be limited to potential increased surface water turbidity due to sediment inputs and/or erosion and physio-chemical pollution related to potential spillages of cement and fuels during construction. Turbidity impacts are likely to be limited given the temporary nature of onsite earthworks. Spillages of fuel and other harmful substances could alter the physio-chemical and biological characteristic of surface water and contaminate watercourse substrate, with potential consequences for both vegetation and wildlife communities. If poorly managed, impacts to water quality could be of **Medium** significance where turbidity and sediment and/or pollution risks are not effectively mitigated. Where best practical mitigation is implemented, this can be potentially limited to **Low** and environmentally acceptable level.

9.2.6 Potential Visual Impacts

The construction phase of the activity will involve the clearing of vegetation to make way for the proposed infrastructure and ancillary components of the proposed solar plant. This will inevitably cause negative impacts on aesthetics and a change in the visual landscape to some extent, keeping in mind the existing mining and industrial activities within the area. The change of visual character of the study area within 5 Km of the site is also expected from the construction phase, mainly due to the presence of temporary site camps and laydown areas and the presence of construction waste material.

This impact can be limited to the site only if the existing vegetation bordering the proposed firebreaks on either side of the perimeter fence is maintained as far as possible assist in screening these ancillary activities.

During the construction phase, night lighting at the site camp and for security purposes will be required. The type and positioning of this lighting should be carefully considered. The primary goal should be to contain the light to the areas that need illumination and to prevent glare from the activities. The strategic placement of lighting covers and shields have the potential to mitigate the impacts of glare and light trespass effectively (Creagh, 2019). Light fittings should also be directed only to areas where needed. Motion sensor lights should be used at security facilities to limit unnecessary illumination.

It is anticipated that the impacts during the construction phase of the activity will be of **Medium** significance for all expected impacts before mitigation. However, these impacts can be lowered to a **Low** impact if the proposed mitigation measures are implemented.

9.2.7 Potential Noise Impacts

Noise levels and noise disturbance in the immediate vicinity of the site will increase during construction activities due to:

- The large number of plant machinery to be used to excavate and shape the site;
- The movement of construction and earth-moving vehicles for creation of platforms;
- Increased traffic entering and exiting the site;
- Operation of generators;
- Noise from hydraulic hammers and winches; and
- General construction noise.

The anticipated impact of the construction activities on noise disturbance is expected to be **Medium** and can be reduced to **Low** with the implementation of the proposed mitigation measures outlined in the EMPr (Appendix G).

9.2.8 Potential Heritage and Paleontological Impacts

Given that the Phase 1 HIA (Appendix E8) did not identify heritage resources on site and the likelihood of fossil finds was rated low (Appendix E8), there is not anticipated to be a significant impact on paleontological or cultural heritage resources. The impact is thus rated **Low**.

It is recommended that the construction of the project may continue as long as the recommendations and mitigation measures provided in the EMPr (Appendix G) are adhered to.

9.2.9 Potential Social Impacts

Positive impacts on the social environment related to the construction phase are anticipated to include job creation and associated local economic growth. This is a positive impact is rated low **Medium**. Negative impacts on the social environment related to the construction phase are anticipated to include an increase in annoyance and nuisance related aspects, an influx of construction workers and the associated increase in crime, and an increase in the exposure to health and well-being hazards. Additionally, it is expected that daily living pattens and social and community infrastructure may be disrupted. Through ensuring implementation of appropriate mitigation measures as outlined in the EMPr (Appendix G), this impact will be **Medium.**

9.2.10 Potential Traffic Impacts

A substantial increase in traffic volumes on the road network surrounding the proposed development will be experienced during the construction phase. The resultant impact will be on the surrounding road network, increasing dust generation, noise and the increase in road maintenance.

Based on the scale of the development, the impact of increased construction related vehicular movement on the surrounding road network is anticipated to be low **Medium**, whilst the anticipated impact associated with abnormal loads and new/larger access points is **Low.** With the implementation of the proposed mitigation measures and the EMPr (Appendix G), the impacts can be reduced to **Low** for vehicular movement and will remain **Low** for abnormal loads and new/larger access points related impacts.

9.3 Environmental Impact Assessment – Operational Phase

The potential impacts identified for the operational phase are discussed below and the significance rating for each impact is presented in Appendix F.

9.3.1 Potential Impacts on Contribution to Renewable Energy Goals and Green House Gas Reduction

The establishment of additional renewable energy facilities is considered significant in light of the renewable energy targets set by South Africa. Private electricity supply options are becoming popular to supplement the electricity purchased from Eskom.

The proposed Lephalale Solar project is a Private IPP Project to provide green energy to Grootegeluk Coal Mine which would in turn contribute to Grootegeluk Coal Mine's decarbonization strategy.

This opportunity leverages the potential cost savings of such supplementary supply, while taking advantage of the reduced carbon footprint of the renewable nature of the technology.

Based on the scale of the development, the impact of the contribution to renewable energy goals and GHG reduction is anticipated to be **Medium**, positive.

9.3.2 Potential Impact on Vegetation

The occurrence of alien invasive vegetation on the study site is relatively low, however, any disturbance of the indigenous vegetation will create and opportunity for alien species to settle on the study site.

Although no aquatic features were identified within the boundaries of the study site, the contribution that the study site will make to the sub-catchment, is to the groundwater that infiltrates through the highly permeable sandy soils on the site. As such, any impact on the substrate on the study site that will prevent the infiltration of water into the substrate will decrease the water inputs from the area to the larger catchment.

The presence of substations within the project design, presents a risk of leakages of petrochemical fluids from these structures. Any such leakages can result in the contamination of the soils on the property as well the groundwater associated with the property. Domestic waste will be generated by the employees that will be managing the facility. The design of the facility will make provision for onsite ablution facilities which will be serviced by a conservancy tank system. The presence of a conservancy tank creates a risk of leakages from this tank.

The expected impact of the operational activities on the site's vegetation is anticipated to be **Medium** and can be reduced to **Low** with the implementation of the proposed mitigation measures outlined in the EMPr (Appendix G).

9.3.3 Potential Impact on Wildlife

The presence of the overhead powerline connecting the solar PV plant to the electricity grid has the potential to generate bird-strikes in the area. The relative pristine nature of the site and the surrounding areas make the presence of large birds of prey likely. As such, the risk of these birds colliding with the powerline becomes increased.

Even though no defined ecological corridors have been identified on the site the risk is present that the project may result in a disruption of the current open space corridor used by the species that occur on the site as well as the surrounding properties. Furthermore, the clearance of vegetation from the project site will result in the reduction in the amount of available foraging habitat for game species in the area.

The presence of substations within the project design, presents a risk of leakages of petrochemical fluids from these structures. Any such leakages can result in the contamination of the soils on the property as well the groundwater associated with the property. Domestic waste will be generated by the employees that will be managing the facility. The design of the facility will make provision for onsite ablution facilities which will be serviced by a conservancy tank system. The presence of a conservancy tank creates a risk of leakages from this tank.

Given the aforementioned, the impact on wildlife is anticipated to be of **Medium** significance and with the implementation of suitable mitigation measures as outlined in the EMPr (Appendix G), the impact significance will be **Low**.

9.3.4 Potential Impact on Soils, Land Capability and Land Use

Inappropriate storage of hazardous substances and the presence of a conservancy tank and transformers pose a risk for potential soil contamination. Additionally, the generation and storage of general waste has the potential to result in soil contamination.

During the operational phase there is also a risk for soil erosion resulting from in appropriate maintenance of gravel roads and the amplified stormwater run-off created by the increased level of compacted soils.

The impact of the operational phase of the proposed development on soil contamination and erosion is considered of **Medium** significance pre-mitigation. Through the implementation effective mitigation measures (refer to the EMPr in Appendix G), the impact can be reduced to **Low**.

9.3.5 Potential Impact on Water Quality and Quantity

Potential sedimentation resulting from increased run-off, even months after the finalization of construction, can be expected during the operational phase. Similarly, erosion as a result of the increased run-off and catchment modification can occur. Care should be taken to prevent and manage potential water contamination from chemical spills, fuel and oil leaks and spills. The anticipated impact is of **Low** negligible significance.

The proposed abstraction of groundwater could result in the lowering of localized groundwater levels, as well as potentially affecting the regional groundwater levels within the aquifer. Adherence to the pumping schedule is crucial and it is recommended that monitoring of the groundwater levels and quality of the surrounding monitoring boreholes and the production and reserve boreholes be regularly undertaken.

The impact of the operational phase of the proposed development on water quantity is considered of **Low** negligible significance pre-mitigation and post-mitigation.

9.3.6 Potential Visual Impacts

It is anticipated that the impacts during the operational phase of the activity will be of **Medium** negative significance. The following mitigation measures are recommended to **lower** the visual impact; however the presence of the PV Panels will remain as a medium negative impact.

Mitigation measures include retaining the vegetation bordering the proposed firebreaks along the study area perimeter, ensuring that infrastructure is always maintained in a neat and visually acceptable manner and using suitable building finishes and colours that blend in with the surrounding landscape. It is important to note that due to the surface area and colour of the PV Panels, the visual impact is difficult to mitigate completely however, by implementing the mitigation measures recommended, the potential visual impact of the solar plant can be lowered.

A change of visual character is also expected within this phase through the operation of the infrastructure and the potential machinery and vehicles on site. However, the machinery and vehicles on site will be much less than during the construction phase. It should be ensured that the time spent by personnel and vehicles onsite be minimized where possible and the speed of vehicles should be regulated.

Regarding security and night lighting, the same mitigation measures recommended for the construction phase should be applied to the operational phase of the activity. It should be ensured that the lighting be directed only where it is needed and that the light sources be regularly inspected and maintained.

9.3.7 Potential Social Impacts

Positive impacts on the social environment related to the operational phase is anticipated to include local economic growth. This is a positive impact is rated **Low**. Negative impacts on the social environment related to the operational phase are anticipated to include glint and glare related aspects, and transformation of the sense of place. Through ensuring implementation of appropriate mitigation measures as outlined in the EMPr (Appendix G), this impact will be low **Medium.**

9.3.8 Potential Traffic Impacts

The operational activities of the proposed development will potentially result in increased dust generation from gravel roads and a new/ larger access point.
Based on the scale of the development, the anticipated impact significance is **Low.**

9.4 Environmental Impact Assessment – Decommissioning Phase

The decommissioning of the site is not foreseen to take place in the near future. However, should the site be decommissioned at some point, environmental impacts are anticipated to be similar to those identified for the construction phase, specifically in terms of topography, soil, surface water contamination, waste management, and impacts on vegetation.

9.5 Environmental Impact Assessment – Cumulative and Residual Impacts

Section 2 of the NEMA requires the consideration of cumulative impacts as part of the environmental assessment process. EIAs have traditionally, however, failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires co-ordinated institutional arrangements; and

- EIA's are typically carried out on specific developments, whereas cumulative impacts result from broader biophysical, social and economic considerations, which typically cannot be addressed at the project level.

Cumulative impacts associated with this type of development could lead to initial, incremental or augmentation of existing types of environmental degradation, including impacts on the air, soil and water present within the available habitat. Pollution of these elements might not always be immediately visible or readily quantifiable, but incremental or fractional increases might rise to levels where biological attributes could be affected adversely on a local or regional scale. In most cases, these effects are not bound and are dispersed or diluted over an area that is much larger than the actual footprint of the causal factor. These impacts are usually most prevalent in areas where continuous and long-term impacts have been experienced.

A summary of the potential cumulative and residual impacts identified for the project and outlined within the various specialist studies is presented in this section. The full impact assessments can be found within the various specialist' reports and the significance rating is presented in Appendix F.

9.5.1 Air Quality Impacts

To determine the proposed cumulative impacts of the Solar PV facility, predicted dust fallout concentrations from both unmitigated and mitigated scenarios have been added to the background ambient monitored dust fallout concentrations (DFO). The following key items are noted from the cumulative assessment:

- During both Unmitigated and Mitigated scenarios, cumulative dust fallout concentrations are below the respective residential standards; and
- Based on predicted cumulative concentrations, construction impacts from the Solar PV facility are likely to be minimal, as the impacts are transient, and concentrations predicted are well below the respective NDCR.

Cumulative impacts associated with the Lephalale Solar PV facility were not assessed for PM10 and PM2.5 as ambient monitoring data representative of the site was not available.

All impacts of the proposed project were evaluated using a risk matrix, which is a semi-quantitative risk assessment methodology. The resultant environmental air quality risks for sensitive receptors were ranked "low" during the construction, with mitigation in place.

9.5.2 Ecological Impacts

Cumulative impacts associated with the development of the Lephalale Solar Project can be summarised as follows:

The loss of indigenous vegetation from the study site is directly associated with the clearance of the entire site which comprises an area of 256ha. This indigenous vegetation falls within the Limpopo Sweet Bushveld vegetation type that is classified as "least threatened" due to the high percentage (approximately 95%) of the vegetation type that is still intact.

The cumulative impact based on the removal of the vegetation from the site is therefore considered to be very low when viewed in the context of the entire distribution of the vegetation type in South Africa.

The occurrence of alien invasive vegetation on the study site is relatively low, however, any disturbance of the indigenous vegetation will create and opportunity for alien species to settle on the study site. If these alien species settle on the study site, the site might become an area from which these species can proliferate into the surrounding areas.

Furthermore, the management of alien invasive plant species must be included in the Environmental Management Programme for the construction phase, as well as the Operational Management Plan for the project. The measures included in this plan must have as a goal to reduce the spread of the alien invasive species and to eradicate them from area within the property in which they occur.

This cumulative impact can therefore be successfully managed and mitigated.

Even though no defined ecological corridors have been identified on the site the risk is present that the project may result in a disruption of the current open space corridor used by the species that occur on the site as well as the surrounding properties.

The land use on the project site as well as the surrounding properties are similar and makes provision for the presence of large areas under indigenous vegetation, which will naturally allow for the movement of species through the area irrespective of the presence of the project.

The rehabilitation plan that will accompany the Quantum Cost Calculation for Rehabilitation must make provision for the rehabilitation of the vegetation on the project site to ensure that the vegetation resembles the of the surrounding areas to ensure that the open space corridors that have been disrupted are again allowed to continue.

This cumulative impact can therefore be successfully managed and mitigated.

The assessment has identified that the study area is located within the Matlabas / Mokolo Sub-catchment which forms a part of the Limpopo Water Management Area that is considered to be a Strategic Water Resource Area. No aquatic features were identified within the boundaries of the study site and as such, the contribution that the study site will make to the sub-catchment is to the groundwater that infiltrates through the highly permeable sandy soils on the site.

As such, any impact on the substrate on the study site that will prevent the infiltration of water into the substrate will decrease the water inputs from the area to the larger catchment.

The implementation of the requirements of the Stormwater Management Plans that must be done for the construction phase as well as the operational phase will make provision for the rainfall that occurs within the project site to be allowed to percolate into the sandy substrate to ensure that the groundwater recharge contribution from the area is still provided to the aquifer.

This cumulative impact can therefore be successfully managed and mitigated.

9.5.3 Social Impacts

Cumulative impacts identified and investigated entailed:

Health and social wellbeing

- Risk of HIV and AIDS.

Quality of the living environment

- Population growth
- Sense of place
- Service supplies and infrastructure and.

Economic

- Job creation and skills development
- Socio-economic stimulation.

The cumulative impacts discussed above are assessed in the table overleaf. It must, however, be noted that this assessment is at a superficial level as any in-depth investigation of the cumulative effects of the various developments being planned for the region are beyond the scope of this study as they would require a broad-based investigation on a far larger scale.

Cumulative impacts

		Before Mitigation											After Mitigation												Mitigation measures
Activity	Impact	Severity rating	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	+/-	Risk Rating	Severity rating	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	+/-	Risk Rating	Confidence level	
Social Impacts																											
Cumulative impacts	Risk of HIV	5	5	4	14	5	5	1	3	14	196	-	H	5	5	4	14	5	5	1	3	14	196	-	H	75%	It remains beyond the scope of a single industrial enterprise to be able to address the cumulative impacts of developments in the area. Any meaningful attempt in addressing cumulative impacts would require an interdisciplinary and multi-agency approach. Following which, a strategy would need to be established to address, monitor and enforce appropriate interventions to ensure a healthy living environment for citizens, with emphasis on protecting vulnerable populations. Any mitigation and optimisation measures would need to be considered on a cumulative basis and applied across all developments in the area. They would also need to be based on a sound understanding of the current regional state of the environment and based on robust scientific grounds.
Cumulative impacts	Sense of place	4	4	5	13	5	5	1	3	14	182	-	H	4	4	5	13	5	5	1	3	14	182	-	H	75%	
Cumulative impacts	Population increase	4	4	5	13	5	5	1	3	14	182	-	H	4	4	5	13	5	5	1	3	14	182	-	H	75%	
Cumulative impacts	Service supplies and infrastructure	3	4	4	11	5	4	1	3	13	143	-	M	3	4	4	11	5	4	1	3	13	143	-	M	75%	
Cumulative impacts	Positive economic impacts	4	5	4	13	5	5	1	3	14	182	+	H	4	5	4	13	5	5	1	3	14	182	+	H	75%	

9.5.4 Visual Impacts

From a cumulative perspective, it is important to note that the proposed solar plant is expected to blend in with the existing coal mine and power stations due to its proximity to these activities. The moderate VAC of the bushveld vegetation and the existing activities will aid in lowering the solar plant's potential visual impact. Furthermore, the sensitive receptors are currently exposed to night lighting from operational activities of the existing mining and industrial activities within the area. Therefore, the expected impacts from the solar plant will add to the cumulative visual impacts however, it will not be significant if the recommended mitigation measures are adhered to.

10 KNOWLEDGE GAPS, ASSUMPTIONS AND LIMITATIONS

The EIA Regulations require that an account of any assumptions, uncertainties and gaps in knowledge applicable to the preparation of this report is provided.

An impact assessment is a predictive tool to identify aspects of a development that need to be prevented, altered or controlled in a manner to reduce the impact to the receiving environment, or determine where remediation activities will need to be incorporated into the overall development/activity plan. This does not mean that the impact will occur at the predicted significance but provides guidance on the formulation of the management and monitoring requirements which need to be incorporated to prevent/reduce/manage the impact.

Several specialist reports were used to define the baseline environment and predict the impacts of this project. The assumptions and limitations applicable to the individual specialist studies are outlined within each of the respective specialist reports appended to this report.

Findings, recommendations and conclusions provided in this report, and all specialist reports, are based on the authors' best scientific and professional knowledge and information available at the time of compilation.

11 ENVIRONMENTAL IMPACT STATEMENT

11.1 Key Findings of Impact Assessment

The results of the impact assessment indicated that the most significant impacts on the receiving environment would be those listed below in Table 11-1 and Table 11-2. The sensitivity of the receiving environment is depicted in Figure 11-1 below. The correct implementation of the mitigation measures outlined in the EMPr will ensure that all impacts are managed, mitigated or avoided as far as practicably possible.

Table 11-1: Key impacts during the construction phase

Environmental Aspect	Impacts
Air Quality & Climate	• Generation of inhalable PM2.5, PM10 and TSP and impacts on health • GHG emissions during the construction activities
Vegetation	• Potential loss of indigenous vegetation units • Potential increase in alien vegetation • Potential loss of floral species of conservation importance • Loss of catchment area and decreased water inputs • Contamination of the area by petrochemical spillages • Contamination of the area by construction and domestic waste • Contamination of the area as a result of leaking portable toilet facilities.
Wildlife	• Potential loss of faunal species of conservation importance • Potential loss of vulture breeding habitat (White-backed Vulture) • Potential loss of foraging habitat for game species • Contamination of the area by petrochemical spillages • Contamination of the area by construction and domestic waste • Contamination of the area as a result of leaking portable toilet facilities. • Road Mortalities
Soils, Land Capability and Land Use	• Soil Contamination • Soil loss / Soil erosion • Loss of agricultural potential • Temporary change in land use from open veld (zoned for mining) to construction
Water Quality	• Increase in water turbidity due to sediment inputs and/or erosion • Physio-chemical water pollution related to potential spillages of cement and fuels
Visual	• Negative visual impact on aesthetics • Change of visual landscape and character

	• Visual intrusion due to glare, light trespass and skyglow
Noise	• Noise disturbance from the movement of construction vehicles • Noise disturbance from the operation of machinery
Heritage & Paleontological Impacts	• Loss of cultural heritage resources • Loss of palaeontological resources
Social	• Increased annoyance, air quality and noise • Increase in crime • Increased risk of HIV infections • Influx of construction workers • Hazard exposure • Disruption of daily living patterns and social and community infrastructure • Job creation and skills development • Positive economic impacts
Traffic	• Increase in traffic • Increase of incidents with pedestrians and livestock • Increase in dust from gravel roads • Increase in road maintenance • Additional abnormal loads • Increase in dust from gravel roads • New / larger access points

Table 11-2: Key impacts during the operational phase

Environmental Aspect	Impacts
Renewable Energy Goals and Green House Gas Reduction	• Contribution to Renewable Energy Goals and Green House Gas Reduction
Vegetation	• Spreading of alien invasive vegetation • Loss of catchment area and decreased water inputs • Contamination of the area by petrochemical spillages • Contamination of the area by domestic waste • Contamination of the area as a result of leaking ablution facilities.
Wildlife	• Potential increase in the number of bird-strikes along the connection powerline • Potential disruption of open space corridor • Potential loss of foraging habitat for game species • Contamination of the area by petrochemical spillages

	• Contamination of the area by domestic waste • Contamination of the area as a result of leaking ablution facilities. • Road Mortalities
Soils, Land Capability and Land Use	• Soil contamination • Soil erosion
Water Quality & Quantity	• Increase in water turbidity due to sediment inputs and/or erosion • Potential sedimentation several months after the site has been constructed. • Physio-chemical water pollution related to potential spillages / leakages of fuels and oils • Lowering of groundwater levels- groundwater abstraction from BH2 • Lowering of regional groundwater levels within the aquifer • Lowering of the water table due to dewatering
Visual	• Landscape visual change • Change of visual character • Visual intrusion due to glare, light trespass and skyglow
Social	• Glint & glare • Transformation of the sense of place • Positive economic impacts
Traffic	• Increase in dust from gravel roads • New / larger access points

11.2 Opinion regarding authorization of activity/ies

The EAP is confident that all major impacts associated with the proposed solar plant has been adequately described and mitigated. It is the opinion of the EAP that the solar plant should be authorised, provided that the proposed mitigation measures are implemented effectively and in line with the EMPr and any site specific conditions outlined within the environmental authorisation. The potential loss of indigenous vegetation and species of conservation importance, as well as the change in the landscape and socio-economic character of the area, will be outweighed by the long-term positive impacts of the proposed solar plant. Based on the findings of the Impact Assessment, the EAP sees no reason why the EA should not be granted for the proposed project to proceed.

11.3 Environmental Management Programme Report

GCS has prepared a Draft Environmental Management Programme Report (EMPr), which is required as part of the EIR submission in Appendix G. The purpose of the EMPr is to control the impacts of construction and operational activities. The effective implementation of an EMPr will ensure that the required works are conducted in an environmentally sound manner and that the potential negative impacts of construction and operational activities are minimised and/or prevented.

The Draft EMPr details the responsibilities and authority of the various parties involved in the project and contains environmental specifications to which the contractor and operator are required to adhere throughout the duration of the construction and operational phases. The Draft EMPr will cover impacts that have been identified in the EIA Process and which could potentially arise during the construction and/or operation of the road. The EMPr will cover the following aspects:

- Project background information.
- Identification/listing of project and operational activities.
- Implementation and operational instructions.
- Roles and responsibilities of parties with regard to environmental management.
- Environmental training and awareness material for construction staff.
- Environmental specifications e.g. protection of biodiversity and sensitive environments, rehabilitation, public safety and perceptions, traffic control, material and waste management, litter, containment and disposal of hazardous substances (e.g. paints, waste oils) etc.
- Measurement of compliance with the EMPr.

11.4 Proposed conditions of Authorisation

Following the findings of the EIA, it is suggested that the CA include the following conditions in the EA, should they decide to grant such:

- The applicant, or anyone acting on the applicant's behalf, must comply with the applicable legislation, regulatory and permit requirements from Lephalale Local Municipality, Waterberg District Municipality, Limpopo Department of Economic Development, Environment and Tourism, DWS and all relevant authorities during the construction and operation phases.
- The recommendations and mitigation measures included in the specialist investigations must be adhered to;

- Correct implementation of all feasible mitigation measures included in the Environmental Management Programme (EMPr) during the project lifecycle; and
- In terms of Environmental Monitoring and Auditing, the following:
    - Appointment of an Environmental Control Officer for the duration of the construction phase of the project, to monitor environmental compliance of the project to all environmental conditions and requirements during all construction phases (pre-construction, construction, post-construction);
    - Appointment of an External Auditor to undertake annual environmental compliance audits for the project.

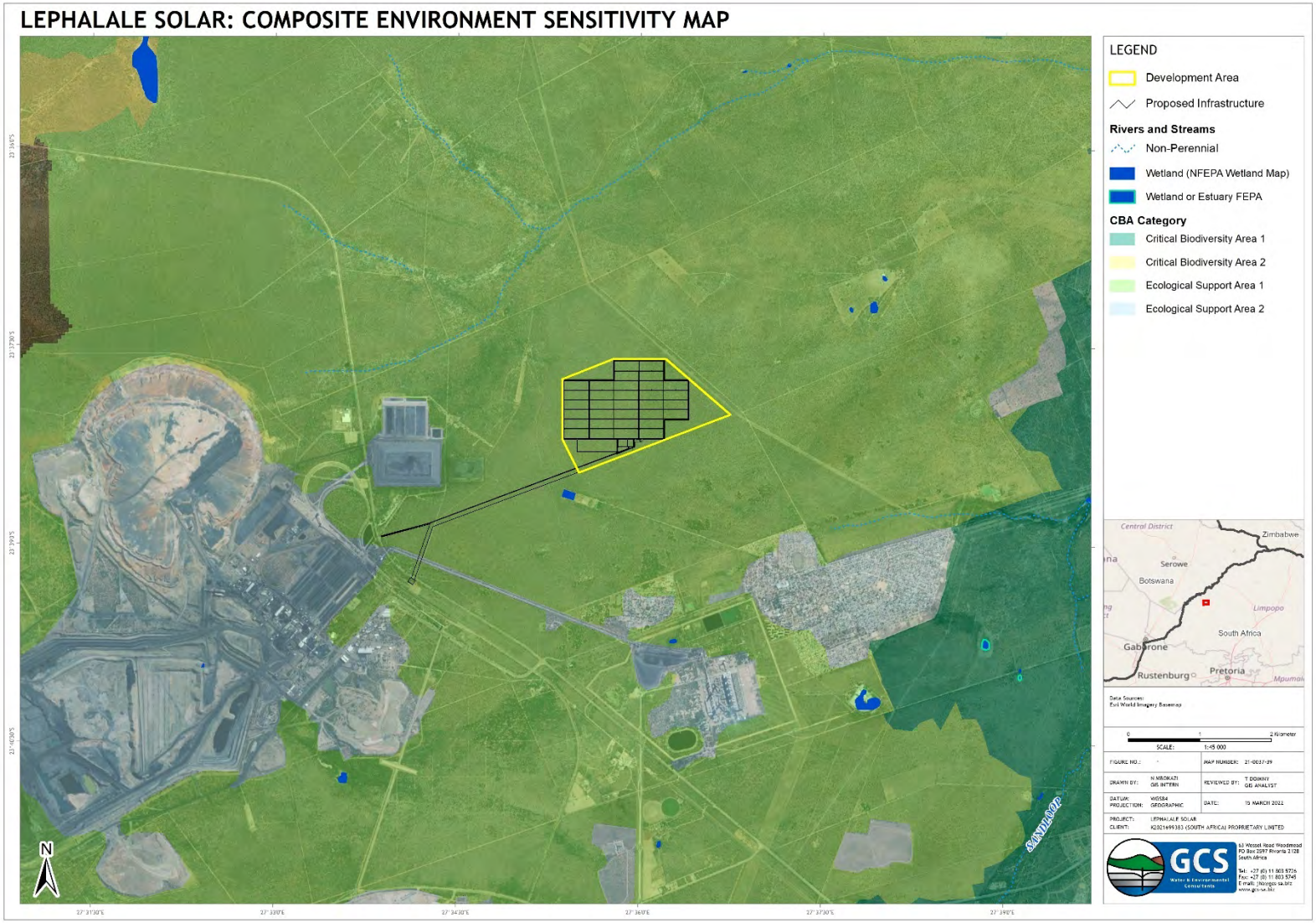


Figure 11-1: Environmental sensitivity of the receiving environment

12 INFORMATION REQUESTED BY THE COMPETENT AUTHORITY

None

13 CONCLUSION AND WAY FORWARD

13.1 Conclusion

A Draft EIA Report has been compiled where the potential impacts on the environment of listed activities associated with the proposed solar plant were considered, investigated and assessed in compliance with the NEMA and EIA Regulations. The report contains all information that is necessary for the competent authority to consider the application and to reach a decision regarding the application and includes an assessment of each identified potential impact, including biophysical, ecological, socio-economic and cumulative impacts of the proposed development on the environment. The impact assessment is more detailed than the preliminary assessment undertaken in the scoping phase, by incorporating all of the conditions required by the EIA regulations, to provide a thorough investigation into all potential impacts.

Based on the conclusion that no environmental fatal flaw was found, and that any negative impacts can be mitigated to acceptable levels, GCS recommends that an EA is granted, provided the rehabilitation measures and all other proposed mitigation measures are implemented and the recommendations are considered.

13.2 Way Forward

The Draft EIR will be submitted to all I&AP's for a 30-day comment period. All comments received from I&AP's have been included in the CRR and included as an appendix to the FEIR.

The FEIR will be submitted to the LDEDET for review.

14 UNDERTAKING BY EAP

14.1 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I, Gerda Bothma, herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected Parties received since project announcement, have been correctly recorded in the report.

Signature of the EAP

Date: 19 April 2022

14.2 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I, Gerda Bothma, herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with Interested and Affected Parties and stakeholders since announcement of the project, has been correctly recorded and reported herein.

Signature of the EAP

Date: 19 April 2022