



**PROPOSED MATJHABENG SOLAR PV WITH
BATTERY ENERGY STORAGE SYSTEMS PROJECT:
PHASE 1 AND PHASE 2 SITES**

SCOPING REPORT

DRAFT

March 2020



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TITLE AND APPROVAL PAGE

Project Name:	Proposed Matjhabeng Solar PV with Battery Energy Storage Systems Project: Phase 1 and Phase 2 Sites
Report Title:	Draft Scoping Report
Authority Reference:	<i>To be provided by DEFF</i>
Report Status:	Draft

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Report Reference:	10716-20200319	R-PRO-REP 20170216		

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EXECUTIVE SUMMARY

A. PROJECT BACKGROUND AND MOTIVATION

Electricity generation sources need to be diversified to ensure security of supply and reduction in the carbon footprint created by the current heavy reliance of South Africa on coal to produce electricity.

SunElex Energy (Pty) Ltd (the Applicant) has proposed the development of the Matjhabeng 400 MW Solar Photovoltaic Power Plant with 80 MW (320 MWh) Battery Energy Storage Systems (hereinafter the 'Project'), which is located north and south of the town of Odendaalsrus in the Free State Province. The proposed Project will be developed to serve the Matjhabeng Local Municipality's energy requirements and will generate power for delivery to the local/national grid.

The proposed utility-scale Project will be developed in the following two (2) phases:

- ❖ Phase 1: 200 MW Solar Photovoltaic with 40 MW (160 MWh) Battery Energy Storage System (on the site located south of Odendaalsrus, hereinafter referred to as "**Phase 1 Site**"); and
- ❖ Phase 2: 200 MW Solar Photovoltaic with 40 MW (160 MWh) Battery Energy Storage System (on the site located north of Odendaalsrus, hereinafter referred to as "**Phase 2 Site**").

The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system.

This document serves as the Draft Scoping Report for the proposed Project: Phase 1 and Phase 2 Sites. A separate Environmental Impact Assessment will be undertaken for the proposed power lines.

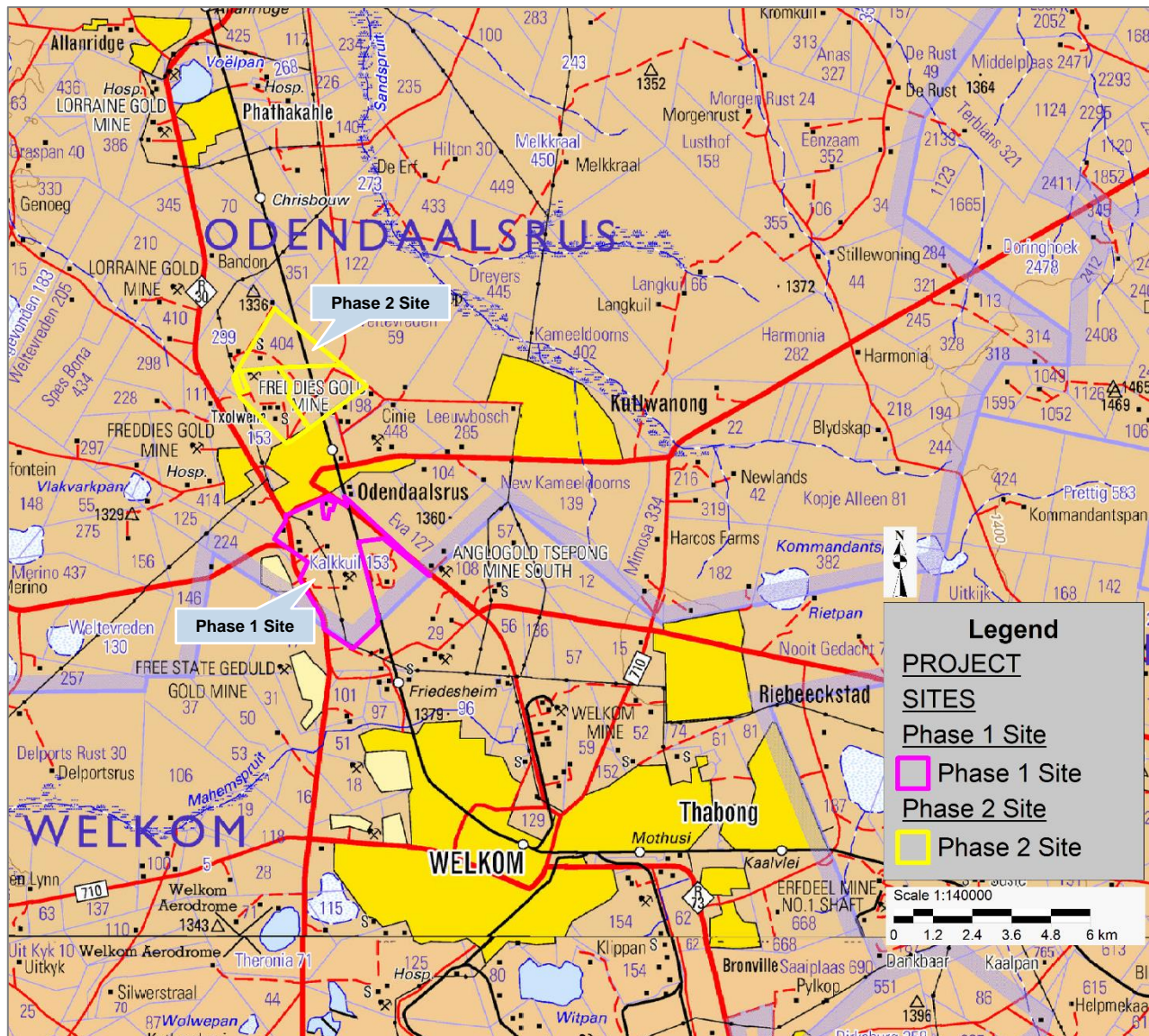
B. PROJECT LOCATION

The rationale for the Project is based on its geographic location and the suitability of the sites (high solar yield area, flat and sparsely populated land, grid connection, water supply, good transport infrastructure, availability of a large portion of municipal land) and the value it provides to the Matjhabeng Local Municipality and users of electricity/energy to be generated by the proposed Project.

The Project is located in the north-western part of the Free State Province and falls within the Matjhabeng Local Municipality and Lejweleputswa District Municipality. The Phase 1 and Phase 2 Sites are located south and north of Odendaalsrus, respectively (see figure to follow). The sites are easily accessible from the north and south by the R30 arterial road (traversing both sites) and from the east and west via the R34 arterial road.

Both of the Phase 1 and Phase 2 Sites are located on municipal owned land that was previously used for mining purposes. The sites have been secured and the Matjhabeng Local Municipality has

entered into a Long-Term Land Lease Agreement with the Applicant. Although there is an existing mining right by Harmony Gold Mining Company Ltd on the area in question, a consent letter was received from the mining company. There is also a Tripartite and Rehabilitation Agreement between Harmony Gold Mining Company Ltd, Matjhabeng Local Municipality and the Applicant related to the rehabilitation obligations.

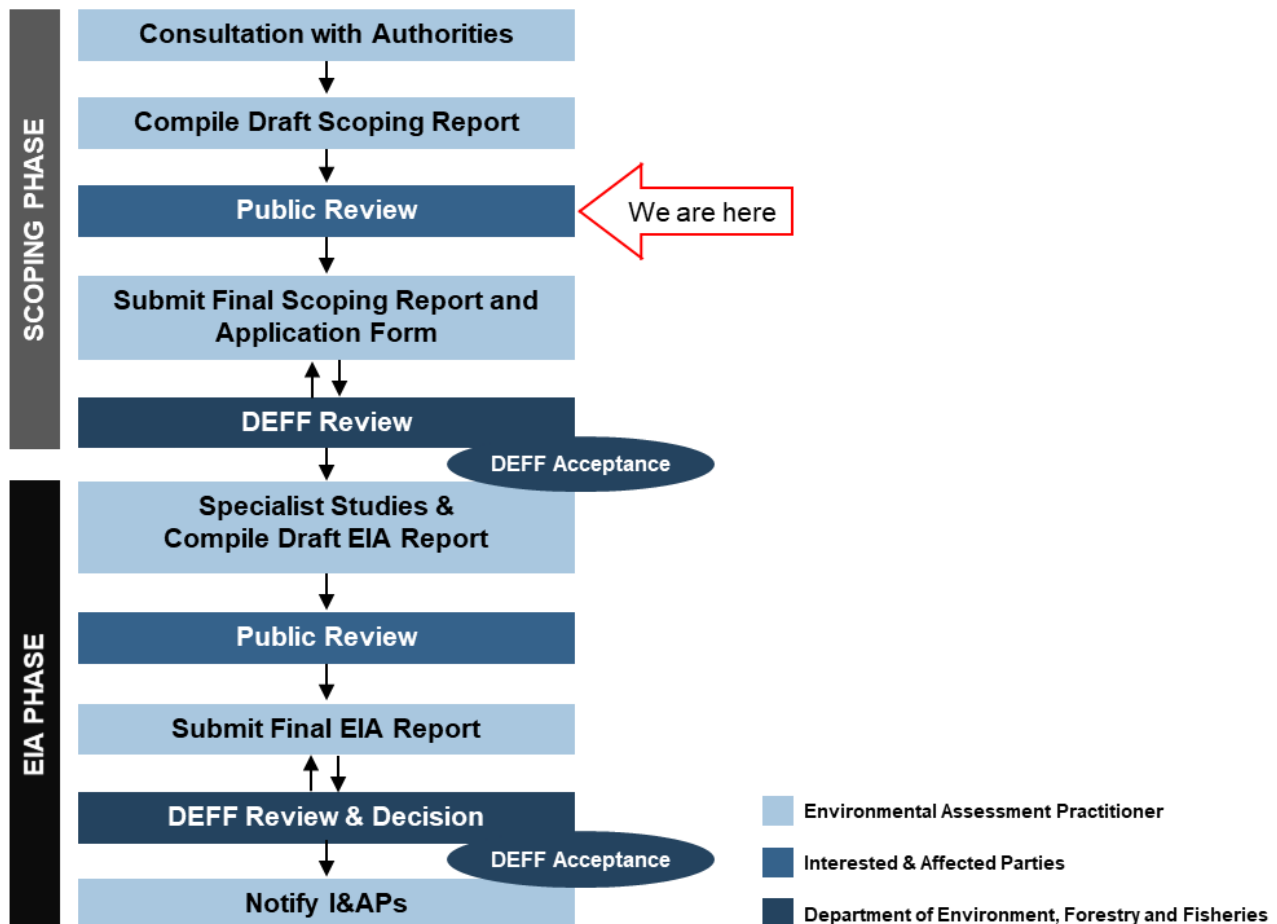


Locality map of Project Area

C. SCOPING AND EIA PROCESS

An Application for Environmental Authorisation in terms of the National Environmental Management Act (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations of 2014 (as amended) has been made for the proposed Project. In terms of the aforementioned Act, the lead decision-making authority for the environmental assessment is the Department of Environment, Forestry and Fisheries.

The process for seeking authorisation is undertaken in accordance with Government Notice No. R. 982 of 4 December 2014 (as amended). Based on the types of activities involved, which include activities contained in Listing Notices 1, 2 and 3 of the Environmental Impact Assessment Regulations of 2014 (as amended), the requisite environmental assessment for the Project is a Scoping and Environmental Impact Assessment process. An outline of the process is provided in the diagram to follow.



Overview of Scoping and EIA process

D. PROJECT'S TECHNICAL DESCRIPTION

The proposed Project consists of the following systems, sub-systems or components:

- ❖ Single-axis tracked, Crystalline-Silicon Photovoltaic panel arrays. The solar arrays are the subsystems which convert incoming sunlight into electrical energy.
- ❖ Mounting structures to support the Photovoltaic panels;
- ❖ On-site inverters to convert the Direct Power to facilitate the Alternating Current connection between the solar energy facility and the electricity grid;
- ❖ New 132 kV power lines between the on-site substation(s) and the grid connection point(s) (covered under a separate Application);
- ❖ Cabling between the Project's components, to be laid underground (where practical);
- ❖ Battery Energy Storage System of Lithium Ion Technology;

- ❖ Administration Buildings (Offices);
- ❖ Workshop areas for maintenance and storage;
- ❖ Temporary laydown areas;
- ❖ Internal access roads and perimeter fencing of the footprint area;
- ❖ Communications Tower;
- ❖ High Voltage Transformers; and
- ❖ Security Infrastructure.

The preliminary layouts of the Phase 1 and Phase 2 Sites are presented in the Scoping Report. An overview of the project life-cycle, as well as all the resources that will be required to execute the Project, is also provided in the Scoping Report.

The alternatives under consideration for the Project include design/layout alternatives, as well as technology alternatives. The Environmental Impact Assessment phase will include a detailed comparative analysis of the Project's feasible alternatives that emanate from the Scoping exercise, which will include environmental (with specialist input) and technical evaluations.

In terms of the no-go alternative, should the proposed Project not be given the required go ahead, then the objectives of the Project, including the benefits (such as the exploitation of the country's renewable energy resources, potential economic development, related job creation, and increased security of electricity supply), will not materialise.

E. PROFILE OF THE RECEIVING ENVIRONMENT

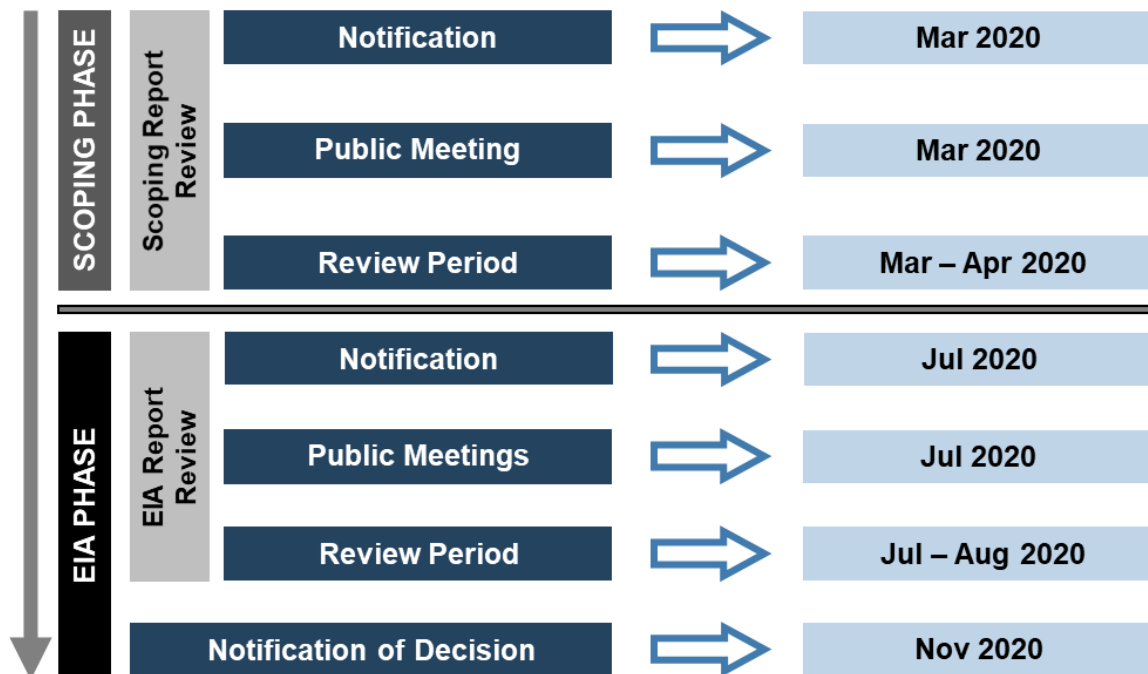
The Scoping Report provides a general description of the status quo of the receiving environment in the Project's Sites. This serves to provide the context within which the Scoping exercise is conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Project. A brief overview is also provided of the manner in which the environmental features may be affected (positively or negatively) by the proposed Project.

The receiving environment is explained in terms of the following:

- | | |
|------------------------------|--|
| ❖ Land Use and Land Cover | ❖ Agriculture |
| ❖ Climate | ❖ Air quality |
| ❖ Geology and Geohydrology | ❖ Noise |
| ❖ Soils | ❖ Historical and Cultural Features |
| ❖ Topography | ❖ Planning |
| ❖ Surface Water | ❖ Existing Structures and Infrastructure |
| ❖ Flora | ❖ Transportation |
| ❖ Fauna | ❖ Aesthetic Qualities |
| ❖ Socio-Economic Environment | ❖ Health |

F. PUBLIC PARTICIPATION

The diagram to follow outlines the public participation process for the Scoping (current) and Environmental Impact Assessment phases (pending) of the proposed Project, with envisaged timeframes.



Outline of Public Participation Process

The Scoping Report explains the public participation tasks undertaken during the Scoping Phase, including the following

- ❖ Compiling the database of Interested and Affected Parties,
- ❖ Obtaining landowner consent;
- ❖ Notification of review of the Draft Scoping Report;
- ❖ Accessing the Draft Scoping Report;
- ❖ Public Meeting to present the Draft Scoping Report; and
- ❖ Addressing Comments Received on the Draft Scoping Report

G. ENVIRONMENTAL ISSUES

In accordance with the purpose of the Scoping Phase, the Scoping Report identifies potentially significant environmental issues for further consideration and prioritisation during the Environmental Impact Assessment Phase. This allows for a more efficient and focused impact assessment, where the analysis is largely limited to significant issues and reasonable alternatives.

Pertinent environmental issues, which will receive specific attention during the Environmental Impact Assessment Phase through a detailed quantitative assessment and relevant specialist studies (where deemed necessary), are discussed in the Scoping Report.

Cumulative impacts are identified by combining the potential environmental implications of the proposed Project with the impacts of other projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the Project area.

A methodology to quantitatively assess the potential impacts is also provided in the Scoping Report, which will be employed during the Environmental Impact Assessment Phase.

H. PLAN OF STUDY FOR EIA

The Scoping Report is concluded with a Plan of Study, which explains the approach to be adopted to conduct the Environmental Impact Assessment for the proposed Project in accordance with the following pertinent tasks and considerations:

- ❖ Potentially significant environmental issues identified during the Scoping Phase;
- ❖ Feasible alternatives to be assessed during Environmental Impact Assessment Phase;
- ❖ Specialist studies to be undertaken, which include –
 - Aquatic Impact Assessment and Delineation;
 - Terrestrial Ecological Impact Assessment;
 - Heritage Impact Assessment;
 - Agricultural Impact Assessment;
 - Visual Impact Assessment; and
 - Socio-Economic Impact Assessment.
- ❖ Public Participation process to be undertaken for the Environmental Impact Assessment Phase;
- ❖ Contents of the Environmental Impact Assessment Report;
- ❖ Consultation with authorities; and
- ❖ Environmental Impact Assessment process timeframes.

I. CONCLUSION

Key outcomes of the Scoping Phase for the proposed Project are as follows:

- ❖ Alternatives for achieving the objectives of the proposed Project were considered;
- ❖ Potentially significant issues pertaining specifically to the pre-construction, construction and operational phases of the Project were identified;
- ❖ Sensitive elements of the environment that may be affected by the Project were identified;
- ❖ Stakeholders were effectively identified to allow for their participation in the Scoping process;
- ❖ A Plan of Study was developed to explain the approach to executing the Environmental Impact Assessment Phase, which also includes the Terms of Reference for the identified specialist studies; and
- ❖ The scoping exercise set the priorities for the ensuing Environmental Impact Assessment Phase.

No fatal flaws were identified in terms of the proposed activities and the receiving environment that would prevent the environmental assessment from proceeding beyond the Scoping Phase. It is the opinion of the Environmental Impact Assessment team that the Scoping Phase was executed in an objective manner and that the process and report conform to the requirements of the Environmental Impact Assessment Regulations of 2014 (as amended). It is also believed that the Plan of Study for the Environmental Impact Assessment is comprehensive and will be adequate to address the significant issues identified during the Scoping Phase, to select the Best Practicable Environmental Option, and to ultimately allow for informed decision-making.

AMENDMENTS PAGE

Date	Nature of Amendment	Amendment No.	Signature
March 2020	Draft for Review by Authorities and the Public	0	

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LIST OF ACRONYMS & ABBREVIATIONS

AC	Alternating Current
AEL	Atmospheric Emission Licence
ASAPA	Association for Southern African Professional Archaeologists
BESS	Battery Energy Storage System
BPEO	Best Practicable Environmental Option
CBAs	Critical Biodiversity Areas
CPV	Concentrated Photovoltaics
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DEFF	Department of Environment, Forestry and Fisheries
DEL	Department of Employment and Labour
DESTEA	Department of Economic, Small Business Development, Tourism and Environmental Affairs
DC	Direct Current
DMRE	Department of Mineral Resources and Energy
DPRT	Department of Police, Roads and Transport
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EEPP	Emergency Economic Priority Project
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EHS	Environmental, Health, and Safety
EMPr	Environmental Management Programme
ESAs	Ecological Support Areas
FSHRA	Free State Heritage Resources Authority
GHG	Greenhouse Gas
GIS	Geographical Information System
GN	Government Notice
GTAC	Government Technical Advisory Centre
HGM	Hydromorphic Unit
HV	High Voltage
IAPs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
KZN	KwaZulu-Natal
LDM	Lejweleputswa District Municipality
Li-Ion	Lithium Ion
MLM	Matjhabeng Local Municipality

MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
Na	Sodium
NaS	Sodium-Sulphur
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NNR	National Nuclear Regulator
NWA	National Water Act (Act No. 36 of 1998)
OHS	Occupational Health and Safety
PES	Present Ecological Status
PCD	Pollution Control Dam
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PS	Performance Standards
PV	Photovoltaic
REDZ	Renewable Energy Development Zones
REEA	Renewable Energy EIA Application
S	Sulphur
S&EIR	Scoping and Environmental Impact Reporting
SA	South Africa
SAAB	South African Association of Botanists
SACAA	South African Civilian Aviation Authority
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIEES	South African Institute of Ecologists and Environmental Scientists
SANS	South African National Standard
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SIPs	Strategic Integrated Projects
SKA	Square Kilometre Array
SMME	Small, Medium and Micro-sized Enterprises
ToR	Terms of Reference
VFB	Vanadium Flow Battery
VRB	Vanadium Redox Battery
WMA	Water Management Area

UNITS OF MEASUREMENT

°C	Degrees Celsius
ha	Hectare
km	Kilometre
km²	Square kilometre
km/h	Kilometres per hour
kV	Kilovolt
m	Metre
m²	Square metre
m/s	Metre persSecond
mm	Millimetre
MW	Megawatt
MWh	Megawatt hour
TWh	Terawatt Hours
%	Percentage

1 PURPOSE OF THIS DOCUMENT

Nemai Consulting was appointed by SunElex (the Applicant) to conduct the Environmental Impact Assessment (EIA) for the proposed development of the Matjhabeng 400 MW Solar Photovoltaic (PV) Plant with 80 MW (320 MWh) Battery Energy Storage System (BESS) (hereinafter the 'Project'), which is located north and south of the town of Odendaalsrus in the Free State Province. The EIA process will be undertaken in terms of Government Notice (GN) No. R. 982 of 4 December 2014 (as amended).

The proposed utility-scale Solar PV Plant will be developed in the following two (2) phases:

- ❖ Phase 1: 200 MW PV with 40 MW (160 MWh) BESS on the Project site located south of Odendaalsrus (hereinafter referred to as '**Phase 1 Site**'); and
- ❖ Phase 2: 200 MW PV with 40 MW (160 MWh) BESS on the Project site located north of Odendaalsrus (hereinafter referred to as '**Phase 2 Site**').

The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system as follows:

- ❖ Phase 1: connection to the Eskom Euclid Substation via a ± 4 km power line; and
- ❖ Phase 2: connection to the Eskom GrootKop Substation via a ± 14 km power line.

This document serves as the **Draft Scoping Report** for the proposed Project: Phase 1 and Phase 2 Sites. A separate EIA will be undertaken for the proposed power lines.

The purpose of the Scoping phase, which constitutes the first phase of the overall EIA process, includes the following but not limited to:

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

2 DOCUMENT ROADMAP

As a minimum, the Scoping Report aims to satisfy the requirements stipulated in Appendix 2 of GN No. R 982 of 4 December 2014 (as amended). **Table 1** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: Scoping Report Roadmap

Chapter	Title	Correlation with GN No. R 982, Appendix 2	Description of content of GN No. R 982, Appendix 2
1	Purpose of this Document	–	–
2	Document Roadmap	–	–
3	Project Background and Motivation	2(1)(f)	A motivation for the need and desirability for the proposed development.
4	Project Location	2(1)(b) & 2(1)(c)	A description of the location of the activity.
5	Legislation and Guidelines Considered	2(1)(e)	A description of the policy and legislative context within which the development is proposed.
6	Scoping and EIA Process	2(1)(a)	Details of Environmental Assessment Practitioner (EAP) who prepared the report and the expertise of the EAP.
7	Assumptions and Limitations	–	–
8	Need and Desirability	2(1)(f)	A motivation for the need and desirability for the proposed development.
9	Project Description	2(1)(c) & 2(1)(d)	A description of the scope of the proposed activity.
10	Alternatives	2(1)(g)(i)	Details of all the alternatives considered.
		2(1)(g)(vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected.
11	Profile of the Receiving Environment	2(1)(g)(iv)	Environmental attributes associated with the alternatives.
		2(1)(g)(vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected.
12	Public Participation	2(1)(g)(ii)	Details of the public participation process.
		2(1)(g)(iii)	A summary of the issues raised by IAPs.
13	Potentially Significant Environmental Issues	2(1)(g)(v)	Impacts and risks identified for each alternative.
		2(1)(g)(vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected.
		2(1)(g)(vi)	The methodology used in identifying and ranking the potential environmental impacts and risks associated with the alternatives.
14	Plan of Study for EIA	2(1)(h)	A plan of study for undertaking the environmental impact assessment process.
	Appendix T	2(1)(i) and 2(1)(j)	An undertaking under oath or affirmation by the EAP.
	N/A	2(1)(k)	Where applicable, any specific information required by the competent authority.
	N/A	2(1)(l)	Any other matter required in terms of section 24(4)(a) and (b) of the Act.

Note that the following sections of Appendix 2 of GN No. R 982 of 4 December 2014 (as amended) will be investigated further and reported on in the Environmental Impact Report (EIR), following the execution of the relevant specialist studies and targeted public participation:

- ❖ Section 2(1)(g)(v) - *The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-
(a) can be reversed;
(b) may cause irreplaceable loss of resources; and
(c) can be avoided, managed or mitigated.*

*The impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts -
(a) can be reversed;
(b) may cause irreplaceable loss of resources; and
(c) can be avoided, managed or mitigated.*
- ❖ Section 2(1)(g)(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 2(1)(g)(viii) - *The possible mitigation measures that could be applied and level of residual risk.*
- ❖ Section 2(1)(g)(ix) - *The outcome of the site selection matrix.*
- ❖ Section 2(1)(g)(xi) - *A concluding statement indicating the preferred alternatives, including preferred location of the activity.*

3 PROJECT BACKGROUND AND MOTIVATION

The South African Government ratified the Paris Agreement in 2016, and thereby showed the country's commitment to contribute to the global effort to address the challenge of climate change.

Electricity generation sources need to be diversified to ensure security of supply and reduction in the carbon footprint created by the current heavy reliance of South Africa (SA) on coal to produce electricity. The electricity demand is increasing in SA, and in order to match that demand there is a need to supply a diversified power generation that includes renewable energy technologies. These technologies include solar, wind, small utility scale hydro, biomass, biogas and energy storage that the Department of Mineral Resources and Energy (DMRE) intends to develop and implement as identified in the approved Integrated Resource Plan (IRP) 2019.

Since the adoption of the Constitution, international and government policy papers have created the foundation for SA's energy programme. The need to expand and increase electricity generation capacity in the country is based on national policy and informed by on-going strategic planning undertaken by the DMRE. The hierarchy of policy and planning documentation that support the development of renewable energy projects such as the proposed Project is illustrated in **Figure 1** below.

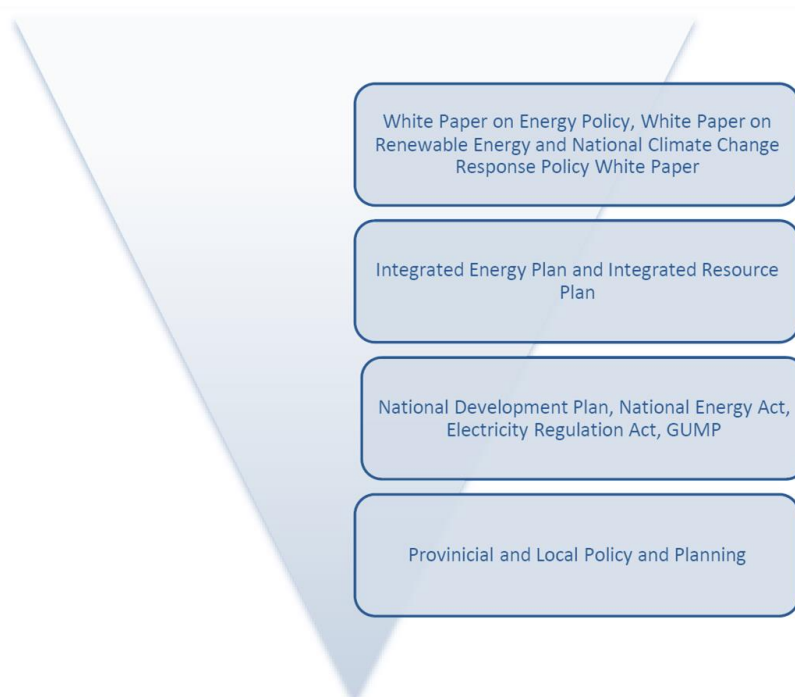


Figure 1: Hierarchy of electricity policy and planning documents

The Matjhabeng Local Municipality (MLM) recognizes the need to meet the energy requirements of its residents in a dynamic changing sector. In response to this need, SunElex Energy (Pty) Ltd (hereinafter referred to as "SunElex") has proposed the development of the Matjhabeng 400MW Solar Photo Voltaic (PV) with Battery Energy Storage Systems (BESS) Power Plant (hereinafter

referred to as the “Project”). The Project will thus be developed to serve the MLM’s energy requirements and will generate power for delivery to the local/national grid. Surplus power will be taken up by other Commercial and Industrial (C&I) off-takers via additional Private Power Purchase Agreements (PPA’s). Therefore, the MLM’s Council has formally classified this Project as an “Emergency Economic Priority Project” (EEPP).

The Project will thus benefit the MLM as follows:

- ❖ Savings on the current and already huge Eskom Bill as the Project’s tariff is lower than the Eskom tariff and the escalation rate is fixed per year at its applicable CPI rates during the life-cycle of the Project;
- ❖ Potential to attract foreign investments and subsequently achieve economic growth;
- ❖ Additional revenue stream due to the innovational technology which has the potential to enable the selling of excess power to Eskom or another off-taker;
- ❖ Refinancing the current Eskom debt for immediate relief;
- ❖ Financial investment into the municipality jurisdiction that will boost the economic cycle of the community;
- ❖ New upcoming industrialization activity attraction;
- ❖ Job creation, skills development and Small Medium Micro Enterprises (SMME) development; and
- ❖ Transforming the energy sector in SA and Africa as per its current timeline. The Project will be the first to rollout utility scale BESS at the capacity quoted within the next 24 months due to imminent delays and risks of Eskom’s pilot BESS programme.

The proposed Project will have a project design life of 25 years. The clean energy from the Solar Park will be integrated and connected to the Eskom national grid which will be done in conjunction with Eskom, SA’s State Owned Company (SOC), which is the national electricity supplier.

The South African Government adopted a National Infrastructure Plan in 2012 that intends to transform our economic landscape while simultaneously creating significant numbers of new jobs, and to strengthen the delivery of basic services. The plan also supports the integration of African economies. The National Infrastructure Plan consists of 18 Strategic Integrated Projects (SIPs), of which SIP 8 targets the development of green energy in support of SA’s economy. This Project supports SIP 8 and aims to address the MLM’s urgent need for electricity.

The surface rights, where the Project will be established, belong to the MLM and SunElex has secured a long term lease with the MLM for the duration of the Power Purchase Agreement (PPA). To this end, the Project is registered as a Public Private Partnership (PPP) with the Government Technical Advisory Centre (GTAC), an agency of the National Treasury.

The Feasibility Studies ,which were finalised in 2016, confirmed the techno-economic feasibility of the Project, as well as its significant potential for positive socio-economic impact in the MLM.

4 PROJECT LOCATION

4.1 Location of the Project relative to Solar Yield Area

The rationale for the Project is based on its geographic location and the value it provides to the MLM and its users of electricity/energy. The Project is to be located in a high solar yield area, with irradiation levels capable of producing over 1TWh (equal to one million MWhs) of renewable energy annually, with a nominal net generating capacity of 400 MWn, based solely on PV technology (refer to **Figure 2** below).

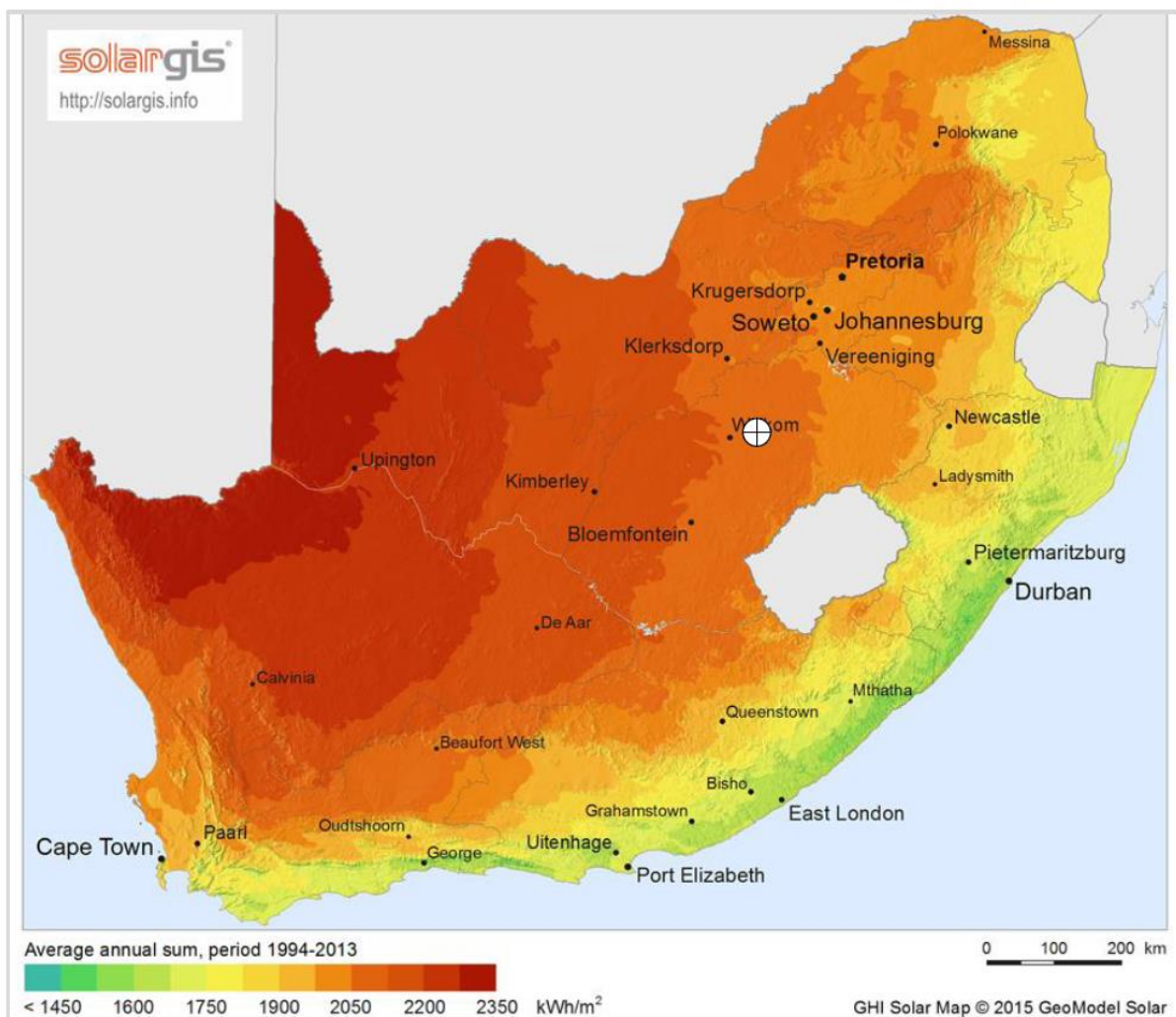


Figure 2: Location of the Project relative to Solar Yield Area
(denoted by the black cross on white background)

4.2 Geographical Context

The Project is located in the north-western part of the Free State Province and falls within the MLM and Lejweleputswa District Municipality (LDM). The locality map is depicted in **Figure 3** below and

aerial views of the Phase 1 and Phase 2 Sites are shown in **Figure 4** and **Figure 5** below, respectively. Additional maps are also contained in **Appendix A**.

The topography is relatively flat which makes it suitable for large scale solar project development. The Project is located in close proximity to all required infrastructure. Specifically, the power infrastructure is excellent and according to a Network Integration Study that was undertaken the two (2) Eskom substations, namely, Euclid and GrootKop, have the potential to enable the evacuation of 900 MW of new electricity generation. The connection to Eskom infrastructure will be uncomplicated, with new 132 kV power lines running from the sites, via existing and/or new associated infrastructure servitudes, to the two (2) Eskom Distribution Stations.

The Project is located within proximity to the town of Odendaalsrus where municipal services (water and sewage connections) are available. The sites are easily accessible from the north and south by the R30 arterial road (traversing both sites) and from the east and west via the R34 arterial road. An operational railway line runs next to the Project's sites.

The details of the Project's Phase 1 and Phase 2 Sites are provided in **Table 2** below. Details of the properties that are directly affected by and adjacent to the proposed development are contained in **Appendix B**.

Table 2: Details of the Project's Phase 1 and Phase 2 Sites

Farm Details	21-digit Surveyor General No.	MLM Ward	Approximate centre point coordinates	Geographical land area (site extent):	Useable area:
PHASE 1 SITE					
Portion 2 of the Farm Kalkkuil 153	F02400000000015300002	35	27°53'58.52"S; 26°41'45.46"E	798 Ha	638 Ha*
PHASE 2 SITE					
Portion 0 of the Farm Dolly 404	F02400000000040400000	36	27°51'00.28"S; 26°41'05.72"E	1,172 Ha	599 Ha*
Portion 0 of the Farm Ophir 405	F02400000000040500000				
Remaining Extent of the Farm Paleis-Heuvel 323	F02400000000032300000				
Portion 3 of the Farm Paleis-Heuvel 323	F02400000000032300003				

* Useable area to take into consideration the findings of the specialist studies in the EIA Phase

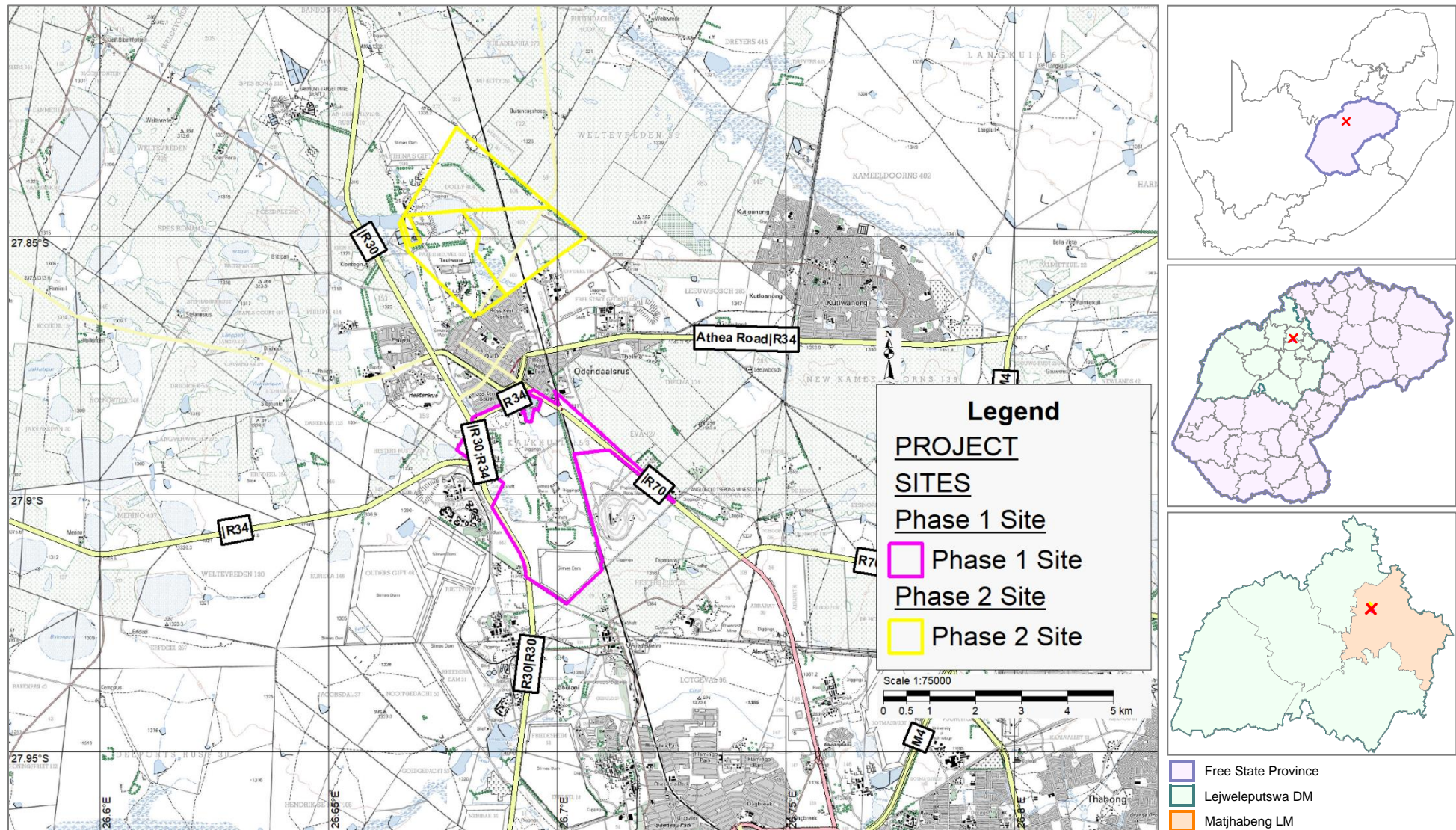


Figure 3: Locality map of the Project's Phase 1 and Phase 2 Sites



Figure 4: Orthophotograph of the Project's Phase 1 Site

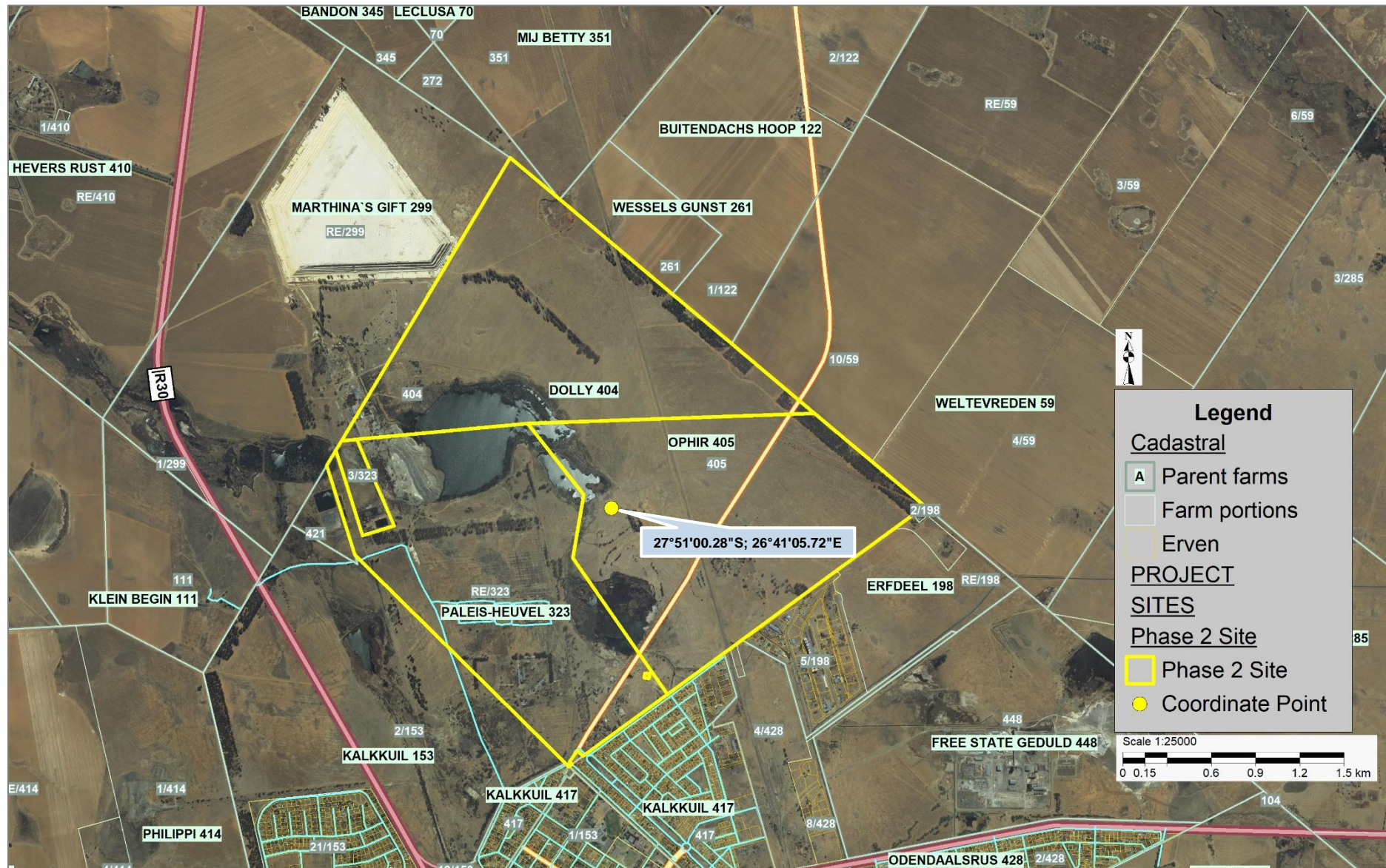


Figure 5: Orthophotograph of the Project's Phase 2 Site

5 LEGISLATION AND GUIDELINES CONSIDERED

5.1 International Finance Corporation - Performance Standards & Guidelines

Where relevant, the Project would strive to satisfy and incorporate the International Finance Corporation (IFC) Performance Standards (PS), which serve as an international benchmark for identifying and managing environmental and social risks.

The IFC PS offer a framework for understanding and managing environmental and social risks for high profile, complex, international and potentially high impact projects. The IFC PS encompass the following eight topics:

- ❖ Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- ❖ Performance Standard 2: Labour and Working Conditions;
- ❖ Performance Standard 3: Resource Efficiency and Pollution Prevention;
- ❖ Performance Standard 4: Community Health, Safety, and Security;
- ❖ Performance Standard 5: Land Acquisition and Involuntary Resettlement;
- ❖ Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- ❖ Performance Standard 7: Indigenous Peoples; and
- ❖ Performance Standard 8: Cultural Heritage.

IFC's Environmental, Health, and Safety (EHS) Guidelines provide technical guidelines with general and industry-specific examples of good international industry practice to meet IFC PS.

5.2 Legislation

5.2.1 Environmental Statutory Framework

The legislation that has possible bearing on the proposed Project from an environmental perspective is captured in **Table 3** below. **Note:** *this list does not attempt to provide an exhaustive explanation, but rather represents an identification of some of the most appropriate sections from pertinent pieces of legislation.*

Table 3: Environmental Statutory Framework

Legislation	Description and Relevance
Constitution of the Republic of South Africa, (No. 108 of 1996)	<ul style="list-style-type: none"> ▪ Chapter 2 – Bill of Rights. ▪ Section 24 – Environmental Rights.
National Environmental Management Act	<ul style="list-style-type: none"> ▪ Key sections (amongst others): <ul style="list-style-type: none"> ○ Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment).

Legislation	Description and Relevance	
(NEMA) (No. 107 of 1998)	<ul style="list-style-type: none"> o Section 28 – Duty of care and remediation of environmental damage. ▪ Environmental management principles. ▪ Authorities – Department of Environment, Forestry and Fisheries (DEFF) (national) and the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) (provincial). 	
GN No. R 982 of 4 December 2014 (as amended)	<ul style="list-style-type: none"> ▪ Purpose - regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto. 	
GN No. R. 983 of 4 December 2014 (as amended) (Listing Notice 1)	<ul style="list-style-type: none"> ▪ Purpose - identify activities that would require environmental authorisations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA. ▪ The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982 (as amended), S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ▪ Activities under Listing Notice 1 that are relevant to this project follow. 	
	<p>GN No. R.983 – Activity no. 9:</p> <p><i>The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water-</i></p> <p><i>(i) with an internal diameter of 0,36 metres or more; or</i></p> <p><i>(ii) with a peak throughput of 120 litres per second or more;</i></p> <p><i>excluding where-</i></p> <p><i>(a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or</i></p> <p><i>(b) where such development will occur within an urban area.</i></p>	<p><i>Storm water measures and management will be necessary as part of the terrain layout and planning.</i></p> <p><i>Water distribution over terrain to certain points for use in cleaning panels.</i></p>
	<p>GN No. R.983 – Activity no. 12:</p> <p><i>The development of -</i></p> <p><i>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</i></p> <p><i>(ii) <u>infrastructure or structures with a physical footprint of 100 square metres or more;</u></i></p> <p><i>where such development occurs -</i></p> <p><i>(a) within a watercourse;</i></p> <p><i>(b) in front of a development setback; or</i></p> <p><i>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; -</i></p> <p><i>excluding -</i></p> <p><i>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</i></p> <p><i>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</i></p> <p><i>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</i></p> <p><i>(dd) where such development occurs within an urban area;</i></p> <p><i>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</i></p>	<p><i>Infrastructure associated with the development with a physical footprint of 100 square metres or more within watercourse(s) / within 32 m from watercourse(s).</i></p>

Legislation	Description and Relevance	
	<p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</p>	
	<p>GN No. R.983 – Activity no. 14: The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</p>	<p>The proposed BESS will not consist of an electrolyte (varying from zinc-bromide, vanadium) but is of Li-Ion technology of which Lithium is considered hazardous.</p>
	<p>GN No. R.983 – Activity no. 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving - (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p>	<p>Infrastructure associated with the development within watercourse(s).</p>
	<p>GN No. R.983 – Activity no. 24: The development of a road - (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road - (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.</p>	<p>Access roads to and within the Phase 1 and Phase 2 Sites (construction and operational phases) are expected to exceed thresholds.</p>
	<p>GN No. R.983 – Activity no. 26: Residential, retail, recreational, tourism, commercial or institutional developments of 1 000 square metres or more, on land previously used for mining or heavy industrial purposes; - excluding - (i) where such land has been remediated in terms of part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or (ii) where an environmental authorisation has been obtained for the decommissioning of such a mine or industry in terms of this Notice or any previous NEMA notice; or (iii) where a closure certificate has been issued in terms of section 43 of the Mineral and Petroleum Resources</p>	<p>The facility will be located on land previously used for mining, although the Project is an energy infrastructure development.</p> <p>The relevance of this activity will be confirmed during the EIA Process as an application for change of land used has been lodged by the Applicant. Tripartite and Rehabilitation Agreement also to be taken into consideration.</p>

Legislation	Description and Relevance	
	<p><i>Development Act, 2002 (Act No. 28 of 2002) for such land.</i></p>	
	<p>GN No. R.983 – Activity no. 27:</p> <p><i>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-</i></p> <p><i>(i) the undertaking of a linear activity; or</i></p> <p><i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</i></p>	<p><i>Clearance areas associated with the construction footprint.</i></p> <p><i>Status of vegetation to be confirmed as part of the Terrestrial Ecological Study.</i></p>
	<p>GN No. R.983 – Activity no. 28:</p> <p><i>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:</i></p> <p><i>(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or</i></p> <p><i>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</i></p> <p><i>excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</i></p>	<p><i>Footprint of Project on land that was previously used for agricultural purposes, prior to mining, outside of an urban area.</i></p>
	<p>GN No. R.983 – Activity no. 31:</p> <p><i>The decommissioning of existing facilities, structures or infrastructure for -</i></p> <p><i>(i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014;</i></p> <p><i>(ii) any expansion and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014;</i></p> <p><i>(iii)</i></p> <p><i>(iv) any phased activity or activities for development and related operation activity or expansion or related operation activities listed in this Notice or Listing Notice 3 of 2014; or</i></p> <p><i>(v) any activity regardless the time the activity was commenced with, where such activity:</i></p> <p><i>(a) is similarly listed to an activity in (i) or (ii) above; and</i></p> <p><i>(b) is still in operation or development is still in progress;</i></p> <p><i>excluding where -</i></p> <p><i>(aa) activity 22 of this notice applies; or</i></p> <p><i>(bb) the decommissioning is covered by part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies.</i></p>	<p><i>To be confirmed during the basic design in the EIA phase. Tripartite and Rehabilitation Agreement also to be taken into consideration.</i></p>
	<p>GN No. R.983 – Activity no. 45:</p> <p><i>The expansion of infrastructure for the bulk transportation of water or storm water where the existing infrastructure -</i></p> <p><i>(i) has an internal diameter of 0,36 metres or more; or</i></p> <p><i>(ii) has a peak throughput of 120 litres per second or more; and</i></p> <p><i>(a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or</i></p> <p><i>(b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more;</i></p>	<p><i>Storm water measures and management will be necessary as part of the terrain layout and planning.</i></p> <p><i>Water distribution over terrain to certain points for use in cleaning panels.</i></p>

Legislation	Description and Relevance	
	<p>excluding where such expansion - (aa) relates to transportation of water or storm water within a road reserve or railway line reserve; or (bb) will occur within an urban area.</p>	
	<p>GN No. R.983 – Activity no. 48: The expansion of - (i) <u>infrastructure or structures where the physical footprint is expanded by 100 square metres or more</u>; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;</p> <p>where such expansion occurs - (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>Excluding - (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.</p>	<p>Expansion of infrastructure associated with the development with a physical footprint of 100 square metres or more within watercourse(s) / within 32 m from watercourse(s).</p>
<p>GN No. R. 984 of 4 December 2014 (as amended) (Listing Notice 2)</p>	<p>GN No. R.983 – Activity no. 56: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre- (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.</p> <p>▪ Purpose - identify activities that would require environmental authorisations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA. ▪ The investigation, assessment and communication of potential impact of activities must follow a Scoping and EIA process, as prescribed in regulations 21 - 24 of GN No. R 982 of 4 December 2014 (as amended). ▪ Activities under Listing Notice 2 that are relevant to this project follow.</p> <p>GN No. R.984 – Activity no. 1: 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.</p> <p>GN No. R.984 – Activity no. 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</p>	<p>Access roads to the Phase 1 and Phase 2 Sites (construction and operational phases). Dimensions to be confirmed.</p> <p>The planned generation capacity of the Solar PV Plant is 400 MW with 80 MW (320 MWh) BESS.</p> <p>The proposed BESS will not consist of an electrolyte (varying from zinc-bromide, vanadium) but is of Li-Ion technology of which Lithium is considered hazardous.</p>

Legislation	Description and Relevance	
	containers with a combined capacity of more than 500 cubic metres.	
	<p>GN No. R.984 – Activity no. 15:</p> <p>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>Cumulative area to be cleared for entire Project (except linear components) exceeds 20 hectares.</p> <p>Status of vegetation to be confirmed as part of the Terrestrial Ecological Study.</p>
GN No. R. 985 of 4 December 2014 (as amended) (Listing Notice 3)	<ul style="list-style-type: none"> ▪ Purpose - list activities and identify competent authorities under sections 24(2), 24(5) and 24D of NEMA, where environmental authorisation is required prior to commencement of that activity in specific identified geographical areas only. ▪ The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982 (as amended), S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ▪ Activities under Listing Notice 3 that are relevant to this project follow. 	
	<p>GN No. R.985 – Activity no. 4(b)(i):</p> <p>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</p>	<p>Access roads to the various sites (construction and operational phases) are expected to exceed thresholds. Dimensions to be confirmed.</p> <p>Activity to be confirmed following Terrestrial Ecological Study.</p>
	<p>GN No. R.985 – Activity no. 10(b)(i):</p> <p>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.</p>	<p>The proposed BESS will not consist of an electrolyte (varying from zinc-bromide, vanadium) but is of Li-Ion technology of which Lithium is considered hazardous.</p> <p>Activity to be confirmed following Terrestrial Ecological Study.</p>
	<p>GN No. R.985 – Activity no. 12(b):</p> <p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>Clearance of large areas associated with the construction footprint.</p> <p>Activity to be confirmed following Terrestrial Ecological Study.</p>
	<p>GN No. R.985 – Activity no. 14(b)(i):</p> <p>The development of—</p> <p>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</p> <p>(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</p>	<p>Various infrastructure within watercourse(s) / within 32 m from watercourse(s).</p> <p>Activity to be confirmed following Terrestrial Ecological Study.</p>
	<p>GN No. R.985 – Activity no. 18(b)(i):</p> <p>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</p>	<p>Access roads to the various sites (construction and operational phases) are expected to exceed thresholds. Dimensions to be confirmed.</p>

Legislation	Description and Relevance	
	<p>GN No. R.985 – Activity no. 23(b)(i):</p> <p>The expansion of -</p> <p>(i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or</p> <p>(ii) <u>infrastructure or structures where the physical footprint is expanded by 10 square metres or more;</u> where such expansion occurs -</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback adopted in the prescribed manner; or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</p>	<p>Activity to be confirmed following Terrestrial Ecological Study.</p> <p>Upgrade of existing bridge(s) along access road(s).</p> <p>Activity to be confirmed following Terrestrial Ecological Study.</p>
National Water Act (Act No. 36 of 1998)	<ul style="list-style-type: none"> ▪ Sustainable and equitable management of water resources. ▪ Key sections (amongst others): <ul style="list-style-type: none"> ○ Chapter 3 – Protection of water resources. ○ Section 19 – Prevention and remedying effects of pollution. ○ Section 20 – Control of emergency incidents. ○ Chapter 4 – Water use. ▪ Authority – Department of Water and Sanitation (DWS). 	
National Environmental Management Air Quality Act (Act No. 39 of 2004)	<ul style="list-style-type: none"> ▪ Air quality management ▪ Key sections (amongst others): <ul style="list-style-type: none"> ○ Section 32 – Dust control. ○ Section 34 – Noise control. ▪ Authorisation type – Atmospheric Emission License. <i>Note that this is not required for the Project.</i> ▪ Authority – DEFF (national) and provincial counterparts as well as municipalities. 	
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	<ul style="list-style-type: none"> ▪ Management and conservation of the country's biodiversity. ▪ Protection of species and ecosystems. ▪ Authorisation type – Permit. ▪ Authority – DEFF and provincial counterparts. 	
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	<ul style="list-style-type: none"> ▪ Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes. 	
National Environmental Management: Waste Act (Act No. 59 of 2008)	<ul style="list-style-type: none"> ▪ Management of waste. ▪ Chapter 5 – licensing requirements for listed waste activities - GN No. R. 921 of 29 November 2013 (as amended). ▪ Authorisation type – Waste Management Licence. <i>Note that this is not required for the Project.</i> ▪ Authority – DEFF (national) and provincial counterparts. 	
National Forests Act (No. 84 of 1998)	<ul style="list-style-type: none"> ▪ Supports sustainable forest management and the restructuring of the forestry sector, as well as protection of indigenous trees in general. ▪ Section 15 – Authorisation required for impacts to protected trees. ▪ Authorisation type – Permit. ▪ Authority – Department of Agriculture, Forestry and Fisheries (DAFF). 	
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	<ul style="list-style-type: none"> ▪ Equitable access to and sustainable development of the nation's mineral and petroleum resources and to provide for matters related thereto. ▪ Key sections (amongst others): <ul style="list-style-type: none"> ○ Section 22 – Application for mining right. ○ Section 27 – Application for, issuing and duration of mining permit. ○ Section 53 – Use of land surface rights contrary to objects of Act. ▪ Authorisation type – Mining Permit / Mining Right. <i>Note that this is not required for the Project.</i> ▪ Authority – Department of Mineral Resources and Energy (DMRE). 	
Occupational Health & Safety Act (Act No. 85 of 1993)	<ul style="list-style-type: none"> ▪ Provisions for Occupational Health & Safety. ▪ Authority – Department of Employment and Labour (DEL). ▪ Relevant regulations, such as Electrical Installation Regulations, Construction Regulations, etc.. 	

Legislation	Description and Relevance
National Heritage Resources Act (Act No. 25 of 1999)	<ul style="list-style-type: none"> ▪ Key sections: <ul style="list-style-type: none"> ○ Section 34 – protection of structure older than 60 years. ○ Section 35 – protection of heritage resources. ○ Section 36 – protection of graves and burial grounds. ○ Section 38 – Heritage Impact Assessment for linear development exceeding 300m in length; development exceeding 5 000m² in extent, etc. ▪ Authorisation type – Permit. ▪ Authority – South African Heritage Resources Agency (SAHRA) and Free State Heritage Resources Authority (FSHRA).
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	<ul style="list-style-type: none"> ▪ Control measures for erosion. ▪ Control measures for alien and invasive plant species. ▪ Authority – Department of Agriculture.
Free State Province Nature Conservation Ordinance 8 of 1969	<ul style="list-style-type: none"> ▪ Provides for the listing of certain protected plant species.

The relationship between the Project and certain key pieces of environmental legislation is discussed in the subsections to follow.

5.2.2 National Environmental Management Act

According to Section 2(3) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), “*development must be socially, environmentally and economically sustainable*”, which means the integration of these three factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

The proposed Project requires authorisation in terms of NEMA and the EIA is being undertaken in accordance the EIA Regulations of 2014 (as amended), which consist of the following:

- ❖ EIA procedure - GN No. R 982 (4 December 2014), as amended;
- ❖ Listing Notice 1 - GN No. R 983 (4 December 2014), as amended;
- ❖ Listing Notice 2 - GN No. R 984 (4 December 2014), as amended; and
- ❖ Listing Notice 3 - GN No. R 985 (4 December 2014), as amended.

The Project triggers activities under Listing Notices 1, 2 and 3, and thus needs to be subjected to a Scoping and EIA process. The listed activities are explained within the context of the Project in **Table 3** above.

Note that the dimensions of the Project’s proposed infrastructure and components should be regarded as approximates due to the dynamic nature of the planning and design process. As a conservative approach, all possible activities that could possibly be triggered by the project were included in the Application Form (draft included in **Appendix C**) that will be submitted to the DEFF with the Scoping Report. A refinement of these activities will take place as the EIA process unfolds.

5.2.3 National Environmental Management: Waste Act

Amongst others, the purpose of the National Environmental Management: Waste Act (NEM:WA) (Act No. 59 of 2008) includes the following:

1. To reform the law regulating waste management in the country by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development;
2. To provide for institutional arrangements and planning matters;
3. To provide for specific waste management measures;
4. To provide for the licensing and control of waste management activities;
5. To provide for the remediation of contaminated land; and
6. To provide for compliance and enforcement.

Some key definitions from this Act include:

- ❖ "*Disposal*" – the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land.
- ❖ "*General waste*" means waste that does not pose an immediate hazard or threat to health or to the environment, and includes -
 - domestic waste;
 - building and demolition waste;
 - business waste: and
 - inert waste;
- ❖ "*Hazardous waste*" – any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.
- ❖ "*Storage*" – the accumulation of waste in a manner that does not constitute treatment or disposal of that waste.
- ❖ "*Waste*" – any substance, whether or not that substance can be reduced, re-used, recycled and recovered -
 - That is surplus, unwanted, rejected, discarded, abandoned or disposed of;
 - Which the generator has no further use of for (he purposes of production;
 - That must be treated or disposed of; or
 - That is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but -
 - A by-product is not considered waste; and
 - Any portion of waste, once re-used, recycled and recovered, ceases to be waste.

GN No. R. 921 of 29 November 2013 (as amended) contains a list of waste management activities that have, or are likely to have, a detrimental impact on the environment. If any of the waste management activities are triggered in Category A and Category B, a Waste Management Licence

is required. Activities listed in Category C need to comply with the relevant National Norms and Standards.

No authorisation will be required in terms of NEM:WA, as the Project will not include any listed waste management activities. The following is noted with regards to waste management for the Project:

❖ Construction phase –

- Temporary waste storage facilities will remain below the thresholds contained in the listed activities under Schedule 1 of NEM:WA;
- The Environmental Management Programme (EMPr) will make suitable provisions for waste management, including the storage, handling and disposal of waste;

❖ Operational phase –

- The minimum waste will be generated during the operational phase;
- Waste from the on-site office and workshop will be sent to the relevant municipal sites; and
- Waste generated during maintenance or replacement of panels and inverters will be sent to suitable disposal sites

5.2.4 Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)

The purpose of the Mineral and Petroleum Resources Development Act (MPRDA) (Act No. 28 of 2002) is to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources and to provide for matters related thereto. This act defines mining as "any operation or activity for the purposes of winning any mineral on, in or under the earth, water or any residue deposit, whether by underground or open working or otherwise and includes any operation or activity incidental thereto".

It is not intended for any mining-related activities to be undertaken as part of the Project, such as creating borrow pits for sourcing of construction material.

Both of the Phase 1 and Phase 2 Sites are located on land that was previously used for mining purposes, which form part of the Harmony Gold's Welkom mining operations (MetroGIS, 2015). In terms of Section 53 of the MPRDA, any person who intends to use the surface of any land in any way which may be contrary to any object of this Act or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner. Accordingly, an application was submitted to the DMRE in terms of the aforementioned provision of the MPRDA by the Applicant. In response, the DMRE stated *inter alia* that there is an existing mining right by Harmony Gold Mining Company Ltd on the area in question. DMRE further stated that due to the fact that the Applicant reached an agreement and submitted a consent letter from the mining company concerned and that no objections were raised by that mining company, no objection is raised by DMRE against the proposed Project. A copy of DMRE's letter is contained in **Appendix D**

5.2.5 National Water Act (Act No. 36 of 1998)

The purpose of the National Water Act (NWA) (Act No. 36 of 1998) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

- ❖ Meeting the basic human needs of present and future generations;
- ❖ Promoting equitable access to water;
- ❖ Redressing the results of past racial and gender discrimination;
- ❖ Promoting the efficient, sustainable and beneficial use of water in the public interest;
- ❖ Facilitating social and economic development;
- ❖ Providing for growing demand for water use; protecting aquatic and associated ecosystems and their biological diversity;
- ❖ Reducing and preventing pollution and degradation of water resources;
- ❖ Meeting international obligations;
- ❖ Promoting dam safety; and
- ❖ Managing floods and droughts.

The Department of Water and Sanitation (DWS) is the custodian of South Africa's water resources.

Some key definitions from this Act include:

- "*Pollution*" – the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it (a) less fit for any beneficial purpose for which it may reasonably be expected to be used; or (b) harmful or potentially harmful;
- "*Waste*" – includes any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted; and
- "*Water resource*" – includes a watercourse, surface water, estuary, or aquifer.

The Project may entail the following activities that constitute water uses in terms of Section 21 of the NWA, which will be confirmed in consultation with DWS:

- ❖ Section 21(c) - Impeding or diverting the flow of water in a watercourse; and
- ❖ Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse.

An Integrated Water Use Licence Application will be submitted separately to DWS to seek authorisation in terms of the NWA for the abovementioned water uses. The process will be undertaken in accordance with the Water Use Licence Application and Appeals Regulations (GN No. R. 267 of 24 March 2017).

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

The purpose of the National Environmental Management: Air Quality Act (NEM:AQA) (Act No. 39 of 2004) is to reform the law regulating air quality by providing measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. This Act aims to promote justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, and for specific air quality measures.

Some key definitions from this Act include:

- ❖ “*Air pollution*” – any change in the composition of the air caused by smoke, soot, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, aerosols and odorous substances.
- ❖ “*Atmospheric emission*” or “*emission*” – any emission or entrainment process emanating from a point, non-point or mobile source that results in air pollution.
- ❖ “*Non-point source*” – a source of atmospheric emissions which cannot be identified as having emanated from a single identifiable source or fixed location, and includes veld, forest and open fires, mining activities, agricultural activities and stockpiles.
- ❖ “*Point source*” – single identifiable source and fixed location of atmospheric emission, and includes smoke stacks and residential chimneys.

This Act provides for the listing of activities which result in atmospheric emissions that pose a threat to health or the environment. No person may without an Atmospheric Emission Licence (AEL) conduct any such listed activity.

No AEL is required for the Project. Provision is made in the EMPr to manage impacts to air quality as a result of the Project during the construction phase.

5.2.7 National Environmental Management: Biodiversity Act (Act 10 of 2004)

The purpose of the National Environmental Management: Biodiversity Act (NEM:BA) (Act 10 of 2004) is to provide for the management and conservation of SA's biodiversity within the framework of NEMA.

The Act allows for the publication of provincial and national lists of ecosystems that are threatened and in need of protection. The list should include:

- ❖ *Critically Endangered Ecosystems*, which are ecosystems that have undergone severe ecological degradation as a result of human activity and are at extremely high risk of irreversible transformation.
- ❖ *Endangered Ecosystems*, which are ecosystems that, although they are not critically endangered, have nevertheless undergone ecological degradation as a result of human activity.
- ❖ *Vulnerable Ecosystems*, which are ecosystems that have a high risk of undergoing significant ecological degradation.

- ❖ *Protected Ecosystems*, which are ecosystems that are of a high conservation value or contain indigenous species at high risk of extinction in the wild in the near future.

Similarly, the Act allows for the listing of endangered species, including critically endangered species, endangered species, vulnerable species and protected species. A person may not carry out a restricted activity (including trade) involving listed threatened or protected species without a permit.

The Regulations on the management of Listed Alien and Invasive Species were promulgated on 1 August 2014. The Listed Invasive Species were also published on this date and were subsequently amended in GN 864 of 29 July 2016.

Some key definitions from this Act include:

- ❖ “*Alien species*” –
 - A species that is not an indigenous species; or
 - An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
- ❖ “*Biological diversity*” or “*biodiversity*” – the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
- “*Indigenous species*” – a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.
- ❖ “*Invasive species*” – any species whose establishment and spread outside of its natural distribution range -
 - Threaten ecosystems, habitats or other species or have demonstrable potential; and
 - May result in economic or environmental harm or harm to human health.
- ❖ “*Species*” – a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind, and includes any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population.

The implications of this Act for the Project *inter alia* include the requirements for managing invasive and alien species, protecting threatened ecosystems and species, as well as for rehabilitation.

Terrestrial and Aquatic Ecological Impact Assessments will be undertaken for the Project, which will be included in the EIA Report.

5.2.8 National Heritage Resources Act (Act No. 25 of 1999)

The purpose of the National Heritage Resources Act (NHRA) (Act No. 25 of 1999) is to protect and promote good management of SA's heritage resources, and to encourage and enable communities to nurture and conserve their legacy so it is available to future generations.

In terms of Section 38 of this Act, certain listed activities require authorisation from provincial agencies:

- ❖ The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- ❖ The construction of a bridge or similar structure exceeding 50 m in length;
- ❖ Any development or other activity which will change the character of a site -
 - Exceeding 5 000 m² in extent; or
 - Involving three or more existing erven or subdivisions thereof; and
- ❖ The re-zoning of a site exceeding 10 000 m² in extent.

A Heritage Impact Assessment will be undertaken for the Project, which will be included in the EIA Report. The Project will need to apply for a permit if any heritage sites or graves are to be affected.

5.3 Governance of Energy in SA

SA has expressed and entrenched its commitment to promoting the use of renewable energy and implementing Energy Efficiency through the following (amongst others):

- ❖ SA is a signatory to various international treaties and conventions relating to climate change and greenhouse gas (GHG), such as –
 - United Nations Framework Convention on Climate Change;
 - Kyoto Protocol; and
 - Paris Agreement.
- ❖ SA has developed the following related policy frameworks –
 - White Paper on Energy Policy (1998);
 - White Paper on Renewable Energy (2003);
 - Integrated Energy Plan (2003);
 - Integrated Resource Plan (IRP) 2010;
 - Integrated Resource Plan (IRP) 2019
 - National Climate Change Response White Paper (2011);
 - Post-2015 National Energy Efficiency Strategy;
 - The National Development Plan (2030);
 - Climate Change Bill (2018); and
 - Carbon Tax Bill (2019).

- ❖ SA has developed the following related legal frameworks –
 - Electricity Regulation Act (Act No. 4 of 2006);
 - National Energy Act (Act No. 34 of 2008); and
 - Income Tax Act (1962) - tax incentive provided for Section 12L.
- ❖ DEA has developed EIA Guideline for Renewable Energy Projects (2015).
- ❖ SA's related voluntary instruments include –
 - South African National Standard (SANS) 941 energy-efficiency of electrical and electronic equipment; and
 - SANS 50001 energy management standard.

5.4 Guidelines

The following guidelines were considered during the preparation of the Scoping Report:

- ❖ Integrated Environmental Management Information Series, in particular Series 2 – Scoping (DEAT, 2002);
- ❖ Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2010a);
- ❖ Guideline on Need and Desirability, EIA Guideline and Information Document Series (DEA&DP, 2010b);
- ❖ Integrated Environmental Management Guideline Series 7: Public Participation in the EIA Process (DEA, 2010);
- ❖ EIA Guideline for Renewable Energy Projects (Department of Environmental Affairs (DEA, 2015); and
- ❖ Guidelines for Involving Specialists in the EIA Processes Series (Brownlie, 2005).

5.5 National and Regional Plans

The following regional plans were considered during the execution of the Scoping Phase (amongst others):

- ❖ Municipal Spatial Development Frameworks (SDFs);
- ❖ Municipal Integrated Development Plans (IDPs);
- ❖ Relevant national, provincial, district and local policies, strategies, plans and programmes; and
- ❖ Free State Biodiversity Plan (2015) (Collins, 2016).

5.6 Renewable Energy Development Zones

A Strategic Environmental Assessment (SEA) was undertaken by the former DEA, which is now known as DEFF, in order to identify geographical areas most suitable for the rollout of wind and solar PV energy projects and the supporting electricity grid network. These areas are referred to as Renewable Energy Development Zones (REDZs), in which development will be incentivised and

streamlined. The proposed Project's Phase 1 and Phase 2 Sites in relation to the REDZs are shown in **Figure 6** below.

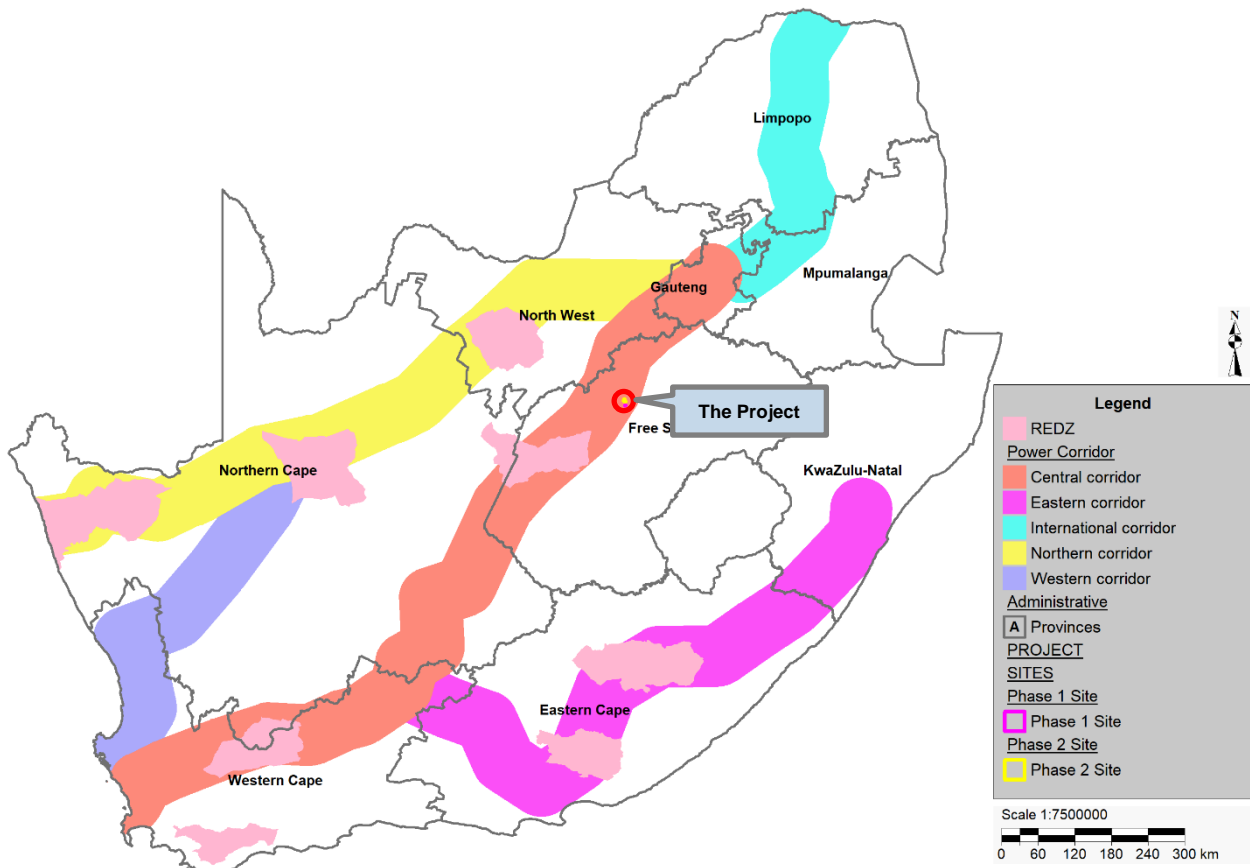


Figure 6: The Project in relation to REDZs

As shown in **Figure 6** above, the Project is not located within any REDZs. According to GNR 114 of 16 February 2018, where an Application for Environmental Authorisation for large scale wind or solar PC facilities is being made and these facilities fall outside of the REDZs then these applications will be considered in terms of the requirements of the EIA Regulations of 2014 (as amended).

As shown in **Figure 6** above, the Project falls within the Central Corridor of the Strategic Transmission Corridors, in terms of GNR 113 of 16 February 2018. As mentioned, a separate EIA will be undertaken for the proposed power lines associated with the Solar PV Plant.

6 SCOPING AND EIA PROCESS

6.1 Previous Scoping Exercise

The Applicant had previously initiated an EIA under another EAP for the proposed development of a Solar PV Park with a combined generation capacity of 500MW at the same sites as for the current Project. However, the previous application (DEA reference number of 14/12/16/3/2/1097) lapsed.

6.2 Environmental Assessment Authorities

In terms of NEMA the lead decision-making authority for the environmental assessment is DEFF, as the competent authority for renewable energy related applications. Due to the geographic location of the Project, DESTEA is regarded as one of the key commenting authorities in terms of NEMA during the execution of the EIA, and all documentation will thus be copied to this Department (amongst others).

Various other authorities with jurisdiction over elements of the receiving environment or project activities (refer to **Section 5.2**) will also be consulted during the course of the EIA. Refer to the database of Interested and Affected Parties (IAPs) contained in **Appendix I** for a list of the government departments.

6.3 DEFF Pre-application Consultation

The Applicant convened a Pre-application Consultation Meeting with DEFF on 22 January 2020 (refer to **Appendix F** for a copy of the minutes of the meeting). The purpose of the meeting included the following:

- ❖ To discuss the history of the previous EIA;
- ❖ To provide an overview of the Project;
- ❖ To initiate a new EIA application process;
- ❖ To seek clarification regarding certain matters that pertain to the EIA process; and
- ❖ To determine DEA's requirements.

6.4 Environmental Assessment Practitioner

Nemai Consulting was appointed by SunElex as the independent EAP to undertake the environmental assessment for the proposed Project.

In accordance with Appendix 2, Section 2(1)(a) of GN No. R 982 of 4 December 2014 (as amended), this section provides an overview of Nemai Consulting and the company's experience

with EIAs, as well as the details and experience of the EAPs that form part of the Scoping and EIA team.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy, which was founded in December 1999. The company is a 100% black female owned company, with a level 1 BBBEE rating. The company is directed by a team of experienced and capable environmental engineers, scientists, ecologists, sociologists, economists and analysts. The company has offices in Randburg (Gauteng) and Durban (KZN).

The core members of Nemai Consulting that are involved with the Scoping and EIA process for the project are captured in **Table 4** below, and their respective Curricula Vitae are contained in **Appendix E**. The oath of the EAP is contained in **Appendix J**.

Table 4: Scoping and EIA Core Team Members

Name	Qualifications	Experience	Duties
Ms D. Naidoo	BSc Eng (Chem)	19 years	<ul style="list-style-type: none"> Project Manager Quality Control EIA Process
Mr D. Henning	MSc (River Ecology)	15 years	<ul style="list-style-type: none"> Project Leader EIA Process
Mr C. Chidley	<ul style="list-style-type: none"> BSc Eng (Civil); BA (Economics, Philosophy) MBA 	20 years	<ul style="list-style-type: none"> Quality Review Technical Input EMPr
Mrs J. Davis	BSc Hons (Geography)	7 years	<ul style="list-style-type: none"> Public Participation EIA Process

6.5 Environmental Screening

According to GN 960 of 5 July 2019, an application for Environmental Authorisation must be accompanied by the report generated by the National Web Based Environmental Screening Tool, as contemplated in Regulation 16(1)(b)(v) of the EIA Regulations of 2014 (as amended).

The aims of the National Web Based Environmental Screening Tool include the following:

- ❖ To screen a proposed site for any environmental sensitivity;
- ❖ To provide site specific EIA process and review information;
- ❖ To identify related exclusions and/or specific requirements including specialist studies applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site; and
- ❖ To allow for a Screening Report to be generated.

The Screening Report for the proposed Project is appended to the Application Form, which is included in **Appendix C**.

6.6 Environmental Assessment Triggers

Based on the outcomes of the pre-application consultation meeting with DEFF, the Application Form and Draft Scoping Report will be submitted to the Department at the same time. A copy of the Application Form is contained in **Appendix C**.

The process for seeking authorisation under NEMA is undertaken in accordance with GN No. R. 982 of 4 December 2014 (as amended), promulgated in terms of Chapter 5 of NEMA. Based on the types of activities involved the requisite environmental assessment for the project is a Scoping and EIA process. Refer to **Section 5** for the project's legal framework and specifically the activities triggered by the project in terms of Listing Notices 1, 2 and 3 of the EIA Regulations of 2014 (as amended).

As mentioned, separate applications will be submitted for the Solar PV Plant: Phase 1 and Phase 2 Sites and for the proposed power lines.

6.7 Scoping Process

6.7.1 *Formal Process*

An outline of the Scoping and EIA process for the proposed Project is provided in **Figure 7** below.

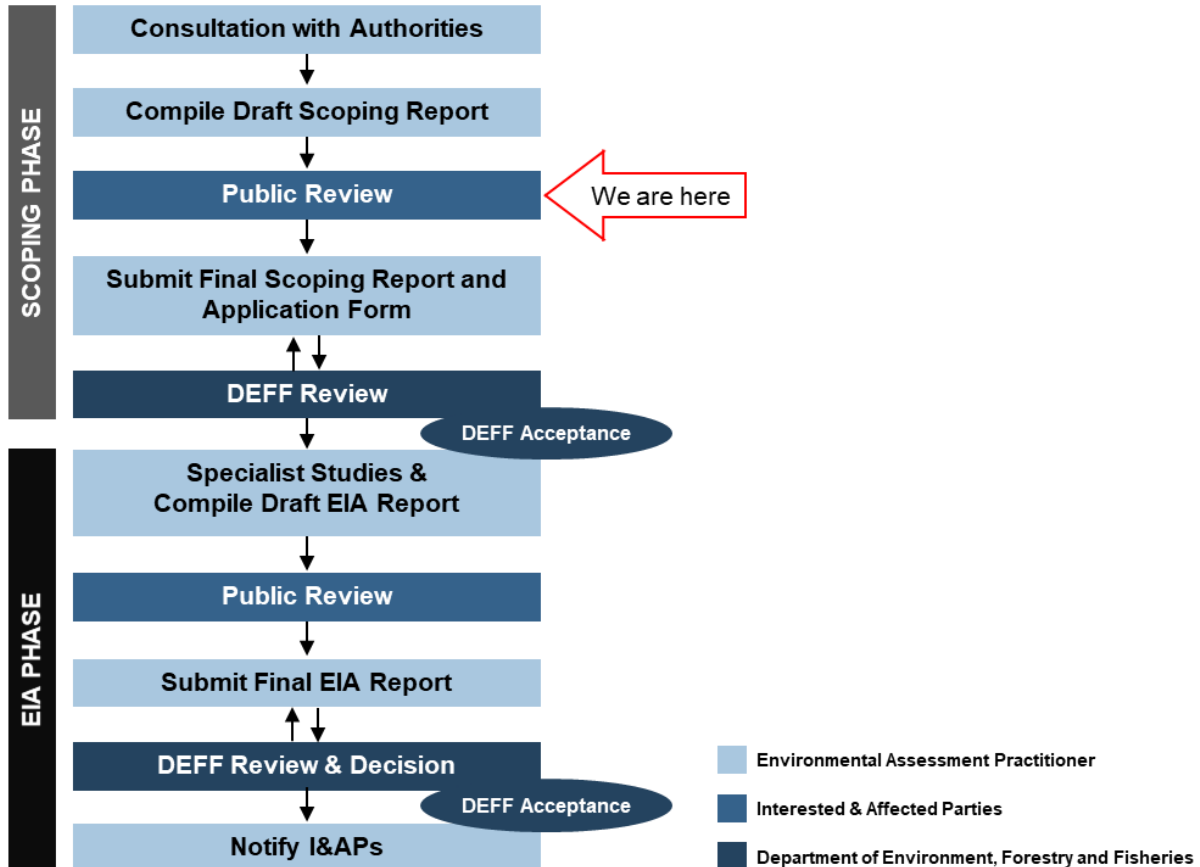


Figure 7: EIA process

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

- ❖ To identify the legal framework in terms of the proposed Project;
- ❖ To identify and engage with IAPs and allow for adequate participation in the process;
- ❖ To duly consider alternatives for achieving the Project's objectives;
- ❖ To identify significant issues to be investigated further during the execution of the EIA Phase;
- ❖ To clarify the roles and responsibilities of various stakeholders in the process;
- ❖ To determine the scope of the ensuing EIA Phase, in terms of specialist studies, public participation, assessment of impacts and appraisal of alternatives; and
- ❖ To allow for informed decision-making by DEFF and other authorities with regard to the EIA process.

6.7.2 Landowner Consent & Landowner Notification

According to Regulation 39(1) of GN No. R 982 of 4 December 2014 (as amended), if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an Environmental Authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land. This requirement does not apply *inter alia* for linear developments (e.g. pipelines, power lines, roads) or if it is a SIP as contemplated in the Infrastructure Development Act, 2014.

The details of the various properties affected by the Project are provided in **Appendix B**. Landowner consent is appended to the Application Form, which is included in **Appendix C**.

6.7.3 Application Form

A copy of the Application Form, which will be submitted to DEFF together with the Draft Scoping Report, is provided in **Appendix C**.

The Application Form makes provision for all the activities associated with the Project's life-cycle. The activities triggered in terms of Listing Notices 1, 2 and 3 were confirmed based on the following:

- ❖ An understanding of the project description and receiving environment;
- ❖ Information contained in the previous Scoping Report (JIS Environmental Engineers, 2019) and Project Feasibility Report (2016);
- ❖ Input received from the Applicant; and
- ❖ Discussions with DEFF.

6.7.4 Screening of Alternatives

Alternatives are the different ways in which a project can be executed to ultimately achieve its objectives. Examples could include carrying out a different type of action, choosing an alternative location or adopting a different technology or design for a project.

A write-up on alternatives is provided in **Section 10** below. A motivation for the Best Practicable Environmental Option (BPEO) will be provided in the EIA Report.

6.7.5 *Impact Prediction*

The potential environmental impacts associated with the proposed Project were identified during the Scoping Phase through an appraisal of the following:

- ❖ Proposed locations and footprint of the project infrastructure and components, which included site investigations as well as a desktop evaluation with a Geographical Information System (GIS);
- ❖ Activities associated with the project life-cycle (i.e. pre-construction, construction, operation and decommissioning);
- ❖ Profile of the receiving environment and the potential sensitive environmental features and attributes;
- ❖ Input received during public participation from authorities and IAPs; and
- ❖ Legal and policy context.

The Scoping exercise aimed to identify and qualitatively predict potentially significant environmental issues for further consideration and prioritisation during the EIA stage (see **Section 13**). Note that “significance” relates to whether the effect (i.e. change to the environmental feature / attribute) is of sufficient importance that it ought to be considered and have an influence on decision-making.

During the EIA stage a detailed quantitative impact assessment will be conducted via contributions from the project team and requisite specialist studies, and through the application of the impact assessment methodology contained in **Section 13.4**. Suitable mitigation measures will be identified to manage (i.e. prevent, reduce, rehabilitate and/or compensate) the environmental impacts, and will be included in the EMP.

6.8 Other Applications in Project Area

DEFF has created the SA Renewable Energy EIA Application (REEA) Database, which contains spatial data for renewable energy applications for Environmental Authorisation. It includes spatial and attribute information for both active (in process and with valid authorisations) and non-active (lapsed or replaced by amendments) applications (https://egis.environment.gov.za/renewable_energy). A map is contained in **Figure 8** below, which shows other renewable energy applications within a 50 km radius of the Project.

According to the REEA Database, renewable energy applications have been made for the properties to the immediate south and west of the Phase 1 Site and to the south-east of the Phase 2 Site (see **Figure 8** below).

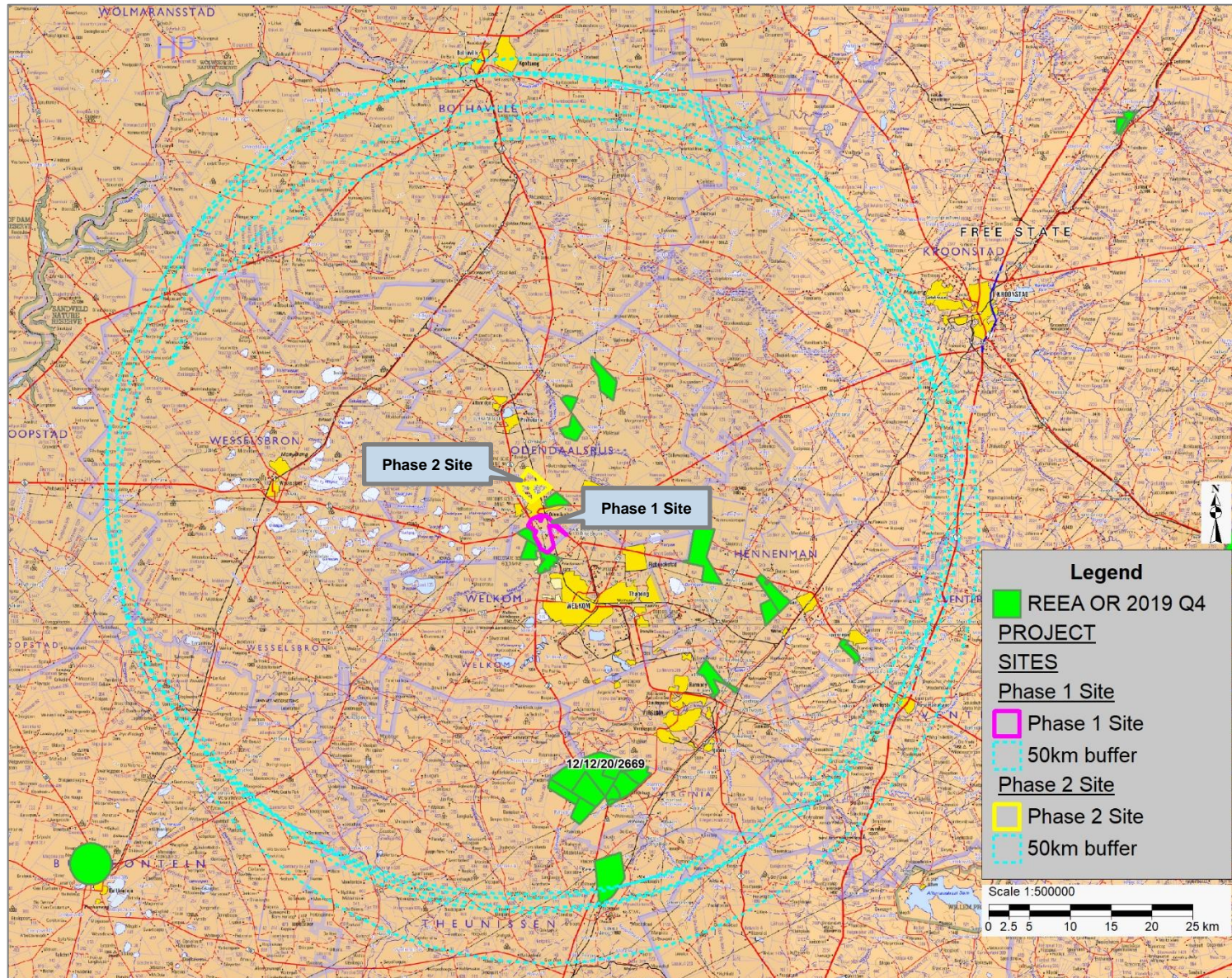


Figure 8: Renewable energy applications in relation to the Project (within a 50 km radius)

7 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations accompany the Scoping exercise:

- ❖ In accordance with the purpose of Scoping, the report does not include detailed specialist investigations on the receiving environment, which will only form part of the EIA Phase. The environment in the project area was primarily assessed in the Scoping Phase through site visits and appraisals, desktop screening, incorporating existing information from previous studies, and input received from authorities and IAPs. A refinement of all maps will also be undertaken in the EIA Phase, if necessary.
- ❖ As the design of the project components is still in feasibility stage, and due to the dynamic nature of the planning environment, the dimensions and layout of the infrastructure may change during the detailed design phase. Subsequent project modifications that emanate from discussions with the IAPs, findings from specialist studies and technical considerations will be conveyed during the public participation of the EIA Phase and will be incorporated into the Draft EIA report, which will be lodged in the public domain.

8 NEED AND DESIRABILITY

This section serves to expand on the motivation / need and desirability for the proposed development that is provided in **Section 3** above. The format contained in the Guideline on Need and Desirability (DEA&DP, 2010b) was used in **Table 5** below.

Table 5: Need and Desirability of the Project

No.	Question	Response
NEED ('timing')		
1.	Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the IDP).	<ul style="list-style-type: none"> ▪ The proposed Project Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant. ▪ The 2018 - 2019 Integrated Development Plan (IDP) of the LDM acknowledges the natural abundance of sunshine associated with the Free State Province to support solar energy projects. ▪ The following is stated in the 2019 - 2020 IDP for the MLM: <ul style="list-style-type: none"> ○ The MLM "is trying level best to decrease its carbon footprint thus moving towards green economy"; ○ There is "an increase of electricity as energy source". The number of people in the MLM's electricity network has increased. ○ There is a "lack of usage of alternative source of energy to fulfil our energy needs". ▪ Refer to Section 11.14 below for a discussion on the SDF and planning aspects. ▪ An application for the change of land use has been submitted to the Free State Department of Agriculture and Rural Development.
2.	Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?	<ul style="list-style-type: none"> ▪ The Project is located in a high solar yield area. ▪ The proposed location of the Solar PV Plant strongly depends on the flat and sparsely populated land, grid connection, water supply, good transport infrastructure and the availability of a large portion of municipal land. ▪ Eskom tariffs have increased and Solar PV capital costs decreased. Generating power via Solar PV is cheaper than pursuing electricity from Eskom.
3.	Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate)	<ul style="list-style-type: none"> ▪ The proposed Project will be developed to serve the MLM's energy requirements. Refer to Section 3 above for the Project's benefits to the MLM.

No.	Question	Response
4.	Are the necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	<ul style="list-style-type: none"> ▪ Ideal location in terms of evacuating the energy via the Eskom grid. Grid showed that 900 MW can be injected in grid at Matjhabeng without any negative impact on the grid or stability. ▪ No upgrade or strengthening of grid needed. ▪ Existing Eskom substation are used to connect to the grid and evacuate energy ▪ The services required for the development are explained in Section 9.9 below.
5.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services)?	<ul style="list-style-type: none"> ▪ The MLM's Council has formally classified this Project as an EEPP (refer to Section 3 above).
6.	Is this project part of a national programme to address an issue of national concern or importance?	<ul style="list-style-type: none"> ▪ SA's commitment to renewable energy is reflected in its ratification of the Paris Agreement and the country's long-term energy planning iterations. ▪ Solar power represents a large component of the needed diversification of SA's electricity system. ▪ According to the Department of Energy (2017), energy is by nature an intergovernmental issue, cutting across energy security, economic prosperity, employment and environment, among others. In recognising these benefits, clean energy has been incorporated into the broader policy framework. ▪ The White Paper on Renewable Energy of 2003 is one of SA's policy documents that laid the foundation for the promotion of renewable energy technologies such as solar, hydro, biomass and wind (http://www.energy.gov.za/files/renewables_frame.html). Through this policy document, a ten year target of how renewable energy technologies could diversify the country's energy mix and secure cleaner energy was set. ▪ Ministerial determination has confirmed that this project is part of the long term energy mix and a suitable substitute for coal fired energy. ▪ This Project supports SIP 8: Green energy in support of SA's economy.
DESIRABILITY ('placing')		
7.	Is the development the best practicable environmental option (BPEO) for this land/site?	<ul style="list-style-type: none"> ▪ The BPEO will only be determined during the EIA Phase.
8.	Would the approval of this application compromise the integrity of the existing approved municipal IDP and SDF as agreed to by the relevant authorities?	<ul style="list-style-type: none"> ▪ It is not anticipated that the proposed project will contradict or be in conflict with the municipal IDPs and SDFs (refer to response provided above to item no. 1).
9.	Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?	<ul style="list-style-type: none"> ▪ The compatibility of the Project with the Free State Biodiversity Plan (2015) and other environmental management and planning tools will be considered in detail during the EIA Phase, following the undertaking of the relevant specialist studies. ▪ Refer to Section 11.8.3 below for a discussion of the project in relation to Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).

No.	Question	Response
10.	Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context).	<ul style="list-style-type: none"> ▪ The rationale for the Project is based on its geographic location and the value it provides to MLM and users of electricity/energy. ▪ The specialist studies, as part of the EIA Phase, will further investigate the location based on sensitive environmental features and receptors. ▪ Refer to response provided above to item no. 2.
11.	How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	<ul style="list-style-type: none"> ▪ The layouts of the Phase 1 and Phase 2 Sites will incorporate the findings of the specialist studies and will attempt to avoid environmentally sensitive areas. The adjusted layouts will be presented in the EIA Report. ▪ See compilation of significant environmental issues associated with the proposed project contained in Section 13.2 below.
12.	How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?	
13	Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	<ul style="list-style-type: none"> ▪ Opportunity costs are associated with the net benefits forgone for the development alternative. ▪ The affected land is rural in nature and was previously used for mining purposes. ▪ As mentioned, the proposed Project Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant. ▪ As noted in Section 5.2.4 above, although there is an existing mining right by Harmony Gold Mining Company Ltd on the area in question, a consent letter was received from the mining company. In addition, no objections were raised by DMRE against the proposed Project (refer to letter received from DMRE contained in Appendix D). ▪ According to Lanz (2015), the agricultural potential varies across the sites due to the different soils. Those parts that have been cultivated in the past are likely to have higher agricultural potential and therefore to have higher agricultural sensitivity to development. ▪ The specialist studies that will be undertaken as part of the EIA Phase will assist in determining whether the opportunity costs will be unacceptable.
14	Will the proposed land use result in unacceptable cumulative impacts?	Cumulative impacts are considered in Section 13.3 below. Cumulative impacts will be evaluated in the EIA Phase, with inputs from the specialist studies and based on comments received from IAPs.

9 PROJECT DESCRIPTION

9.1 Solar Technology

Solar energy facilities operate by converting solar energy into a useful form (i.e. electricity). The use of solar energy for electricity generation is a non-consumptive use of a natural resource and consumes no fuel for continuing operation. Solar power produces an insignificant quantity of greenhouse gases over its lifecycle as compared to conventional coal-fired power stations. The operational phase of a solar facility does not produce carbon dioxide, sulphur dioxide, mercury, particulates, or any other type of air pollution, as fossil fuel power generation technologies do.

9.2 Photovoltaic

PV technology produces direct current (DC) which is then converted to alternating current (AC) via power electronic inverters. The main technology categories are crystalline modules (mono or poly), thin film, and concentrated photovoltaics (CPV). **Figure 9** below provides an overview of Solar PV Power Plant.

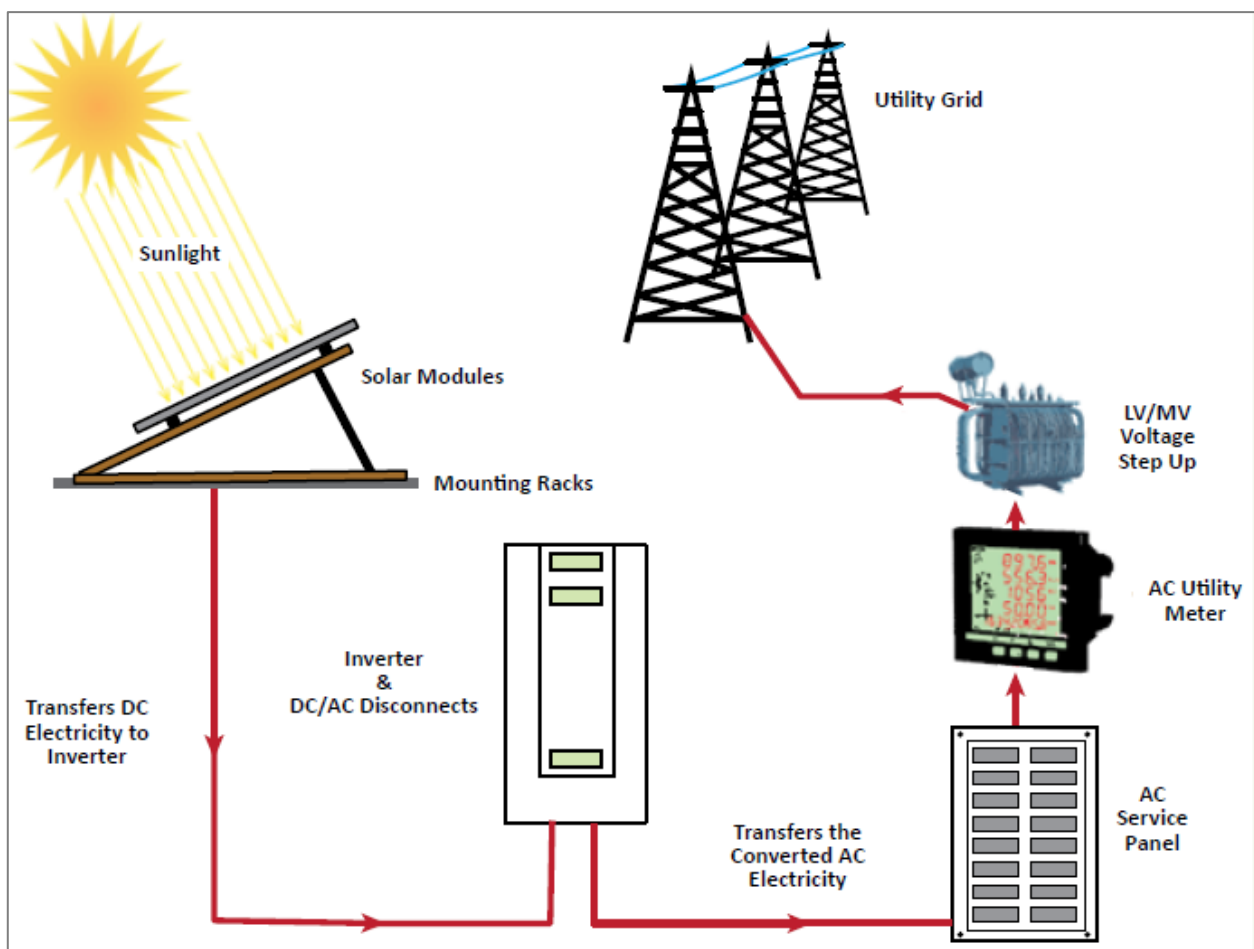


Figure 9: Overview of Solar PV Power Plant (IFC, 2015)

The components of a Solar PV Facility include the following:

- ❖ **PV panels/modules:** A PV cell is made of silicone which acts as a semiconductor used to produce the PV effect. Individual PV cells are linked and placed behind a protective glass sheet to form a PV panel. The differences in cell technology are mainly attributed to the way they are manufactured and the different semi-conductive materials used. A single PV cell is sufficient to power a small device such as an emergency telephone, however, to produce 400 MW of power (as proposed for the Project), the proposed plant will require numerous cells arranged in multiples/arrays which will be fixed to support structures or mounts. The performance of a PV module decreases over time. Degradation has different causes, which may include effects of humidity, temperature, solar irradiation and voltage bias effects (IFC, 2015). **Table 6** below lists the different PV module technologies. **Figures 10 - 11** below show examples of PV facilities

Table 6: The different PV module technologies that are considered


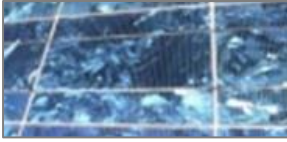


PV MODULE TYPES			
MONO-CRYSTALLINE	POLY- CRYSTALLINE	THIN FILM	CONCENTRATED PV
			
Silicon single crystalline cell structure	Silicon multi- crystalline cell structure string	Semi-conductive materials with amorphous structure combined in thin layers	Optical concentration of irradiation onto PV cells




Figure 10: Example of a PC facility



Figure 11: A Solar PV Plant under construction in SA

- ❖ **Support Structure** (mounting structure options): There are options to have fixed tilt or tracking systems, with either one or two axes. The Project proposed the use of tracking systems. **Table 7** below describes the mounting structure. In order to maximise the electricity generated these mounts need to be angled in such a fashion so to receive the maximum amount of solar radiation throughout the year. The preferred angle of the panels (which is dependent on the latitude of the proposed facility) may be adjusted to optimise for summer or winter solar radiation characteristics. This is further optimised through the utilisation of tracking technology, whereby the PV panels are able to ‘track’ the sun during the day. The approximate height of the support structure with modules on top is 4.8m.

Table 7: The mounting structure options

MOUNTING STRUCTURE OPTIONS	
SINGLE/DUAL AXIS TRACKING	
	Tracking systems maximise exposure to irradiation and may produce a greater yield through maintaining optimum alignment with the sun. One could either use single or dual axis trackers, depending on the cost and land requirements.

- ❖ **Cables between the PV panels:** Underground cables from the arrays of panels will feed into the invertors.
- ❖ **Inverters:** The inverter serves to convert the electricity, which is produced as DC, into alternating current (AC). The generated power can then be stored or evacuated into a local electricity grid to meet the load requirements. In the case of the latter, the electricity is evacuated to either a substation or a switching station which houses an inverter.
- ❖ **Batteries:** Of the two classification of batteries existing in the field, the type of batteries to be used is Deep Cycle. This is suitable for PV in that it has less instant energy but greater long term energy delivery. Other characteristics that govern the type of batteries include: specific energy, internal resistance, cycle life, overcharge tolerance, self-discharge, cell voltage, charge cut-off voltage, peak load current, charge temperature, discharge temperature, maintenance requirement, safety requirements, toxicity and costs.

PV plants (including mono-crystalline, poly-crystalline and thin film) can be of any size and their layouts can be flexible, as the systems are modular and the PV modules can be arranged to fit within most footprints, even if the land shape is not rectangular (see **Table 8** below). This is of benefit compared to CSP where particular footprints and aspect ratios are usually required.

Table 8: PV technology footprints

Module	Mounting configuration	Footprint
Mono-crystalline	Single-axis tracking	0.6MW/Ha or 1.5 ha per 1 MW
Poly-crystalline	Single-axis tracking	
CPV	Tracking	

9.3 Project Infrastructure

It is envisaged that the proposed Solar Park will make use of tracking PV with a total generating capacity of 400 MW Solar PV Plant with 80 MW (320 MWh) BESS.

The proposed Project consists of the following systems, sub-systems or components:

- ❖ Single-axis tracked, Crystalline-Silicon PV panel arrays. The solar arrays are the subsystems which convert incoming sunlight into electrical energy;
- ❖ Mounting structures to support the PV panels. A possible tracking system to be used for the Project is shown in **Figure 12** below;
- ❖ On-site inverters to convert the DC to facilitate the AC connection between the solar energy facility and the electricity grid;
- ❖ New 132 kV power lines between the on-site substation(s) and the grid connection point(s) (covered under a separate Application);
- ❖ Cabling between the Project's components, to be laid underground (where practical);
- ❖ Battery Energy Storage System of Li-Ion Technology;
- ❖ Administration Buildings (Offices);
- ❖ Workshop areas for maintenance and storage;
- ❖ Temporary laydown areas;
- ❖ Internal access roads and perimeter fencing of the footprint area;
- ❖ Communications Tower;
- ❖ High Voltage (HV) Transformers; and
- ❖ Security Infrastructure.

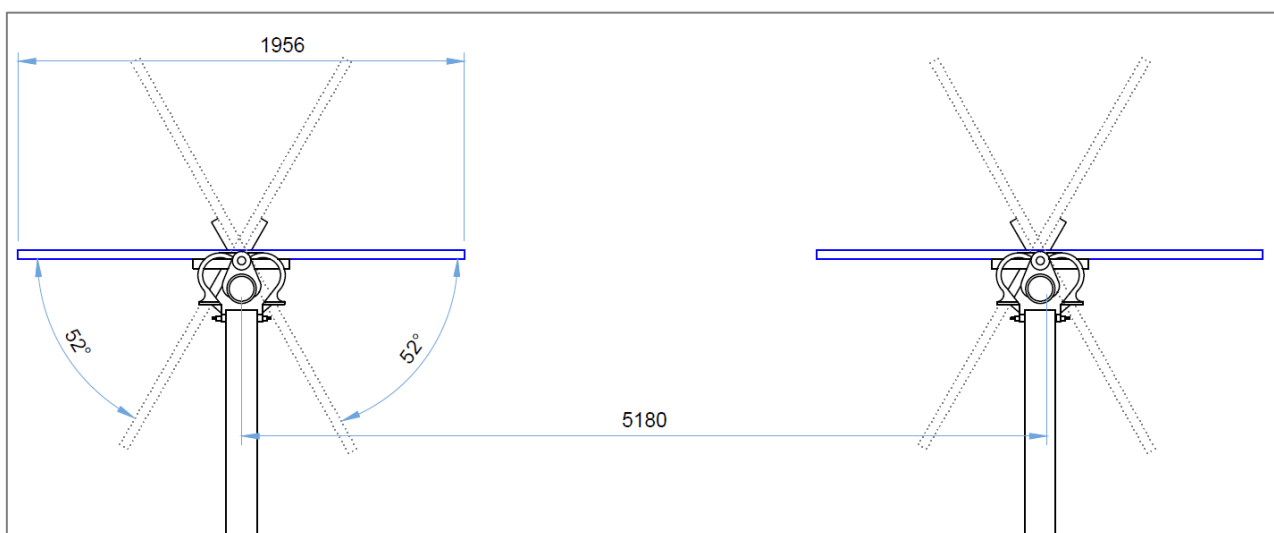


Figure 12: DuraTrack HZ v3 (+/-52) tracking system (not to scale)

A list of the worst case scenario dimensions of the planned infrastructure is included below:

- ❖ Technology: Tracking PV with a panel height not exceeding 4.8 m;
- ❖ Project development footprint: < 2914 ha;

- ❖ Construction laydown areas (temporary): 3 times 500 m x 250 m (to be confirmed);
- ❖ Power lines: Servitude with 32 m and Length approximately 5km (to be confirmed);
- ❖ Access roads: Upgrade existing roads to 8 m, provide direct access to the project development site of the R30 (Phase 1 and Phase 2); and
- ❖ Workshop areas and other buildings: Workshop approximately 500 m².

9.4 Project Layout

The desirability of the proposed Phase 1 and Phase 2 Sites for the development of the proposed Solar Park is due to the following key characteristics:

- ❖ **Solar Radiation:** The feasibility of a solar facility especially a Solar Park of this magnitude is dependent on the direct solar irradiation levels (refer to **Figure 2** above).
- ❖ **Topography:** The suitability of the surface area is an important characteristic for the construction and operation of solar facilities. It was found that the majority of the site has a slope of less than 2% and can therefore be considered as suitable for most technologies. **Table 9** below indicates the solar technology slope requirements.

Table 9: Solar Technology Slope Requirements

Technology	Slope requirement (%)
PV Fixed	< 10% for north facing slope
	<5% in all other directions
PV tracking	<8%
CPV	<5%

- ❖ **Power and transmission considerations:** The electricity generated by the Solar PV Plant will be injected into the existing Eskom 132 kV distribution system (refer to **Section 9.6** below).
- ❖ **Extent of site:** The overall extent of the sites is sufficient for the installation of the PV facility, and allows for the avoidance of site sensitivities.
- ❖ **Site access and road infrastructure:** The site can be accessed via the R30 (to the west of the site) and R34 (access to the north and western section of Phase 1 Site) and can also be accessed via other secondary roads.
- ❖ **Availability of land:** The proposed Project Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant. The proposed land satisfies this planning requirements.

The preliminary layouts of the Phase 1 and Phase Sites are shown in **Figure 13** and **Figure 14** below and are contained in **Appendix G**.

The following factors were considered in determining the layouts (amongst others):

- ❖ Findings from previous studies (including Feasibility Study, Geotechnical Investigation and Solar Resource Assessment);

- ❖ Watercourses;
- ❖ Existing servitudes and infrastructure; and
- ❖ Exclusion zones associated with defunct mining areas.

The layouts will be further refined, as necessary, based on the findings of the specialist studies in the EIA Phase.

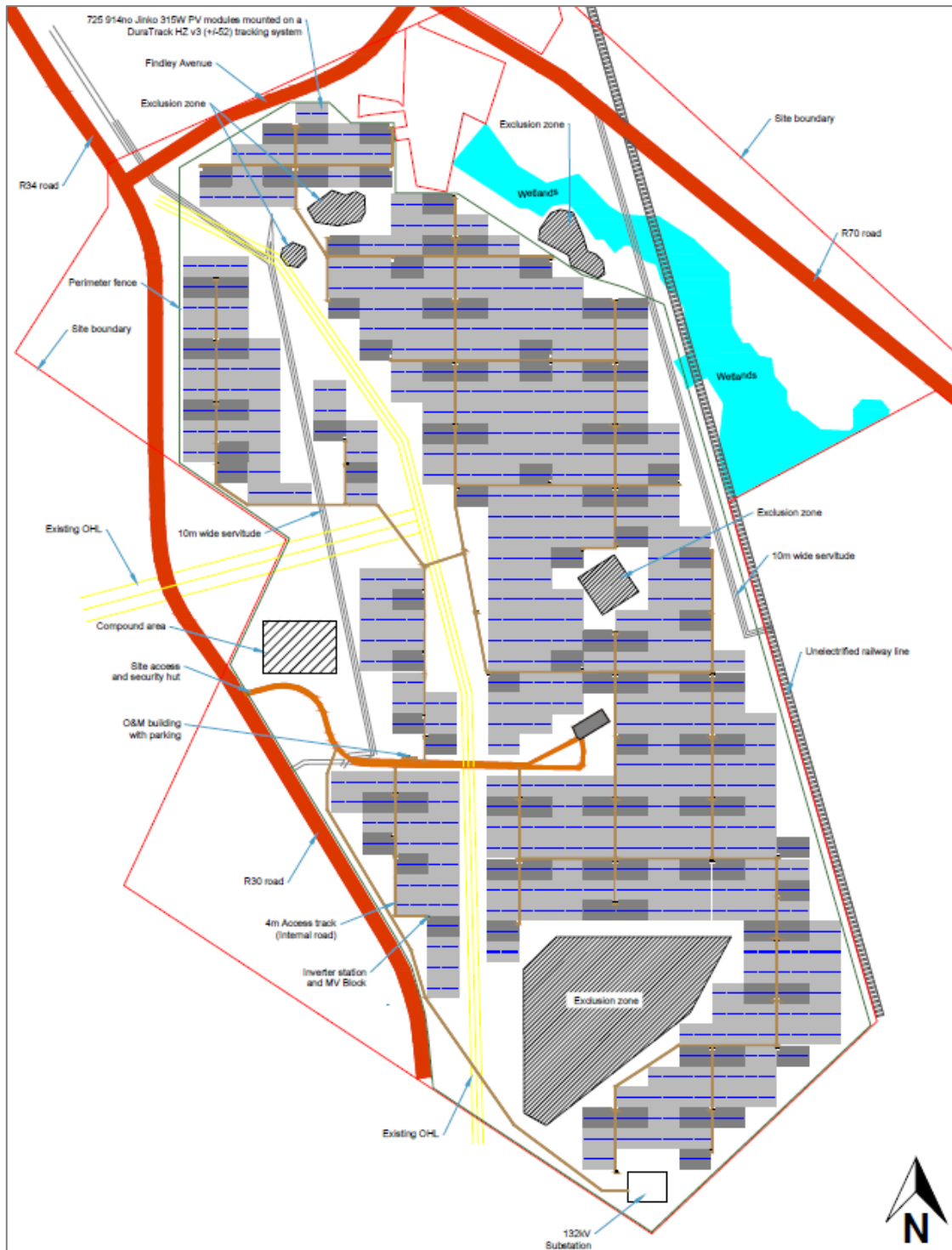


Figure 13: Preliminary layout of the Phase 1 Site

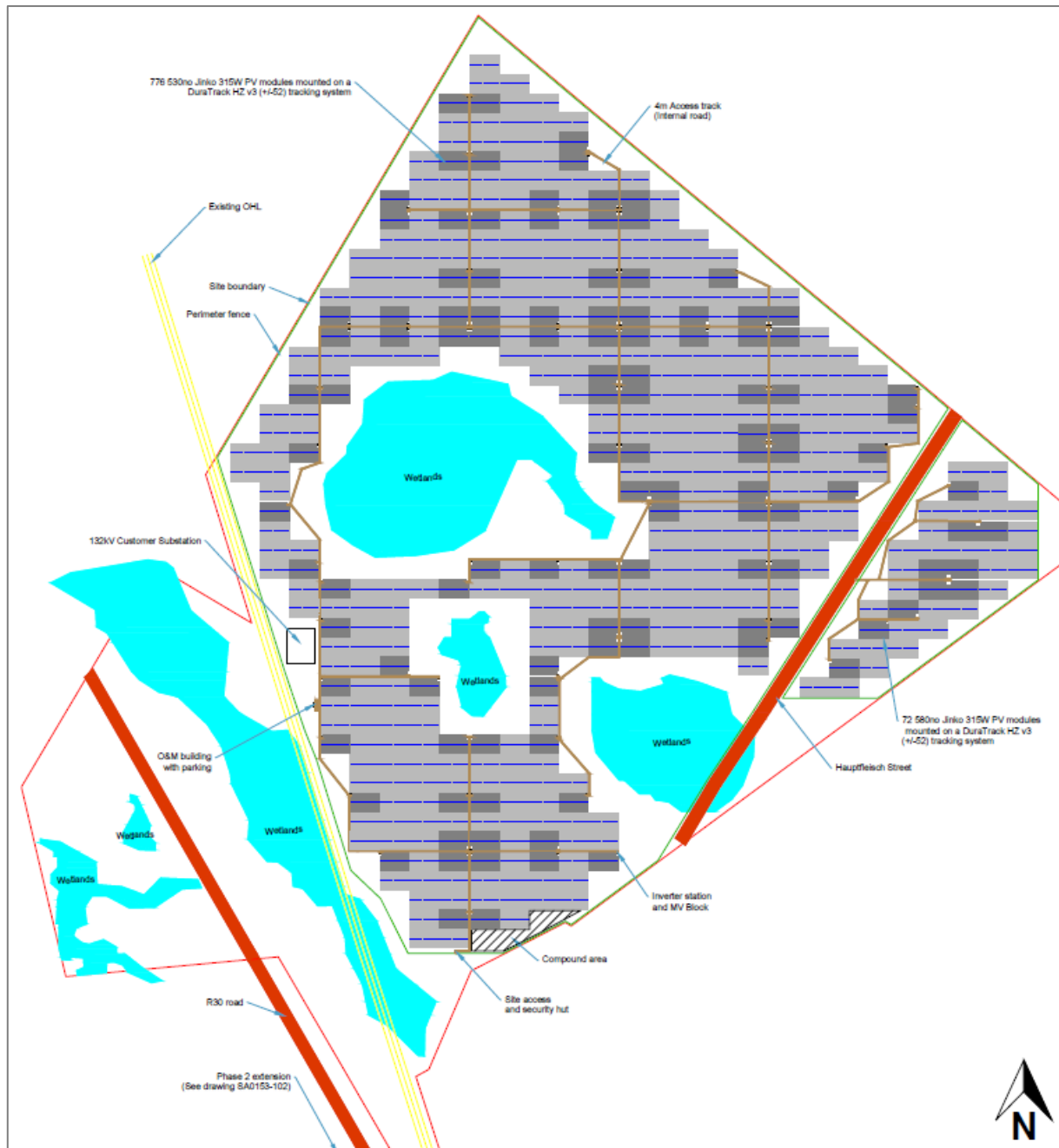


Figure 14: Preliminary layout of the Phase 2 Site

9.5 Battery Energy Storage System

9.5.1 *Types of Electrical Energy Storage Systems*

Electrical Energy storage systems consist of Mechanical, Chemical, Electrical, Thermal and Electrochemical systems. **Figure 15** below summarizes the various Electrical Energy Storage systems. The Electrochemical/battery storage system was selected as the preferred solution to meet the requirements of the Project. The BESS can be broken into solid state and flow battery systems, as explained below.

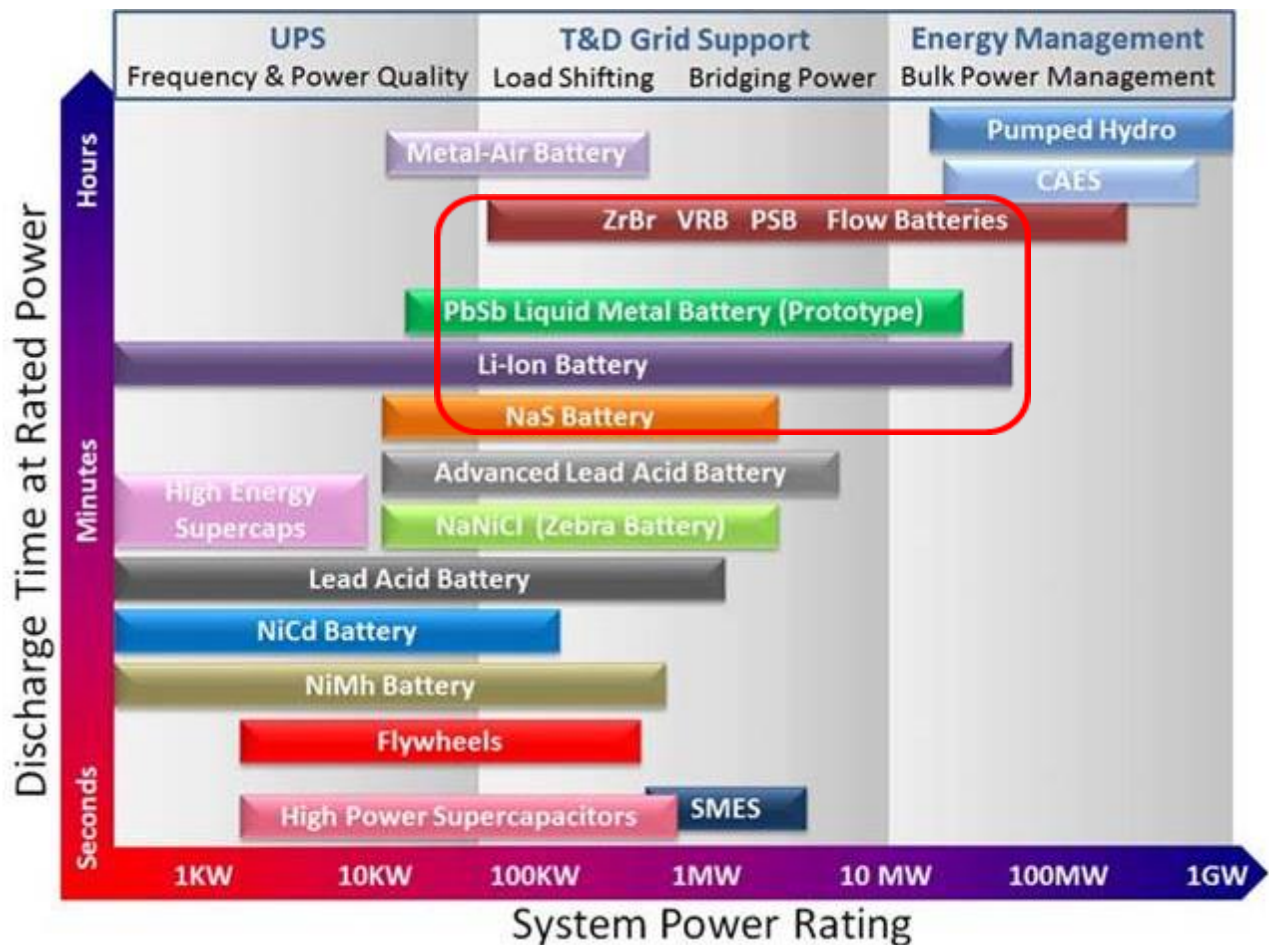


Figure 15: Grid Energy Storage Technologies and Applications

9.5.1.1 Solid State Battery Systems

Solid state batteries consist of lithium ion, lead acid etc. lithium ion is used extensively in the Electrical Energy Storage systems. Current estimates indicate that approximately 85% of the electrochemical systems installed use lithium ion batteries. “Lithium-ion” refers to a wide array of chemistries in which lithium ions are transferred between the electrodes during the charge and discharge reactions. The construction/composition of the lithium ion battery varies from manufacturer to manufacturer. Lithium ion has the smallest installation footprint when compared to the technologies for the similar energy capacity.

9.5.1.2 Flow Battery Systems

Flow or redox flow battery is where chemical energy is provided by two chemical components dissolved in liquids contained within the system and separated by a membrane. Typical systems use Vanadium or Zinc Bromine, which are further explained below:

- ❖ The vanadium redox battery (VRB), also known as the vanadium flow battery (VFB) is a rechargeable flow battery that employs vanadium ions in different oxidation states to store chemical potential energy. The battery consists of an assembly of cells in which

the two electrolytes are separated by a proton exchange membrane; both half-cells are additionally connected to storage tanks and pumps so that the electrolytes can be circulated through the cell. The main advantages of the VRB are that it can offer almost unlimited energy capacity simply by using larger electrolyte storage tanks; it can be left completely discharged for long periods with no ill effects; if the electrolytes are accidentally mixed, the battery suffers no permanent damage; a single state of charge between the two electrolytes avoids the capacity degradation due to a single cell in non-flow batteries; the electrolyte is aqueous and inherently safe and non-flammable. The main disadvantage with vanadium redox technology is a relatively poor energy-to-volume ratio.

- ❖ Zinc Bromine flow battery uses a solution of Zinc bromide stored in two tanks the electrolyte is pumped from one tank to the other tank during the charging and discharging process. The advantages and disadvantages listed for the vanadium redox is applicable to the Zinc bromine flow battery.
- ❖ Sodium-Sulphur (NaS) battery system is also an energy storage system based on electrochemical charge/discharge reactions that occur between a positive electrode (cathode) that is typically made of molten Sulphur (S) and Sodium (Na). The NaS battery has the general advantages as for the Vanadium and Zinc bromine i.e. long life, high number of charge and discharge cycle, ability to discharge fully with no effects to the performance. The disadvantage is the low energy to size ratio.

9.5.2 The Project's BESS Infrastructure

The total capacity of the Project is 80 MW (320 MWh) of BESS. Each Phase will be of 40 MW (160 MWh). The technology is commercially proven solid state battery systems. The main battery suppliers in the world who have a total market share of 85% are Tesla, CATL, Fluence and Samsung.

This type of technology is widely used in mobile phones and electric vehicles. It is also predominantly used in large utility scale projects. The batteries are contained in specially manufactured shipping containers that are vandal proof and have an IP rating of 66 or more. Each container of an approximate dimension of 7m x 2m, will have an approximate capacity of 2.5 MWh. Hence, a total number of 139 containers will be required for each Phase of the Project. The containers will not be stacked, but will be installed in 9 rows of approximately 15 containers each. The total footprint, taking into consideration the spacing, will be approximately 2,500 m². The BESS installations for each Phase will be installed in this one footprint adjacent to each PV Plant. Examples of similar utility scale BESS are shown in **Figure 16** below.

These containers are environmentally friendly during their life-cycle. However, the Lithium in this technology is considered hazardous / dangerous goods. Used batteries will be removed by the suppliers.

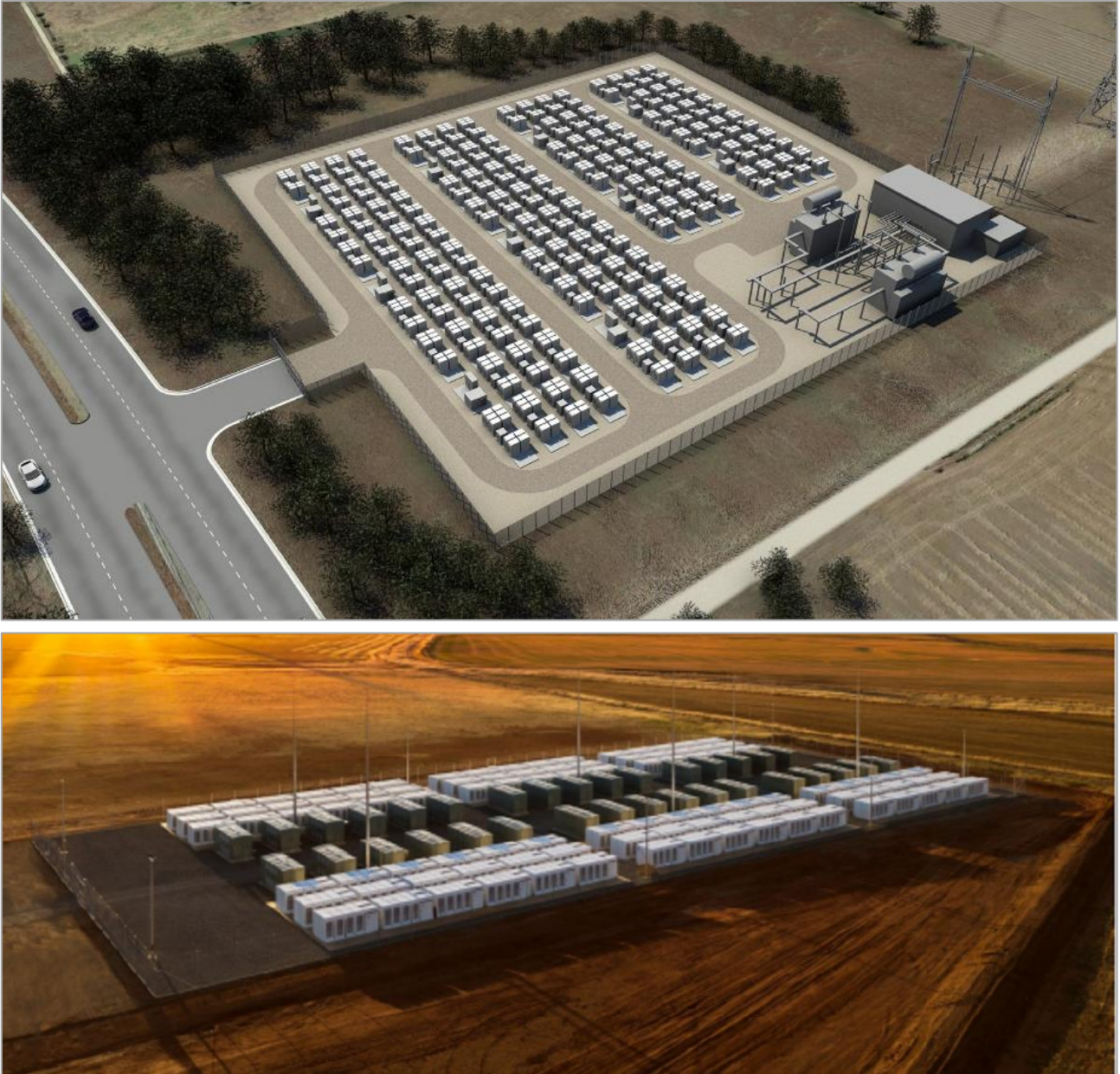


Figure 16: Examples of BESS installations (South Australia)

9.6 Grid Connection

As mentioned, a separate EIA will be undertaken for the proposed power lines, as was agreed to with DEFF during the pre-application meeting held for the Project. An overview of the proposed grid connection is provided below.

A Network Integration Study was undertaken to investigate the integration of the proposed Solar PV Plant into the Eskom electrical network. Two sub-transmission integration options per plant were identified and assessed, based on technical, operational and economic factors in order to determine the preferred option. The results showed that the Eskom grid has sufficient spare capacity to absorb the phases of the Project.

Based on the findings of the abovementioned study, the electricity generated by the Solar PV Plant will be injected into the existing Eskom 132 kV distribution system as follows:

- ❖ Phase 1: connection to the Eskom Euclid Substation via a ± 4 km power line (refer to preliminary route alignment shown in **Figure 17** below); and
- ❖ Phase 2: connection to the Eskom Grootkop Substation via a ± 14 km power line (refer to preliminary route alignment shown in **Figure 18** below).

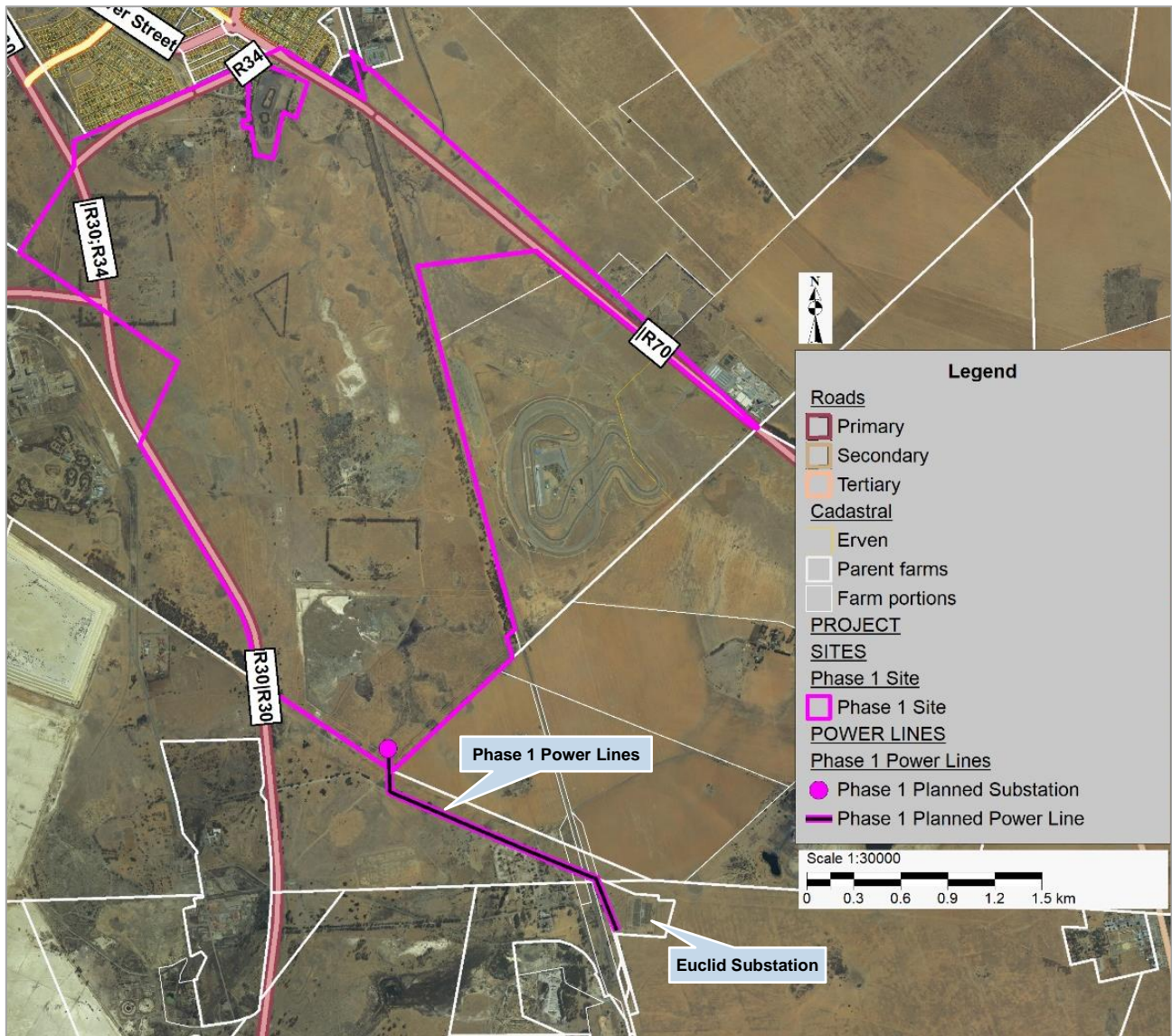


Figure 17: Preliminary power line alignment for Phase 1

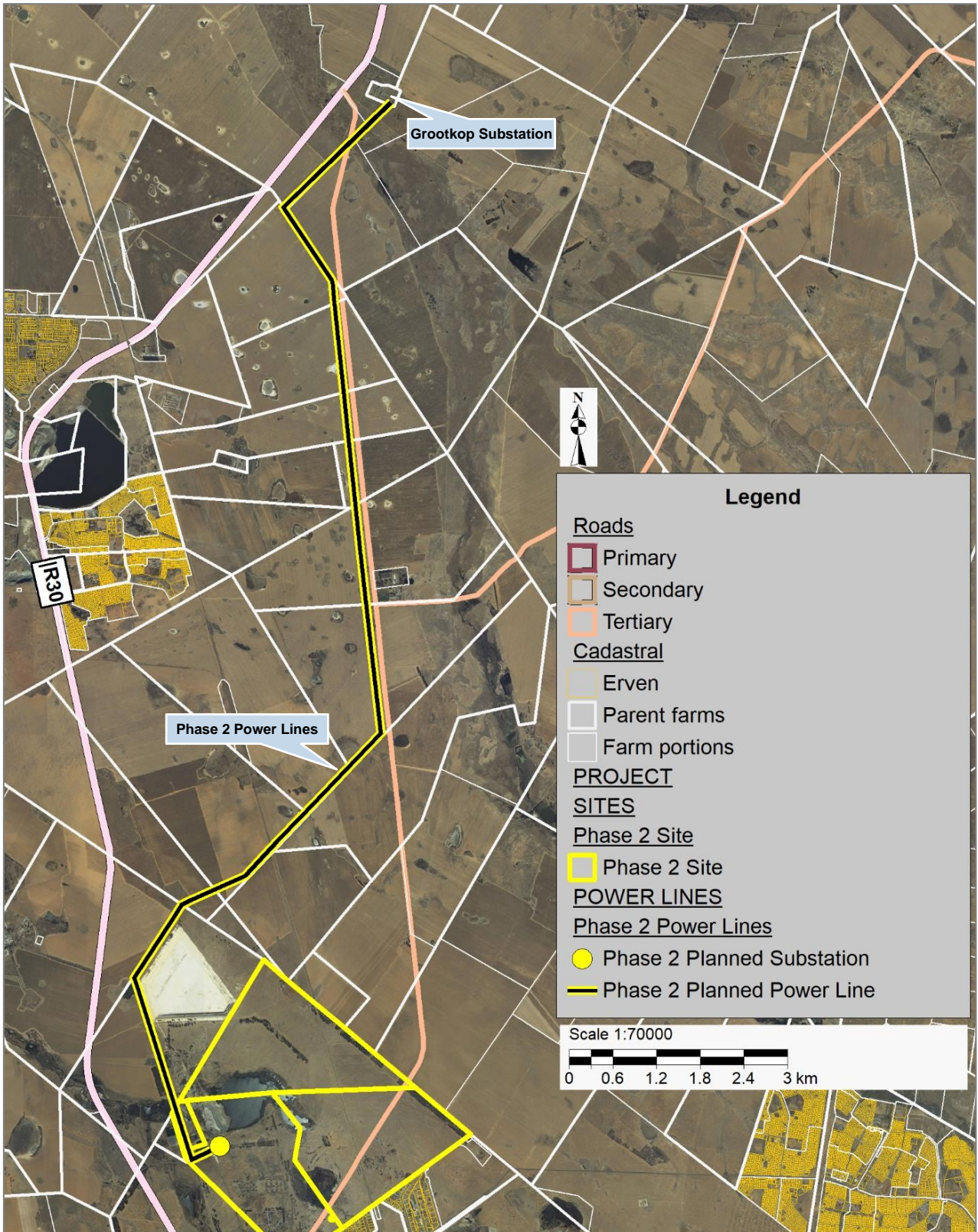


Figure 18: Preliminary power line alignment for Phase 2

9.7 Project Life-Cycle

The project life-cycle for a new Solar PV Plant includes the following primary activities (high level outline only):

- ❖ Feasibility phase - This phase includes confirming the feasibility of the Project by evaluating and addressing the following (amongst others) –
 - Solar resource assessment;
 - Site selection;
 - Project land allocation;
 - Project yield assessment;
 - Permitting and licensing;
 - Legal agreements;
 - Socio economic development;
 - Industrialisation and localisation;
 - Project cost determination;
 - Project financing; and
 - Risk analysis.
- ❖ Design phase - This phase includes the following (amongst others) –
 - Confirming key design features such as the type of PV module to be used, tilting angle, mounting and tracking systems, inverters, and module arrangement;
 - Confirming specifications for the components of the Solar PV Plant and BESS;
 - Preparing detailed designs (layout, civil, electrical) for the Phase 1 and Phase 2 Sites;
 - Preparing construction plans;
 - Preparing the Project schedule; and
 - Preparing the commissioning plans.
- ❖ Construction phase – During the implementation of the project, the following construction activities will be undertaken –
 - Establishing access roads;
 - Preparing the site (fencing, clearing, levelling and grading, etc.);
 - Establishing the site office;
 - Establishing laydown areas and storage facilities;
 - Transporting equipment to site;
 - Undertaking civil, mechanical and electrical work; and
 - Reinstating and rehabilitating working areas outside of permanent development footprint.
- ❖ Operational phase - Once the solar park is up and running the facility will be largely self-sufficient. Operational activities associated with the maintenance and control of the Solar PV Plant will include the following (amongst others) –
 - Testing and commissioning the facility's components;
 - Cleaning of PV modules;

- Controlling vegetation;
 - Managing stormwater and waste;
 - Conducting preventative and corrective maintenance; and
 - Monitoring of the facility's performance.
- ❖ **Decommissioning** - Solar PV Plants are likely to have an operational lifetime of 20 to 25 years or more. The most likely scenario would be extension of the lifespan of the solar facilities by means of replacing individual components with newer more appropriate technology available at that time. The decommissioning phase will include measures for complying with the prevailing regulatory requirements, rehabilitation and managing environmental impacts in order to render the affected area suitable for future desirable use.

9.8 Implementation Programme

Key milestones during the Project's implementation programme include the following:

- ❖ Financial Close: 30 November 2020.
- ❖ Phase 1 –
 - Notice to proceed (commencement of construction): 15 December 2020; and
 - Commercial Operation Date (COD): 28 February 2022.
- ❖ Phase 2 –
 - Notice to proceed (commencement of construction): 1 September 2022; and
 - COD: 30 November 2023.

9.9 Resources and Services required for Construction and Operation

This section briefly outlines the resources that will be required to execute the Project. Note that provision is made in the EMP_r to manage impacts associated with aspects listed below, as relevant.

9.9.1 *Raw Materials*

Construction

Material required for construction purposes, including fencing and construction material (e.g. cement, sand, aggregate, etc.), will be sourced from suitable suppliers. The PV modules and other components of the facility will also be sourced from accredited suppliers.

Operation

During the operational phase, few raw materials will be required. Material such as consumable spares will be used for the operation of the facility.

9.9.2 Water

Construction

During construction, the Contractor will require water for potable use by construction workers and water will also be used in the construction of the foundations and other components of the Project. The necessary negotiations will be undertaken with the MLM or landowners to obtain water from approved sources.

Operation

Water use requirements for a Solar PV Plant during the operational phase depends on the technology and climate conditions at the site. In general, solar power technologies use relatively low volumes water for cleaning solar collection and reflection surfaces like PV panels, as well as for domestic consumption by the staff.

Water will be supplied by the MLM, with water connections to the Phase 1 and Phase 2 Sites.

9.9.3 Sanitation

Construction

Sanitation services will be required for construction workers in the form of chemical toilets, which will be serviced at regular intervals by the supplier.

Operation

Sewage from the buildings and toilets across the site will be discharged into various septic tank systems. The soakaway systems will be designed with sufficient spare capacity to accommodate the possibility of excessive usage above the anticipated average. This option is by far the most cost effective system for this Project. It is to be considered that a well-constructed and maintained septic tank should be odourless and problem free.

Should the receiving environment be regarded as sensitive, then the use of honey sucker services from an independent contractor will be considered.

9.9.4 Waste

Construction

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g. at the construction camp) and will be removed at regular intervals and disposed of at approved waste disposal sites. According to the 2019 - 2020 IDP for the MLM, there are four permitted municipal landfill sites. All the waste disposed of will be recorded.

Wastewater, which refers to any water adversely affected in quality through construction-related activities and human influence, will include the following:

- ❖ Sewage;
- ❖ Water used for washing purposes (e.g. equipment, staff); and
- ❖ Drainage over contaminated areas (e.g. workshop, equipment storage areas).

Suitable measures will be implemented to manage all wastewater generated during the construction period.

Operation

Refuse generated during the operational phase will be removed on a weekly basis and will be disposed of at a permitted waste disposal facility. Used batteries will be removed by the suppliers.

9.9.5 Roads

Construction

Temporary access roads will be created during the construction phase. The areas affected by temporary roads will be reinstated, if they are not be used permanently in the operational phase.

Operation

As shown in **Figure 19** below, both the Phase 1 and Phase 2 sites are accessible from the north and south by the R30 arterial road (traversing both sites) and from the east and west via the R34 arterial road.

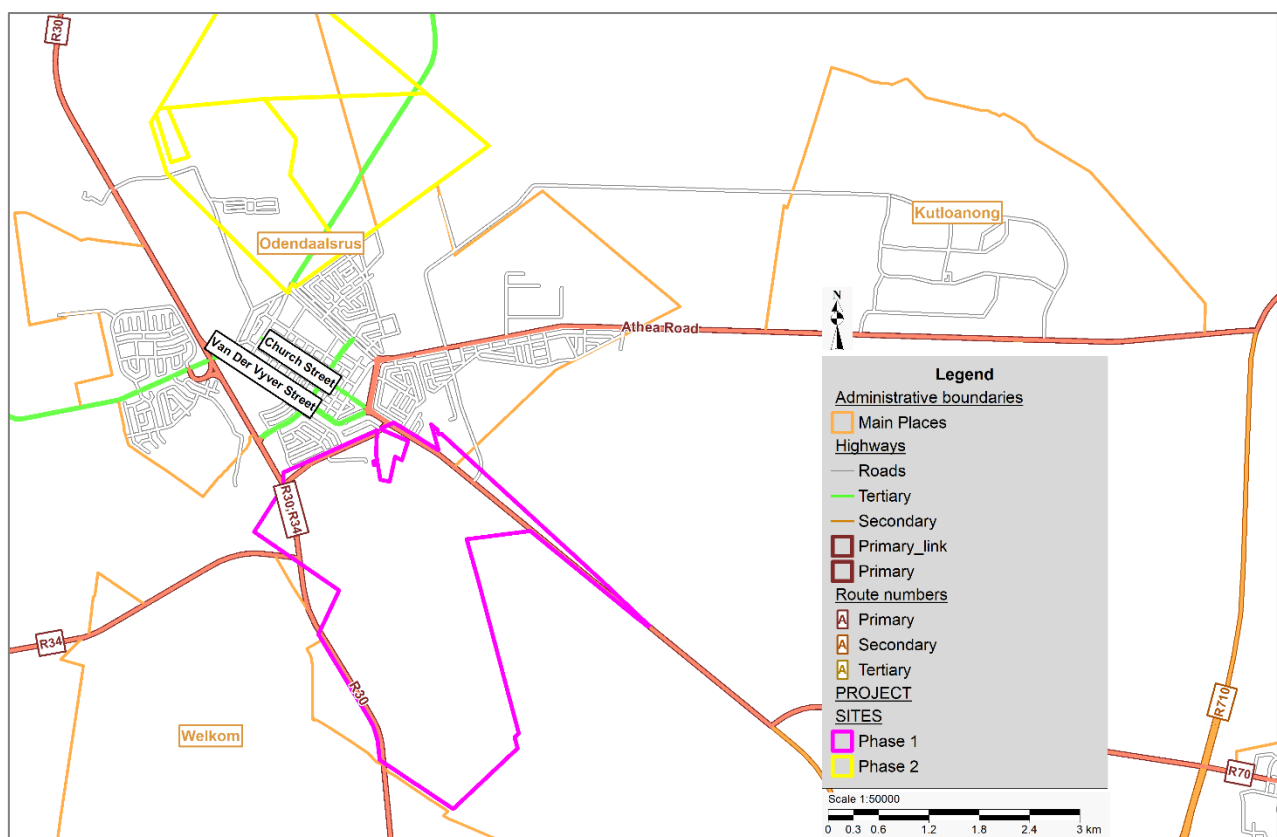


Figure 19: Road network surrounding the Phase 1 and Phase 2 Sites

9.9.6 Stormwater

Construction

Best environmental practices will be implemented during construction to manage stormwater.

Operation

The stormwater run-off along the main access road will be controlled by side swales and dispersed in a controlled manner at regular intervals. Stormwater run-off from the buildings will be disposed of through soakaways. A formal piped stormwater system is not envisaged for the wider site. Water will be managed on the surface and dispersed into natural drainage routes. Separation of clean water from dirty water shall be implemented using the capturing of the first 5 minutes of rainwater into the holding dam and the rest being allowed to drain into the natural watercourses.

9.9.7 Electricity

Construction

The EPC Contractor will be responsible for the supply of electricity during construction. The electricity supply will be obtained from diesel generators and / or temporary supply via cables from the site power grid.

Operation

The electricity will be supplied by the plant during daylight hours (off-peak times – 07:00 to 17:00). The BESS will supply electricity during night hours (peak times – 05:00 to 07:00 and 17:00 to 19:00). During other times electricity will be supplied from the power grid.

9.9.8 Laydown Areas

Construction

A laydown area will be required during the construction phase. Details will be provided in the EIA Report.

9.9.9 Construction Workers

Construction

The appointed Contractor will mostly make use of skilled labour for the construction of the facility and its associated infrastructure. In those instances where casual labour is required, the Applicant will request that such persons are sourced from local communities as far as possible.

10 ALTERNATIVES

10.1 Introduction

Alternatives are the different ways in which the Project can be executed to ultimately achieve its objectives. Examples could include carrying out a different type of action, choosing an alternative location or adopting a different technology or design for the project.

The sub-sections to follow discuss the Project's alternatives considered during the Scoping process. The EIA process will provide a detailed comparative analysis of feasible alternatives from environmental (including specialist input) and technical perspectives.

By conducting the comparative analysis, the Best Practicable Environmental Option (BPEO) can be selected with technical and environmental justification. Münster (2005) defines BPEO as the alternative that *"provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term"*.

10.2 Site Alternatives

No site alternatives are proposed for this Project, as the placement strongly depends on the flat and sparsely populated land, grid connection, water supply, good transport infrastructure and the availability of a large portion of municipal land. Refer to **Section 9.4** above for the factors that contribute towards the suitability of the proposed Phase 1 and Phase 2 Sites.

10.3 Layout / Design Alternatives

It is anticipated that the space available at the two sites will be adequate to position the facility and its associated infrastructure to avoid areas of sensitive environmental features, which will be determined in the EIA Phase through the specialist studies. The extent of the site allows for the identification of layout/design alternatives to manage impacts to environmental sensitivity.

Specific design/layout alternatives that may be considered include:

- ❖ The layout and mounting of the PV panels;
- ❖ Alternative routes for the power lines/cabling, substations and access roads;
- ❖ Placement of temporary laydown areas; and
- ❖ Buildings and other associated infrastructure.

10.4 Technology Alternatives

10.4.1 *PV Technology*

In PV technologies the sunlight photons are converted directly to electricity. Fixed and tracking crystalline PV, fixed thin film PV and CPV fall into the PV category. The proposed Project proposes to use tracking technology, and alternatives to this preferred technology will not be considered further.

Some of the benefits associated with this technology include its robustness, long lifetime, the equipment prices have drastically decreased the past 10 years, it is easy to maintain, it does not cause any emissions and no waste is generated.

10.4.2 *BESS Technology*

The BESS can be broken into solid state and flow battery systems. Refer to **Section 9.5.1** above for the advantages and disadvantages associated with the types of BESS.

10.5 No-Go Option

As standard practice and to satisfy regulatory requirements, the option of not proceeding with the Project is included in the evaluation of the alternatives.

The no-go alternative can be regarded as the baseline scenario against which the impacts of the Project are evaluated. This implies that the current status and conditions associated with the proposed Phase 1 and Phase 2 Sites will be used as the benchmark against which to assess the possible changes (impacts) associated with the Project.

In contrast, should the proposed Project not go ahead, any potentially significant environmental issues would be irrelevant, and the status quo of the local receiving environment would not be affected by the project-related activities. The objectives of the Project, including the benefits (such as the exploitation of SA's renewable energy resources, potential economic development and related job creation, and increased security of electricity supply), will not materialise.

The no-go alternative will be assessed during the EIA Phase, taking into consideration the findings of the specialist studies and the outcomes of public participation (amongst others).

11 PROFILE OF THE RECEIVING ENVIRONMENT

11.1 General

This section provides a general description of the status quo of the receiving environment in the Project area. This serves to provide the context within which the Scoping exercise was conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Project and provides a baseline against which impacts can be determined.

The study area includes the entire footprint of the project components and related activities for the Phase 1 and Phase 2 Sites.

As mentioned, the Applicant had previously initiated an EIA for the Project (see **Section 6.1** above), which did not progress beyond the Scoping Phase. Information pertaining to the environmental baseline, which was contained in the previous Scoping Report (JIS Environmental Engineers, 2019), was obtained from the following scoping-level specialist studies (contained in **Appendix H**):

- ❖ Biodiversity Assessment (Lidwala, 2015a);
- ❖ Visual Assessment (MetroGIS, 2015);
- ❖ Cultural Heritage Impact Assessment (van Schalkwyk, 2015);
- ❖ Preliminary Desktop Agricultural Study (Lanz, 2015);
- ❖ Wetland Scoping Study (Lidwala, 2015b);
- ❖ Social Impact Assessment (Lidwala, 2015c); and
- ❖ Radiological Survey (SciRAD Consulting, 2015).

The description of the receiving environment in the sub-sections to follow was supplemented with information from the above studies.

Where necessary, the regional context of the environmental features is also explained, with an ensuing focus on the local surrounding environment. More in-depth discussions on the receiving environment will be provided in the EIA Report, where the findings of the requisite specialist studies will be incorporated into the document.

A brief overview is also provided of the manner in which the environmental features may be affected (positively or negatively) by the proposed Project during its life-cycle. Significant environmental issues are discussed further in **Section 13** below. These preliminary impacts are only discussed concisely on a qualitative level, as part of the Scoping Phase. The EIA Report will provide a comprehensive evaluation of the potential impacts and will quantify the effects to the environment based on the methodology presented in **Section 13.4** below.

11.2 Land Use & Land Cover

Status Quo

11.2.1 General

The Land Cover Map (shown on **Figure 20** below) indicates the large extent of rainfed agriculture (maize fields), mining activities and the populated or built-up land within the study area.

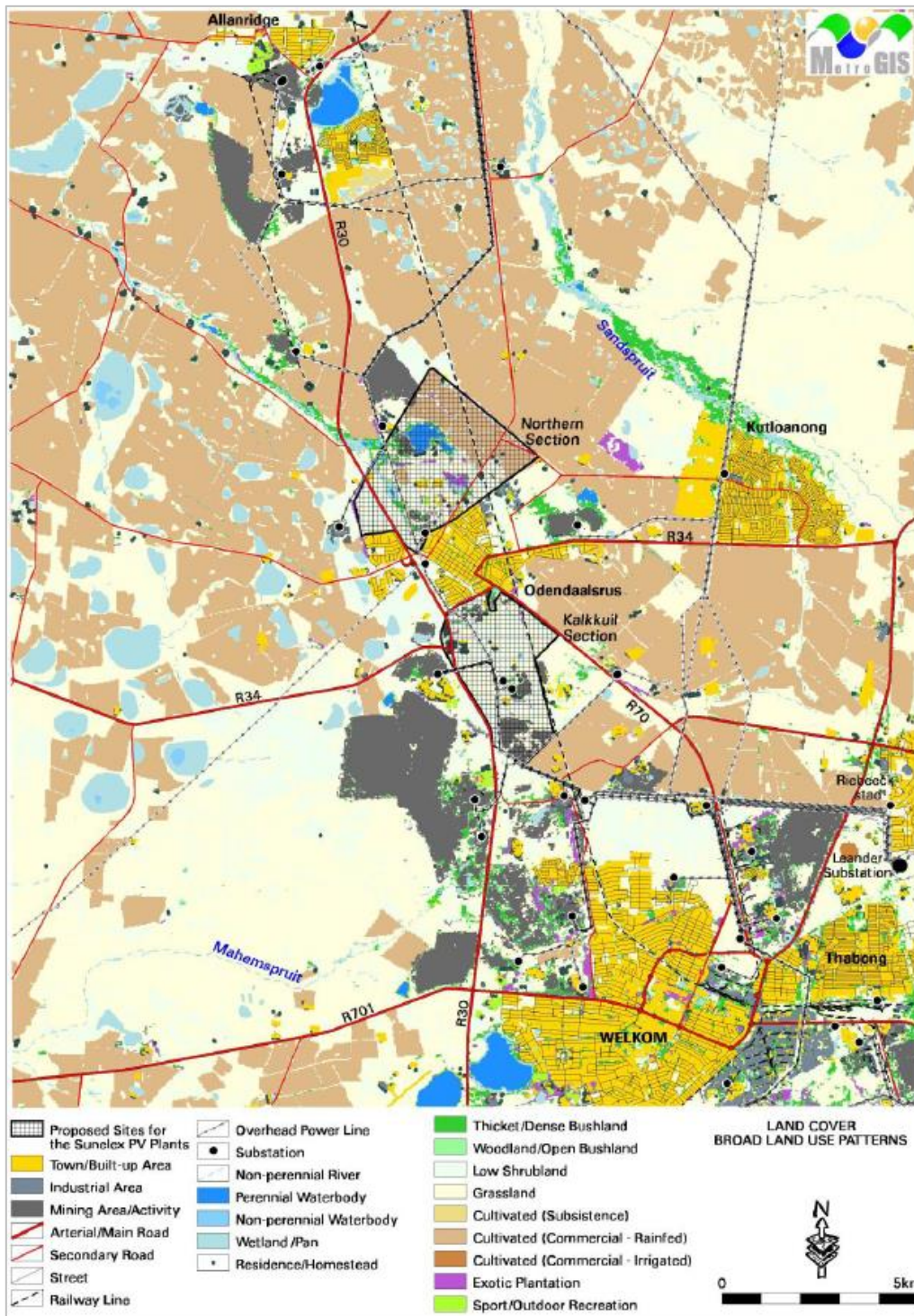


Figure 20: Land cover/land use map (MetroGIS, 2015)

In terms of the 2013-14 South African National Land-Cover dataset, the Phase 1 Site is mostly dominated by urban township and mines. The Phase 2 Site is dominated by cultivated fields in the north, grassland in the centre; some cultivation, plantations and mines with the rest mostly in the south dominated by urban township. Located in the middle of the two sites is the town Odendaalsrus which is dominantly classified as an Urban Village with open trees and bush. Remaining natural land cover types include mainly grassland, low shrubland, pans and limited thicket/dense bushland along the Sandspruit. Some scattered woodland areas also occur, and some planted trees and shrubs (mainly wind breaks) are also shown (MetroGIS, 2015).

Views of the Phase 1 and Phase 2 Sites, showing areas that are vacant and not affected by previous mining activities, are provided in **Figure 21** and **Figure 22** below, respectively.



Figure 21: Views of the Phase 1 Site



Figure 22: Views of the Phase 2 Site

The land uses surrounding the sites include the following:

- ❖ Phase 1 Site –
 - North – Odendaalsrus town, municipal-owned recreational amenities (including a public park and old caravan park) and dam at Mimosa Park (see **Figure 23** below);
 - West and south – mining (including Harmony’s Phakisa Mine);
 - East – mining and industry, as well as recreation (Phakisa Freeway racing circuit); and
 - South-east and north-east – agriculture;
- ❖ Phase 2 Site –
 - North, east and west – agriculture;
 - South – Odendaalsrus town;
 - South-west – mining; and
 - South-east – industry.



Figure 23: Aerial view of Phase 1 Site, looking south (Odendaalsrus town in foreground)

11.2.2 Radiological Sources

The sites were previously utilised by Harmony Gold Mining Company Ltd for mining activities. A radiological survey was undertaken of the following four radiological sources (i.e. anything that may cause radiation exposure or releasing radioactive substances or materials) found on the proposed sites (shown in **Figure 24** below):

- ❖ Kalkkuil South Tailings (26°41'47.80"E, 27°54'41.37"S);
- ❖ Kalkkuil North Tailings (26°41'57.69"E, 27°53'56.40"S);
- ❖ Waste Rock Dump (26°40'15.69"E, 27°51'0.51"S); and
- ❖ Existing Tailings (26°40'28.15"E, 27°50'11.96"S).

The radiological survey concluded the following (SciRAD Consulting, 2015):

- ❖ Based on the gamma survey only a small area on the Kalkuil South Tailings and nearly the entire Kalkuil North Tailings need to be removed in order for the total site to be excluded from regulatory control;
- ❖ If the above-mentioned tailings material are to be removed, a follow-up survey needs to be conducted to verify that the activity concentrations in the respective areas are indeed below 0.5 Bq/g (exclusion level for radionuclides in soil);
- ❖ The National Nuclear Regulator (NNR) may request, if not already performed by Harmony Gold Mining Company Ltd, that a public safety assessment be conducted for the future site use before a land clearance certificate is issued;
- ❖ The results of the elemental and full radionuclide analyses will indicate if there are any other radionuclides and pathways that may be of concern; and
- ❖ Consequently, the radiological impact of the tailings material (both on- and offsite) on future workers have to be determined to ensure that they are adequately protected when working in the vicinity of tailings storage facilities.

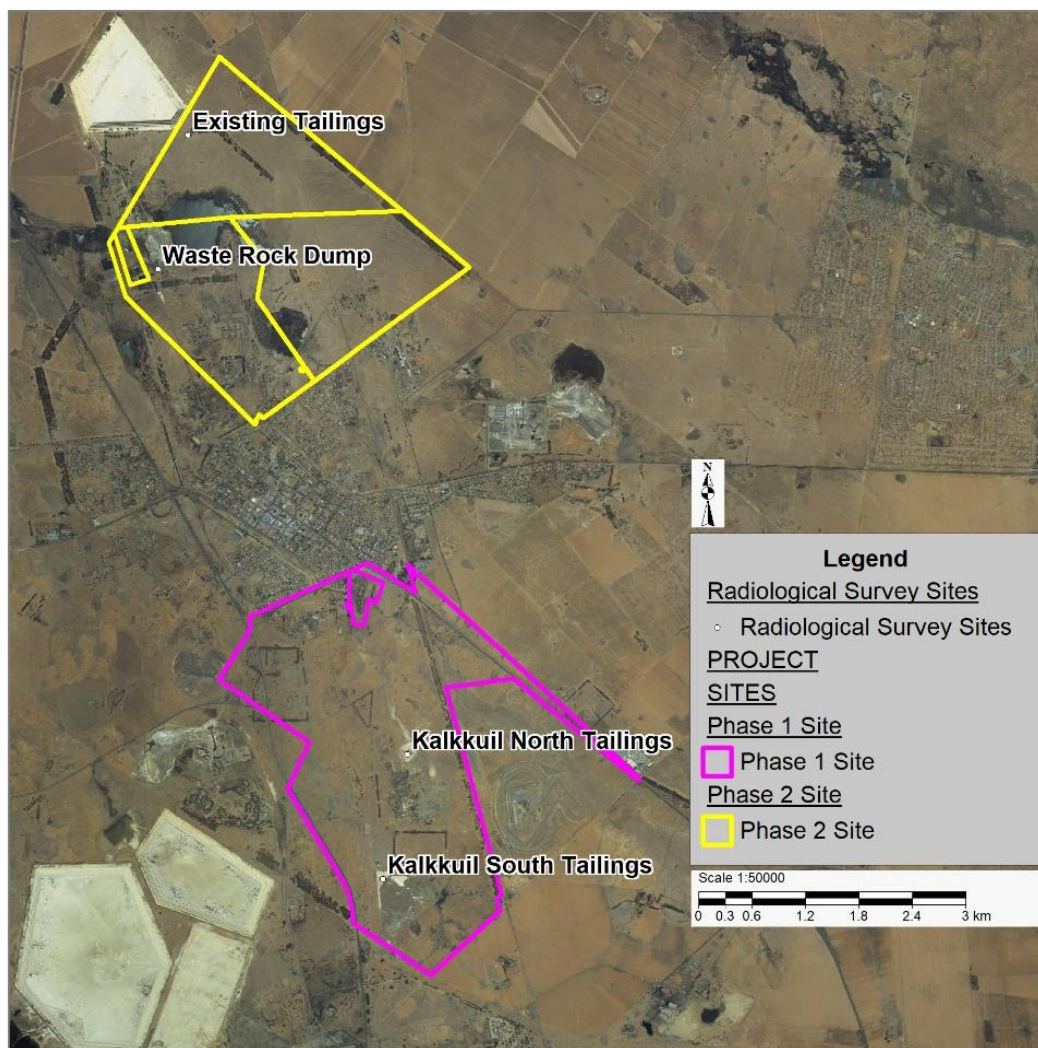


Figure 24: The locations of the three tailings storage facilities and the waste rock dump on the proposed Sunelex sites (SciRAD Consulting, 2015)

11.2.3 Rehabilitation Requirements

The previous mining company (i.e. Harmony Gold Mining Company Ltd) is responsible for all the surface disturbances on the mining areas which includes, all historical mining and prospecting activities. Key rehabilitation activities for the mining company to undertake include the following:

- ❖ Dump structures must not be left on the surface, this includes topsoil stockpiles, overburden stockpiles, waste rockpiles, tailing dumps and slime dams;
- ❖ All excavations must be backfilled to the natural surface level;
- ❖ Removal of the old buildings and foundations on the site;
- ❖ Removal of pollutants in the soil and groundwater, if applicable;
- ❖ Removal of alien species, such as the Black Wattle occurring on site;
- ❖ Removal of slimes dam;
- ❖ Removal of vent shaft on site;
- ❖ Removal of mine settlements;
- ❖ Removal of old shaft on the north west of the site.

The MLM is responsible for the removal of informal dwellings and illegal dumping areas on the sites, as well as for relocating the people residing in the old mine houses.

Potential Impacts / Implications

- ❖ Solar power is regarded as one of the most land-intensive power generation technologies. However, layouts can be flexible as the systems are modular and the PV modules can be arranged to fit within most footprints. The land is suitable for the scale and requirements of the proposed Project.
- ❖ The previous mining activities on the sites pose constraints to development, such as radiological sources, excavations, mining structures and infrastructure, dump structures, etc. The recommendations from the radiological survey need to be implemented. In addition, the sites need to be adequately rehabilitated.
- ❖ The impact on land use needs to be considered in light of the disturbance caused by previous agricultural and mining activities, as well as through illegal dumping.
- ❖ As noted in **Section 5.2.4** above, although there is an existing mining right by Harmony Gold Mining Company Ltd on the area in question, a consent letter was received from the mining company. In addition, no objections were raised by DMRE against the proposed Project (refer to letter received from DMRE contained in **Appendix D**).
- ❖ The land use rights have been secured by the Applicant for the MLM.
- ❖ Requirements and restrictions associated with servitudes on the properties need to be adhered to.

Specialist Study Triggered / Additional Investigations

Specialist studies to be conducted in the EIA Phase that will consider land use and land cover include the following:

- ❖ Agricultural Impact Assessment;
- ❖ Terrestrial Ecological Study;
- ❖ Visual Impact Assessment;
- ❖ Socio-economic Impact Assessment; and
- ❖ Heritage Impact Assessment.

The layouts of the Phase 1 and Phase 2 Sites will incorporate the findings of the specialist studies and will attempt to avoid environmentally sensitive areas, as well as exclusion zones related to previous mining activities. The adjusted layouts will be presented in the EIA Report.

11.3 Climate

Status Quo

Rainfall for the site is given as 505 mm per annum with a standard deviation of 115 mm according to the South African Rain Atlas (Water Research Commission, undated). The average monthly distribution of rainfall is shown in **Table 10** below. Local thunderstorms and showers are responsible for most of the precipitation during the summer, from October to March and peaking in January. Hail is sometimes associated with the thunderstorms and mainly occurs in the early summer from October to January with its highest frequency in December.

Table 10: Average monthly rainfall (mm) for the site (27° 47' S 26° 44' E) in mm (Water Research Commission, undated)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
77	70	70	42	18	7	5	8	21	46	65	74	505

The proposed development site falls within class 4 (C4) in terms of moisture availability (see **Table 11** below).

Table 11: The classification of moisture availability climate classes for summer rainfall areas across South Africa (Agricultural Research Council, Undated)

Climate class	Moisture availability (Rainfall/0.25 PET)	Description of agricultural limitation
C4	12-18	Moderate to severe

The dominant wind direction is north-easterly. The Weather Bureau has supplied information which indicates that wind speeds of up to 17 m/s can occur (annual frequency of 4 per 100). Generally,

however, wind speeds do not exceed 6m/s. The highest wind velocities (on a monthly basis) are generally associated with westerly and north-westerly winds.

The winds are seldom high over the central interior but gust winds of more than 100 km/h associated with thunderstorms can occur. Moderate to fresh winds (30 - 50 km/h) usually occur with the passing of cold fronts. The area is known locally for dust storms with wind velocities capable of lifting the soil off the lands that have been prepared for summer crop cultivation. (5 m/s = 18 km/h = 9.7 knots).

According to Airshed (2015), the annual maximum, minimum and mean temperatures are given as 24°C, 10°C and 17°C, respectively, based on the long-term record. Average daily maximum temperatures range from 29°C in January to 17°C in June, with daily minima ranging from 17°C in January to 2°C in June and July. Sunshine duration in summer is about 60%.

Potential Impacts / Implications

- ❖ The Project proposes to generate energy from a renewable resource, by harnessing solar energy. Renewable energy sources play a role in providing energy services in a sustainable manner and, in particular, in mitigating climate change.
- ❖ The Phase 1 and Phase 2 sites were found to be suitable for the development of the Solar PV Plant due to the local climate and good solar resource (irradiation) (amongst others).
- ❖ High wind speeds will need to be factored into the plant specifications and the operation of the tracking systems.
- ❖ The efficiency of the facility could be adversely affected if the modules are soiled (covered) by particulates/dust. Soiling of modules will require an appropriate maintenance and cleaning plan.
- ❖ Climate change may impact on the Project through extreme floods, which may pose a risk to the facility's infrastructure.

Specialist Study Triggered / Additional Investigations

- ❖ The EMPr will make provision for the maintenance of the facility.
- ❖ Infrastructure will be located outside of the 1:100 year floodline of any watercourse.

11.4 Geology and Geohydrology

Status Quo

A geotechnical investigation was undertaken for the Project to provide an overview of the expected geological and geotechnical conditions encountered at the sites. An extract from the Geotechnical Report (Jeffares & Green, 2016) follows.

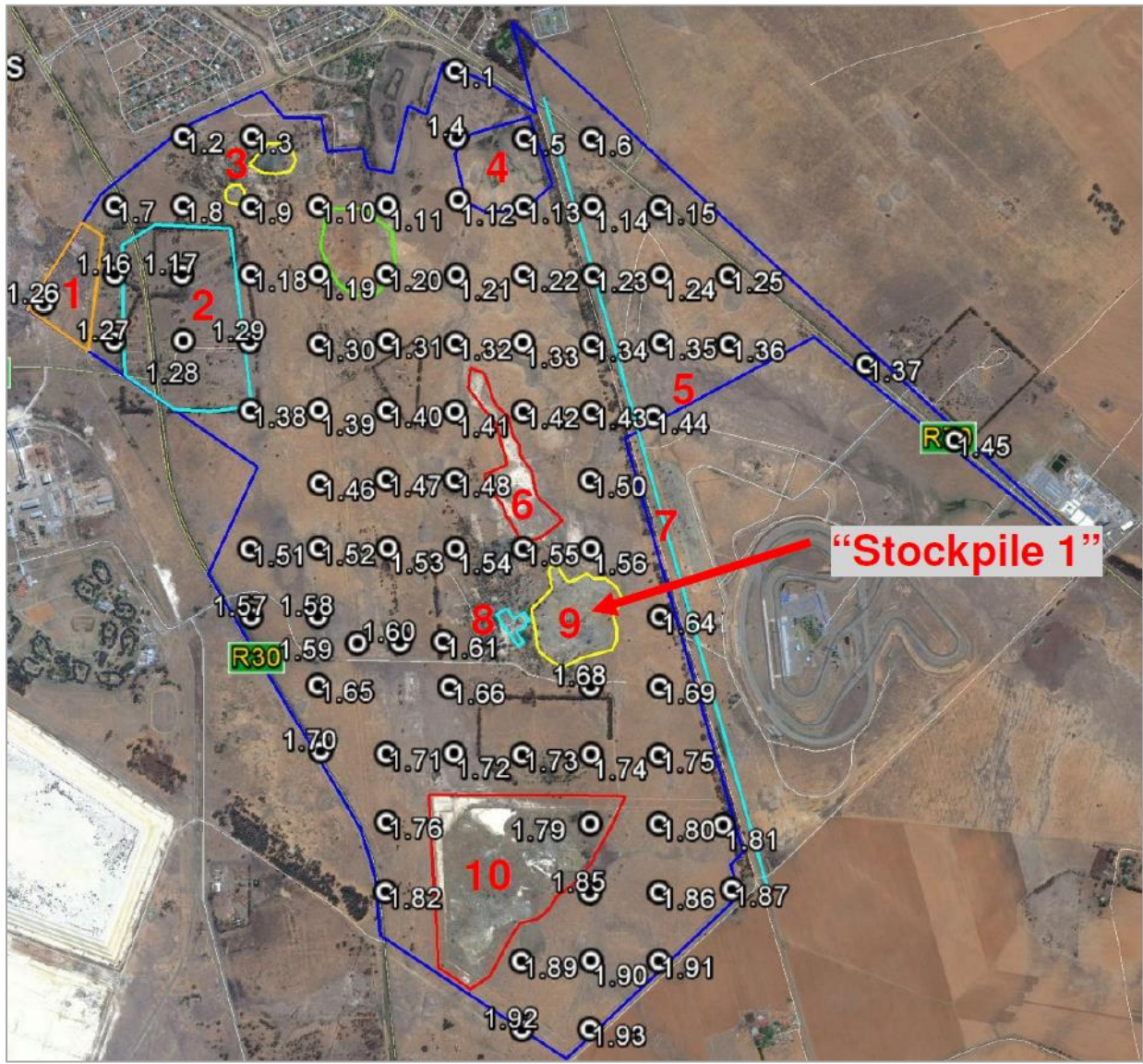
❖ Phase 1 Site –

- The geology map shown in **Figure 25** below indicates that the Phase 1 Site is underlain predominantly by windblown sands. The windblown sands, colloquially known as “Kalahari Sands”, consist of rounded quartz grains coloured by a thin coating of haematite, which results in the characteristic red to red-brown colour of the soils. These soils frequently exhibit an open-voided grain structure and can be prone to collapse settlement.
- These sands are generally underlain by calcretes or contain various amounts of ferricretes. Calcrete / ferricrete are a pedogenic material formed by the precipitation of calcium carbonate / iron oxides. The material occurs in varying forms, characterised by the degree of cementation. Often a layer of hard calcrete is underlain by softer, residual material.
- The calcretes overlie residual soils and mudstones of the Volksrust Formation, of the Ecca Group, Karoo Supergroup.
- Residual soils develop from the weathering of the mudstones (fine grained siliciclastic sedimentary rocks - siltstone, claystone, mudstone, slate, and shale) of the Karoo Supergroup and may contain active clay minerals of the smectite group. The climatic Nvalue for the site is approximately 5, and it is anticipated that the clayey residual soils at Phase 1 are moderately expansive.
- Alluvial deposits, formed by sedimentation along a river or stream, are shown to occur in a narrow band in the eastern section of the site, following south-easterly to north-westerly trending drainage line.
- No groundwater seepage was encountered in any of the test pits excavated on Phase 1 site. However, the investigation was undertaken during a period of drought and some groundwater seepage should be expected after rainfall events, particularly during the wetter summer season. Care must be taken in the vicinity of surface water bodies and slimes dams as the subsoils will be prone to collapse when wet.
- Seasonally shallow groundwater conditions are expected within and adjacent to the pans and wetland areas observed on the site. Surface water ponding is also expected within the pans and wetlands.
- Various developments and associated infrastructure were found to be present at the Phase 1 Site, as shown in **Figure 26** below. *Refer to other existing structures and infrastructure noted in **Section 11.15** below.*



MAP SYMBOL	STRATIGRAPHY	LITHOLOGY
Qs	Quaternary Age	Aeolian sands
Jd	Jurassic Age Intrusion	Dolerite
Pa	Adelaide Subgroup, Beaufort Group, Karoo Supergroup	Sandstone, mudstone, siltstone
Pvo	Volksrust Formation, Ecca Group, Karoo Supergroup	Mudstone, siltstone, shale

Figure 25: Phase 1 Site Geology (extracted from 1:250 000 scale Geological Map 2726 Kroonstad, Council for Geoscience) with Stratigraphy and Rock Types shown in table (Jeffares & Green, 2016)



- 1 Landfill site (unfenced)
- 2 Partly demolished mine infrastructure (slabs, foundations remain)
- 3 Stockpiles (predominantly quartzite) & old mine workings
- 4 Stream and potential wetland area
- 5 Potential wetland area
- 6 Slimes dams and erosion plume
- 7 A railway line running along the treeline (illustrated in blue). A large-diameter water pipeline runs to the west of the railway line.
- 8 Substation and ventilation shaft
- 9 Quartzite stockpile
- 10 Slimes dam

Figure 26: Features Map Phase 1 Site (Jeffares & Green, 2016)

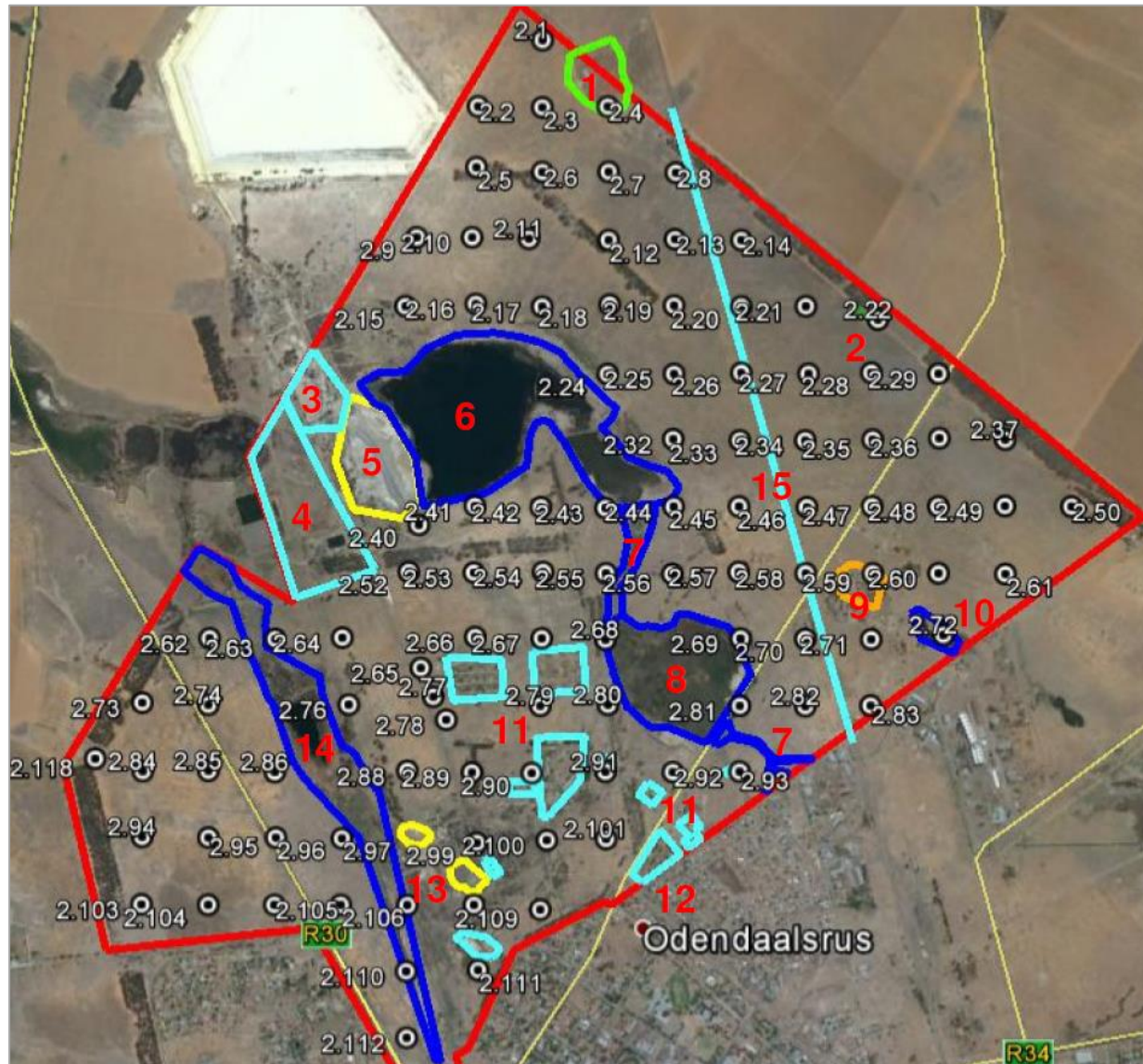
❖ Phase 2 Site –

- The geology map shown in **Figure 27** below indicates that the Phase 2 Site is almost entirely underlain by windblown sands.
- These sands have varying thicknesses and are interpreted to be underlain predominantly by mudstones of the Volksrust Formation, of the Ecca Group, Karoo Supergroup.
- Calcrete / ferricretes are present in the area, underlying the aeolian sands.
- As observed over the Phase 1 Site, the aeolian soils on the Phase 2 site exhibit an openvoided, pinholed grain structure which is indicative of potentially collapsible soils.
- No groundwater seepage was encountered in any of the test pits excavated on Phase 2 site. However, the investigation was undertaken during a period of drought and some groundwater seepage should be expected after rainfall events, particularly during the wetter summer season. Test pits were not excavated in valley bottoms, and groundwater seepage is expected in these areas. Care must be taken in the vicinity of surface water bodies and wetlands as the subsoils will be prone to collapse when wet.
- Various developments and associated infrastructure were found to be present at the Phase 5 Site, as shown in **Figure 28** below. Refer to other existing structures and infrastructure noted in **Section 11.15** below.



MAP SYMBOL	STRATIGRAPHY	LITHOLOGY
Qs	Quaternary Age	Aeolian sands
Jd	Jurassic Age Intrusion	Dolerite
Rb	Bothaville Formation, Ventersdorp Supergroup	Quartzite, conglomerate, greywacke

Figure 27: Phase 2 Site Geology (extracted from 1:250 000 scale Geological Map 2726 Kroonstad, Council for Geoscience) with Stratigraphy and Rock Types shown in table (Jeffares & Green, 2016)



- 1 Existing borrow pit
- 2 Graves around 2.22
- 3 Old mine infrastructure
- 4 Sewage treatment plant
- 5 Mine stockpile
- 6 Large dam
- 7 Stream and associated wetlands
- 8 Wetland
- 9 Informal landfill
- 10 Possible spring and associated wetland
- 11 Old mine infrastructure
- 12 Residential area
- 13 Mine stockpiles
- 14 Drainage line, dam and associated wetland
- 15 Railway line

Figure 28: Features Map Phase 2 Site (Jeffares & Green, 2016)

Potential Impacts / Implications

- ❖ The residual risks posed by previous mining activities.
- ❖ The geotechnical characteristics determine the suitability of the sites in terms of foundations for structures and infrastructure. Findings from the Geotechnical Report (Jeffares & Green, 2016):
 - The bulk of the infrastructure will comprise solar PV panels, which are mounted on racks made of aluminium or steel. The racks may be founded using various methods. The embedment depth of the piles is largely determined by the capacity of the piles to resist pull-out and lateral forces caused by wind loading.
 - The preferred founding method (from a technical and economic perspective) should be determined by a specialist, based on the geotechnical information provided in this report and further testing, as required. Regardless of the method used, it is recommended that trial installations are undertaken at various representative locations in order to confirm the suitability of the proposed installation system. Pull out tests are recommended during construction.
 - It is understood that areas covered by rock fill and stockpiles of rock will be rehabilitated and the rock fill material removed prior to installation of the solar PV panels. The presence of rock fill, along with the presence of surface and underground infrastructure (slabs, foundations, etc) will hamper construction where encountered, if not removed.

Specialist Study Triggered / Additional Investigations

- ❖ The Geotechnical Survey will be included in the EIA Report.
- ❖ The EIA Phase will investigate potential impacts to groundwater (e.g. pollution during construction) and suitable mitigation measures will be identified to manage these impacts.
- ❖ The layout will provide exclusion zones, which may include areas with geotechnical and geohydrological constraints (as relevant).

11.5 Soils

Status Quo

There are two different land types within the study area, as shown in **Figure 29** below. Land type Ae40 is dominated by deep, red coloured, sandy to loamy sand textured soils of the Hutton soil form. These soils fall into the Oxidic soil groups. These are generally good agricultural soils and most of the cultivated lands in the surrounding area are on such Ae land types. Only a small proportion of the land type is shallow soils. Land type Dc9 has a much higher proportion (63%) of shallow soils, limited in depth by a dense clay layer. These include soils of the Katspruit, Willowbrook Swartland, Valsrivier and Sterkspruit soil forms. These soils fall into the Duplex soil group. This land type generally does not support cultivation (Lanz, 2015).



Figure 29: Satellite image of the sites (red boundary) with land type boundaries and labels in light brown and areas of past cultivation with green boundary (Lanz, 2015)

Refer to **Section 11.10** below for an extract from the Preliminary Desktop Agricultural Study (Lanz, 2015) (contained in **Appendix H**).

Potential Impacts / Implications

- ❖ Construction phase:
 - Loss of soil suitable to agriculture.
 - The previous mining activities on the sites pose constraints to development, such as contaminated soil. The sites need to be adequately rehabilitated.
 - Use of heavy equipment during the construction phase could lead to soil compaction.
 - Soil could be contaminated through inadequate storage and handling of hazardous materials, spillages from equipment and plant and poor management of waste, wastewater and cement mixing.
 - Topsoil may be lost if not properly stripped and stockpiled for use during rehabilitation.
 - Erosion may take place if stormwater is not adequately managed.
- ❖ Operational phase:

- Erosion may take place if stormwater is not adequately managed.
- Soil could be contaminated through inadequate storage and handling of hazardous materials, leaks from the BESS and poor management of waste and wastewater.

Specialist Study Triggered / Additional Investigations

- ❖ An Agricultural Impact Assessment will be undertaken, and the findings will be included in the EIA Report.
- ❖ Management of contaminated soils as a result of previous mining activities.
- ❖ The layout will take into consideration the agricultural potential of the area.
- ❖ The EMPr will contain measures to mitigate against impacts to soil, for example the management of topsoil, preventing soil contamination during construction, etc.

11.6 Topography

Status Quo

The entire study area is located on the Highveld and the terrain morphology is described as Plains and Pans of the Central Interior Plain. The study area has an even flat slope ranging from 1440m above sea level (near Riebeeckstad) to 1290m to the north-west and south-west. The most prominent topographical features are the man-made mine dumps often dominating the skyline (MetroGIS, 2015). Slopes across the study area are less than 1% (refer to **Figure 30** below).

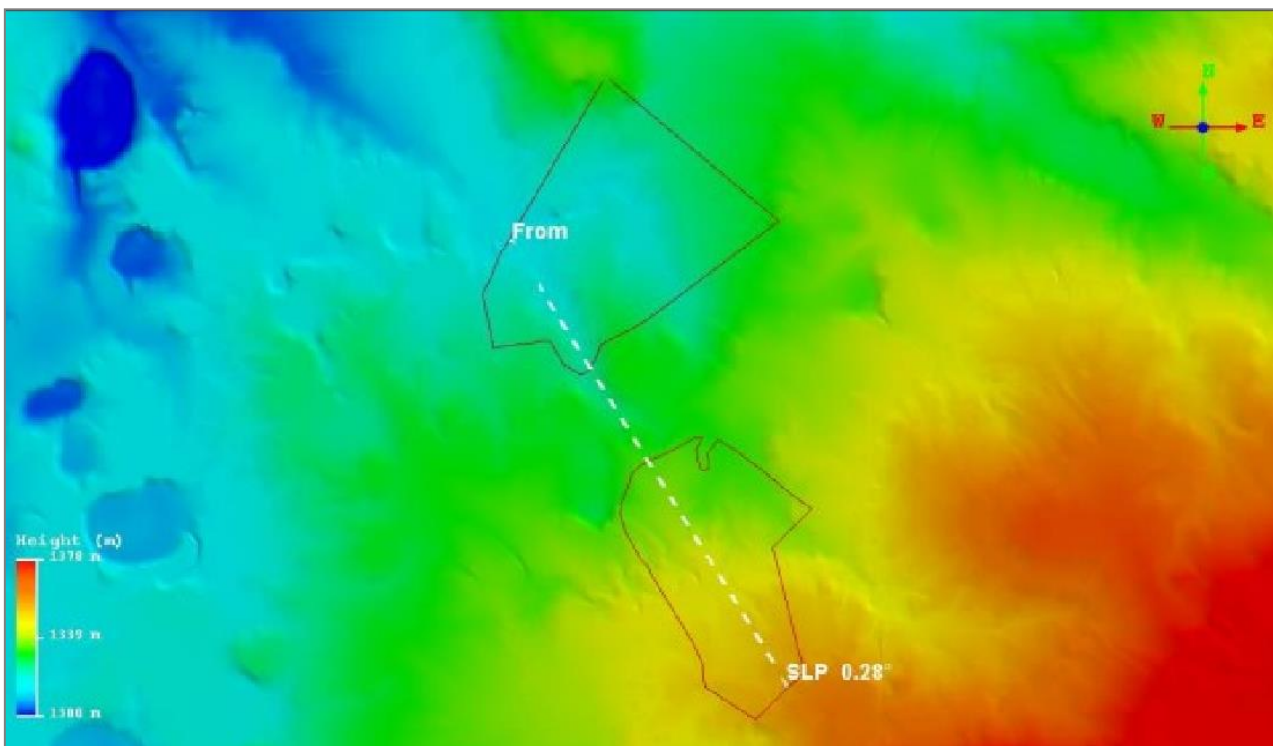


Figure 30: Digital Elevation Model (adapted from MetroGIS, 2015) indicating the bigger landscape setting and the average slope of the study area (white dotted line) is 0.49%/0.28°

No perennial rivers are present on the sites. The Mahemspruit (south-west of Phase 1 Site), Sandspruit (north-east of Phase 2 Site) and a non-perennial river (west of Phase 2 Site) are the most prominent rivers in the greater area (MetroGIS, 2015).

Potential Impacts / Implications

- ❖ The topography is relatively flat which makes it suitable for the development of a large scale Solar PC Plant.
- ❖ Visual impact caused by proposed Project infrastructure.
- ❖ Erosion of areas cleared for construction purposes.

Specialist Study Triggered / Additional Investigations

- ❖ A Visual Impact Assessment will be undertaken, and the findings will be included in the EIA Report.
- ❖ The EMPr will make provision for managing stormwater during the construction and operational phases of the Project.

11.7 Surface Water

Status Quo

11.7.1 *General*

The majority of the study area is situated in the C25B Quaternary Catchment. The southern part of the Phase 1 Site extends into Quaternary Catchment C43B. The catchment is within the Middle Vaal Water Management Area (WMA). The surveyor general 1:50 000 map (2726DC of 1997) indicates that the watercourses are associated with canals, dam walls, changes from mining operations and also indicates that they are non-perennial although anthropogenic impacts changed the hydrograph of the system to the current perennial status.

Figure 31 below shows the topographical map of the sites, including rivers, existing dams and National Freshwater Ecosystem Priority Areas (NFEPA) wetlands.

The Sandspruit flows to the north-east and the Mahemspruit to the south of the sites. In general, the rivers in the greater area are polluted by anthropogenic causes, including point sources (e.g. wastewater treatment works) and diffuse sources (e.g. runoff from mining, agricultural and urban areas).

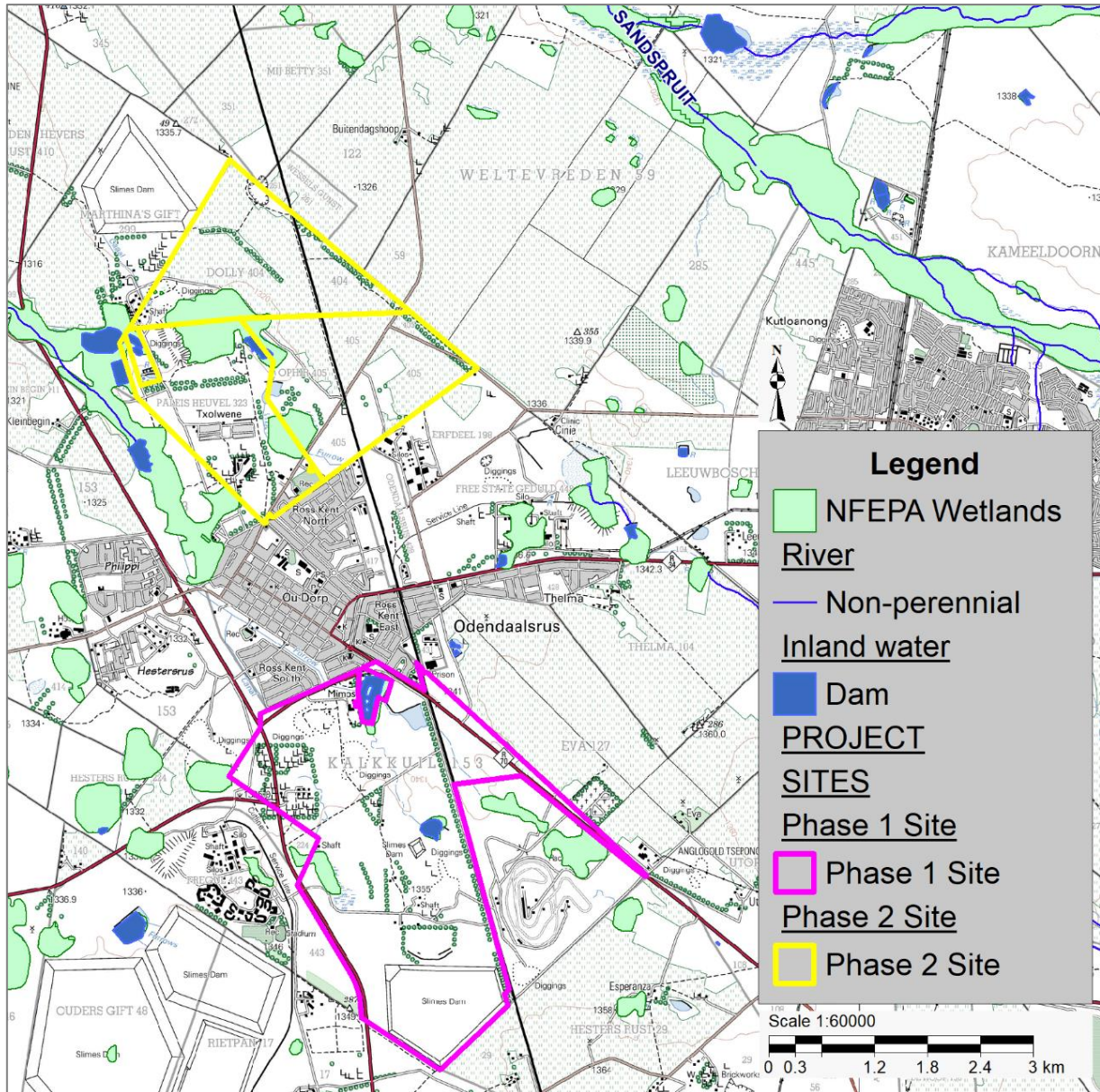


Figure 31: Rivers, existing dams and NFEPA wetlands

11.7.2 Wetlands

A scoping-level delineation and assessment of wetlands located within a 500 m radius of the sites was undertaken on a desktop level (refer to the Wetland Scoping Study contained in **Appendix H**). The delineation of the wetlands at the Phase 1 Site (see **Figure 32** below) and the Phase 2 Site (see **Figure 33** below) was based on the following characteristics (Lidwala, 2015b):

- ❖ Presence of hydrophytic plant species (see **Figures 34 – 35** below);
- ❖ Wetland soil indicators. Although infilling and mining activities buried some of the wetland soil, the system still represents broad characteristics of wetland soils; and
- ❖ Landscape is characteristic for the pans, hillslope seepage wetlands and the valley bottom system (see **Figure 36** below) including verification through historic imagery.

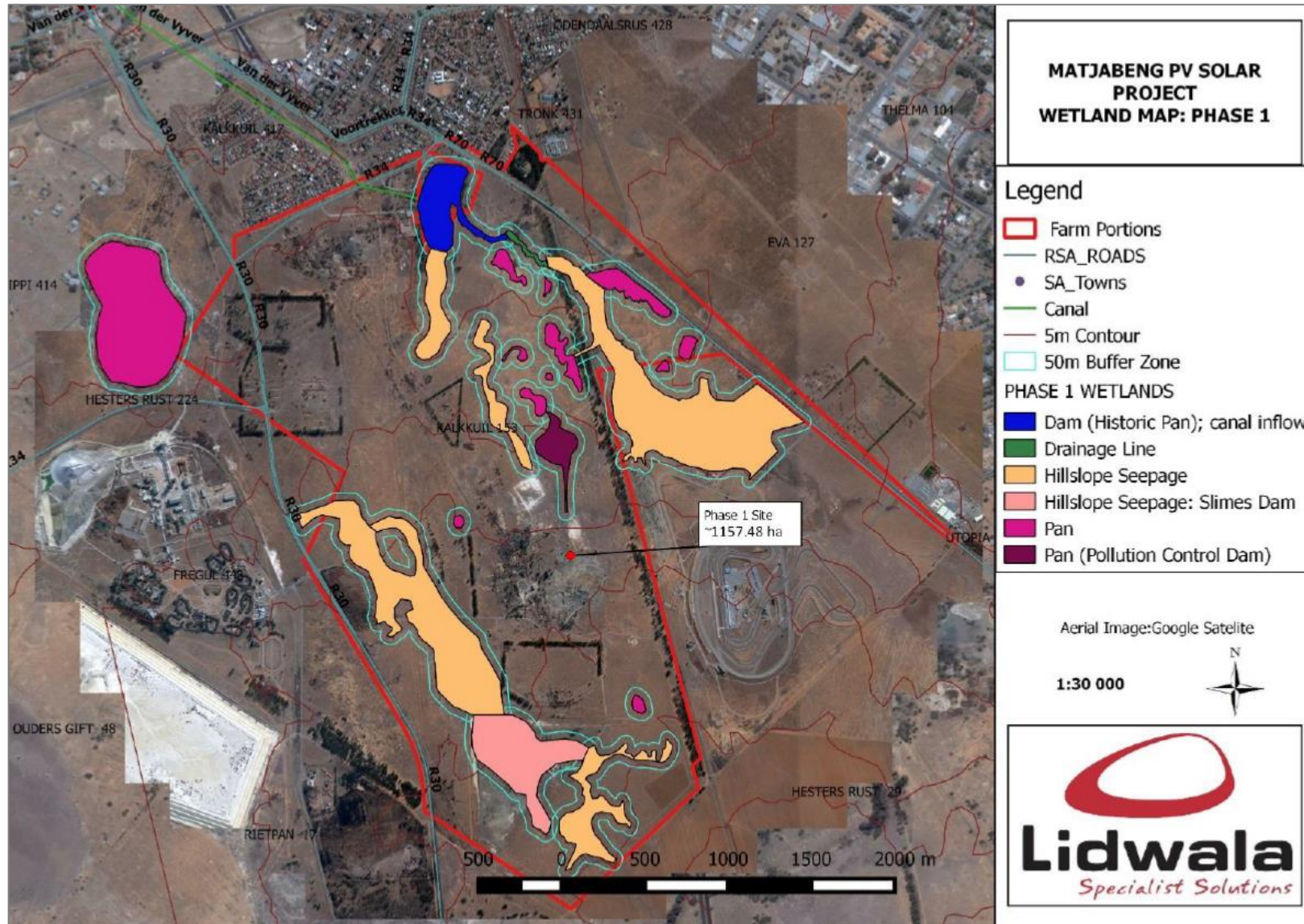


Figure 32: Wetland sensitivity areas delineated together with associated buffer zones for the Phase 1 Site (Lidwala, 2015b)

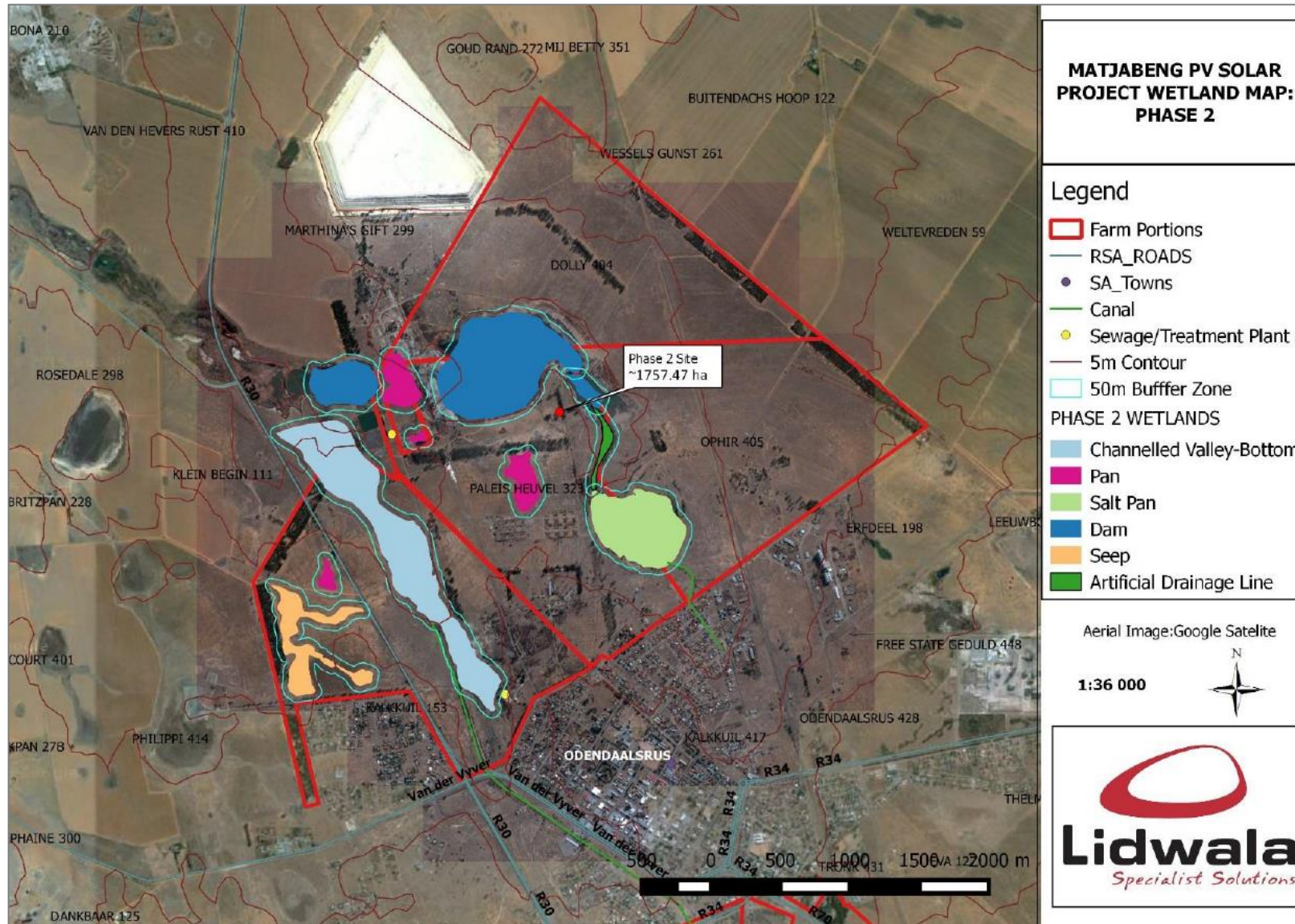


Figure 33: Wetland sensitivity areas delineated together with associated buffer zones for the Phase 2 Site (Lidwala, 2015b)



Figure 34: The southern Salt Pan on the Phase 2 Site. Wetland species such as Bullrushes (*Typha Capensis*) visible in the background and Biesie (*Juncus rigidus*) in the foreground (Lidwala, 2015b)



Figure 35: The Channelled Valley-bottom wetland located in the east of the Phase 2 Site. Stands of Bullrushes (*Typha Capensis*) visible (left). Stands of Biesie (*Juncus rigidus*) and *Scoenoplectus muricinux* visible in the background (right) (Lidwala, 2015b)



Figure 36: The pan at the rock dump near Freddie's 9 shaft was transformed into a dam through historic mining operations (left). The hillslope seepage wetland located west of the R30 within the Phase 2 Site (right) (Lidwala, 2015b)

Findings from this scoping-level Wetland Assessment follow (Lidwala, 2015b):

- ❖ The study area for the Phase 1 Site includes various pans (depressions/salt pans) and hillslope seepage wetlands (see **Figure 32** above). Some of these hydromorphic units (HGM's) were completely transformed over the years. Examples include the dam at the Mimosa Park which was historically a pan, the slimes dam in the south which was established in a hillslope seepage wetland and another pan was transformed into a pollution control dam (PCD) just to the north of the smaller central slimes dam. The wetland cluster (pans and hillslope seepage wetlands) in the north-eastern part of the study area was also historically artificially connected due to the dewatering that took place when the Freddie's 3 shaft was sunk which increased the surface water (historic imagery of 1952 and 1953). Current evidence still indicates there is an artificial water input with a high nutrient component found in sewage or similar leakage into the pan systems in the north east corner of the Phase 1 Site. A large pan is also located outside the border of the north-western corner of the site. This pan is also transformed as it is currently being used as a landfill. All of the wetlands on the Phase 1 Site have been impacted by historical mining operations or agricultural activities. The functionality, including the Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS), of the wetlands will be further assessed in the EIA Phase.
- ❖ The study area for the Phase 2 Site includes a channelled valley-bottom system, a seepage wetland and various pans (mostly salt pans) across the central study area (see **Figure 33** above). The pans starting at the southern salt pan were all subjected to an increased surface water input when the mines were in operation and is still currently experiencing an increased surface water flow through the canal system from Odendaalsrus. These pan systems historically functioned as depressions prior to the mining operations and only received seasonal water input, in other words these pans changed from a non-perennial to perennial systems. The high artificial surface water input from both the mining operations and from Odendaalsrus resulted that these pans are now/or more frequently connected, flowing from the higher to the lower areas in the landscape, thereby creating artificial drainage networks between the pans. The large dam in the north of the study area was historically also a pan (salt pan) before it was dammed up with waste rock from the Freddie's 9 shaft. The channelled valley bottom wetland in the west of the study area also receives water input from the sewage treatment plant just adjacent to the head of the wetland (north-west of Odendaalsrus) and the sewage treatment plant located just south of the Freddie's 9 shaft. No wetlands were recorded in the north-eastern section of the Phase 2 Site. All of the wetlands on the Phase 2 Site have been impacted by historical mining operations or agricultural activities. The functionality, including the PES and EIS, of the wetlands will be further assessed in the EIA Phase.

According to Lidwala (2015b), the type of pans (depressions) found in the study area can be classified as Salt pans which is also evident looking at historic imagery of 1944 before mining operations changed the hydrograph of these systems. These pans are mostly shallow, ephemeral systems that under natural conditions, without any artificial water input (from mining operations and dysfunctional sewage systems), seldom hold surface water and are thus limited in the role they can

play in supporting aquatic biodiversity. However, not only do they provide habitats that at times support aquatic biodiversity and avifauna, but they also play an important role in supporting biodiversity within the terrestrial habitats through the provision of surface water (Lidwala, 2015b).

Potential Impacts / Implications

- ❖ Construction phase:
 - Damage to riparian or wetland habitat or destabilisation of morphology (i.e. river structure) as a result of construction activities in proximity to watercourses.
 - Reduction of water quality through sedimentation (e.g. access roads over watercourses, silt from the construction site transported via runoff) and poor construction practices (e.g. improper management of wastewater, incorrect storage of material, spillages, etc.).
 - Temporary alteration of flow and the structure (i.e. bed and banks) of watercourses at river crossings for access roads, or as a result of poor management of stormwater.
 - Reduction in biodiversity of aquatic biota as a result of the abovementioned drivers.
 - Alteration of site drainage.
- ❖ Operational phase:
 - Sedimentation through silt-laden runoff, caused by inadequate stormwater management.
 - Damage to the facility from major flood events.
 - Water resources could be contaminated through inadequate storage and handling of hazardous materials, leaks from the BESS and poor management of waste and wastewater.
 - Water use requirements of the Project need to be satisfied.
- ❖ Should construction activities encroach into the regulated area of a watercourse (i.e. 1:100 year floodline / delineated riparian habitat, or 500 m of a wetland habitat) water use authorisation will be required in terms of Section 21 of the National Water Act (Act No. 36 of 1998).

Specialist Study Triggered / Additional Investigations

- ❖ An Aquatic Impact Assessment and Delineation will be undertaken, and the findings will be included in the EIA Report.
- ❖ The preliminary layouts of the Phase 1 and Phase Sites, as shown in **Figure 13** and **Figure 14** above, have attempted to avoid watercourses. The layouts will be refined further to incorporate the findings of the Aquatic Impact Assessment and Delineation and will take into consideration delineated riparian habitats and wetlands, as well as their respective buffers zones. The adjusted layouts will be presented in the EIA Report.
- ❖ Flood risks need to be determined. The layouts will ensure that the facility is located outside of the 1:100 year floodline.
- ❖ Best practices to mitigate impacts to watercourses and to manage stormwater will be included in the EMPr.

11.8 Flora & Fauna

Status Quo

11.8.1 Flora

11.8.1.1 Regional Vegetation

The area falls between two vegetation types as indicated in **Figure 37** below. The northern part of the study area is located within the Vaal-Vet Sandy Grassland vegetation type, whereas the largest part of the Phase 2 Site and the entire Phase 1 Site fall within the Western Free State Clay Grassland. In addition, the Highveld Salt Pan vegetation type is also encountered.

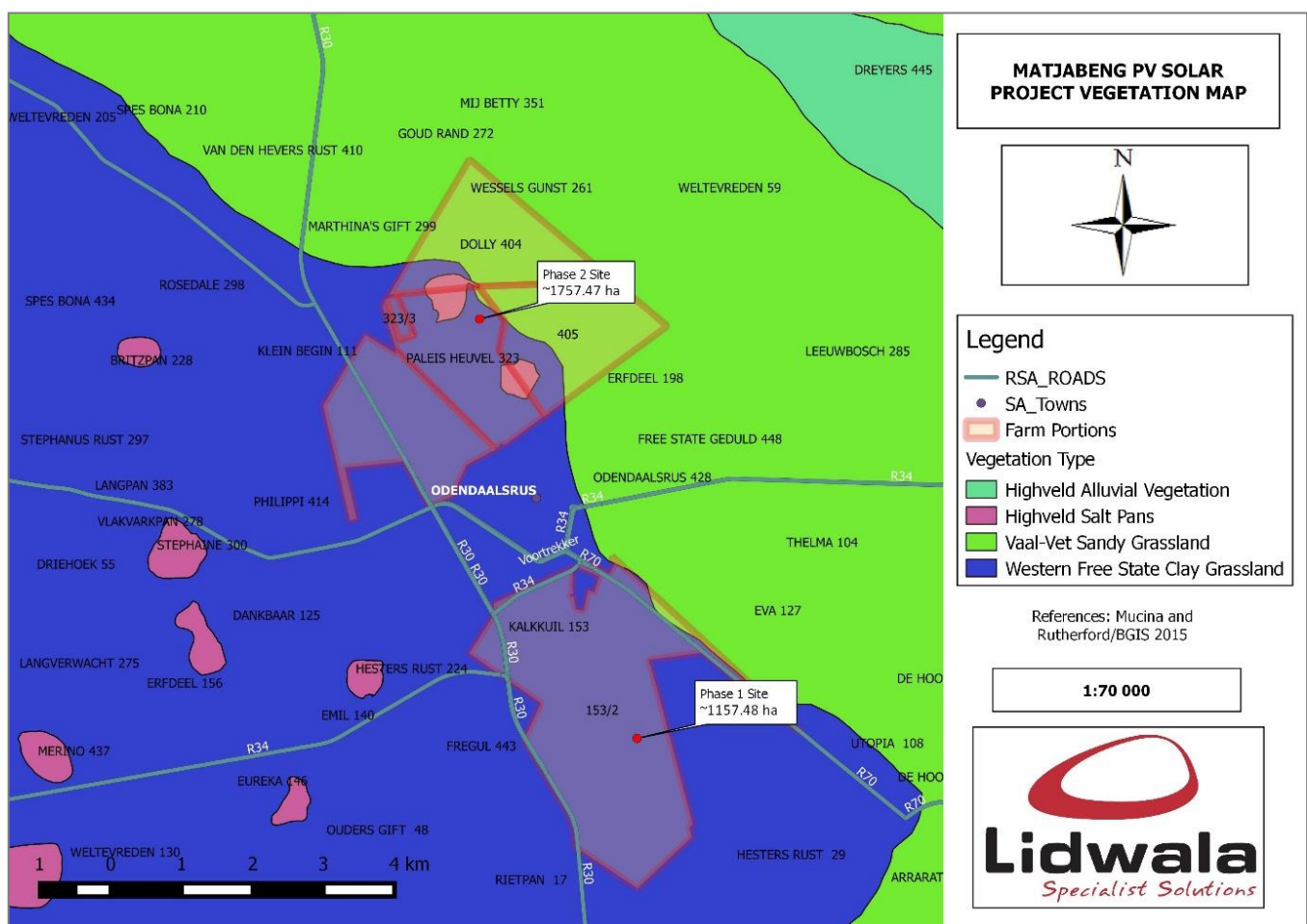


Figure 37: Vegetation units across the Phase 1 and Phase 2 Sites (Lidwala, 2015a)

A brief description of each vegetation type follows, as extracted from the scoping-level Biodiversity Assessment (Lidwala, 2015a).

The Vaal-Vet Sandy Grassland - Endangered (EN)

Plains-dominated landscape with some scattered, slightly irregular undulating plains and hills. Mainly low-tussock grasslands with an abundant karroid element. Dominance of

Themeda triandra is an important feature of this vegetation ecosystem. Locally low cover of *T. triandra* and the associated increase in *Elionurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall (Mucina & Rutherford, 2006). At least one endangered plant species occurs in the ecosystem.

Conservation – Endangered. Target 24%. Only 0.3% statutorily conserved in the Bloemhof dam, Schoonspruit, Sandvelt, Faan Meintjies, Wolwespruit, and Soetdoring nature reserves. More than 63% has been transformed for cultivation and the rest is under strong grazing pressure. Erosion is very low (Mucina & Rutherford, 2006).

Western Free state Clay Grassland

According to Mucina & Rutherford (2006), the landscape is restricted to flat bottomlands which support dry, species poor grassland with a high number of salt pans embedded. Dwarf Karoo shrublands surround the salt pans in disturbed areas.

Conservation - Least Threatened. Target 24%. None conserved in statutory conservation areas. Around 20% of the area is already transformed for maize and wheat cultivation. A species of prosopis appears as occasional invasive alien. Erosion is very low (38%), low (30%) and moderate (28%).

Salt Pan Vegetation

These areas are described as depressions in the plateau landscape containing temporary water bodies. The central parts of the pans are often seasonally inundated and sometimes with floating mycophyte vegetation or the vegetation cover develops on drained bottoms of pans and forms concentric zonation patterns. Open to sparse grassy dwarf shrubland has developed on the edges of the pans.

Conservation: Target 24%. Only a very small portion is statutorily conserved in the Vaalbos National Park and the Bloemhof dam. Around 4 % has been transformed so far, but developmental threats are still increasing. There are also a significant invasion of alien plants in some of these systems.

11.8.1.2 Terrestrial Threatened Ecosystems

A map showing threatened ecosystems is provided in **Figure 38** below. Based on the aforementioned map, threatened ecosystems are encountered in the central and eastern part of the Phase 2 Site. This will be investigated further as part of the Terrestrial Ecological Impact Assessment.

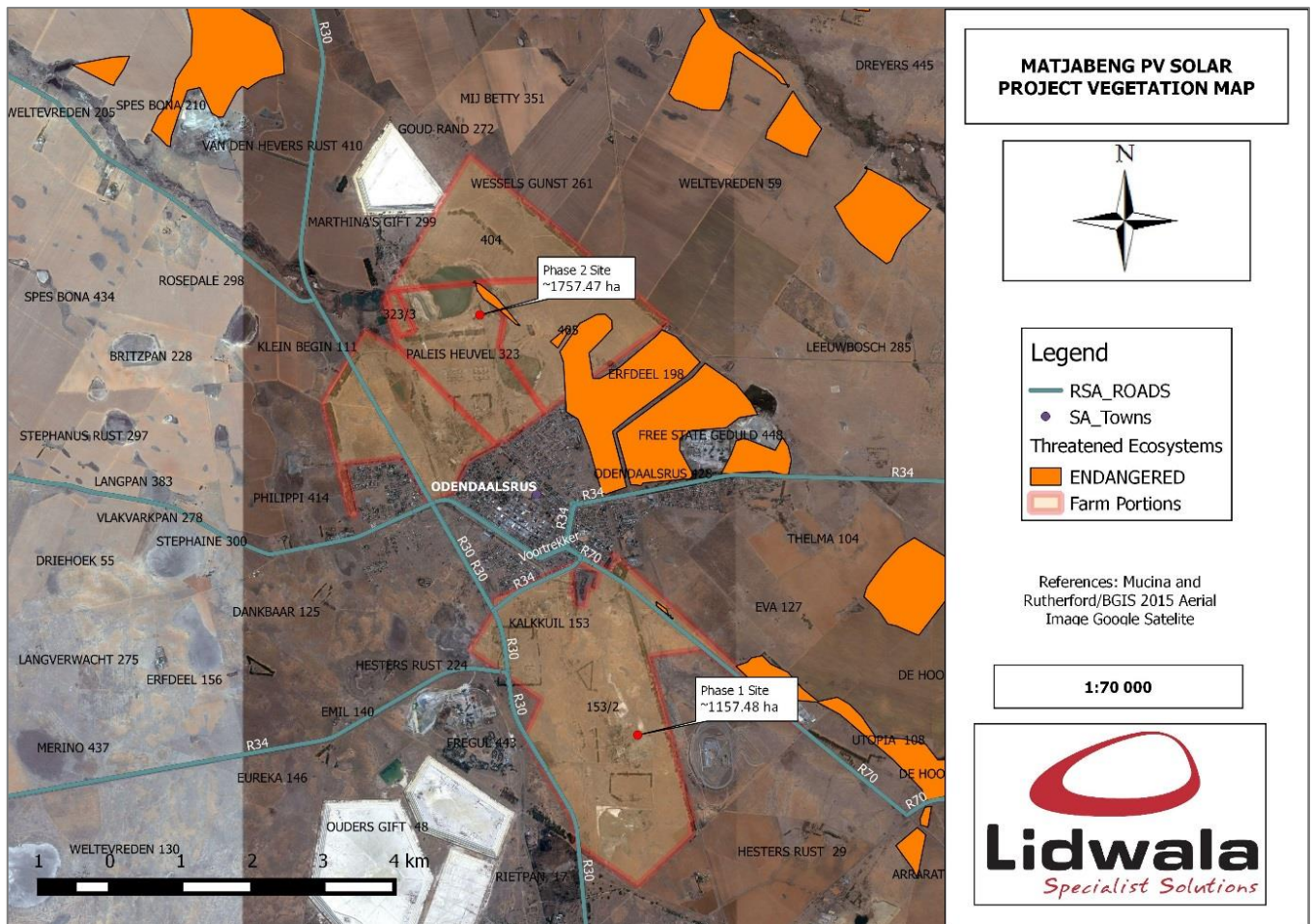


Figure 38: Threatened ecosystems across the study area (BGIS) (Lidwala, 2015a)

11.8.1.3 Invasive species

Invasive alien species with a high probability of occurrence within the area, which need to be actively removed, are listed in **Table 12** below.

Table 12: Alien species with a high probability of occurrence within the area (Lidwala, 2015a a)

Botanical Name	Common Name	Category
<i>Cirsium vulgare</i>	Spear Thistle	Cat 1 Weed
<i>Datura spp</i>	Thorn apple/Olieboom	Cat 1 Weed
<i>Flaveria bidentis</i>		
<i>Nicotiana glauca</i>	Wild Tobacco	Cat 1 Weed
<i>Eucalyptus camaldulensis</i>	Red river gum	Cat 2 Invader
<i>Pinus spp</i>	Pine tree	Cat 2 Invader
<i>Prosopis glandulosa</i>	Honey Mesquite	Cat 2 Invader
<i>Melia azedarach</i>	Syringa	Cat 3 Invader
<i>Tamarix ramosissima</i>	Tamarisk	Cat 3 Invader
<i>Asparagus spp</i>	Wild asparagus/Katbos	Indicator of bush encroachment

11.8.1.4 Terrestrial Biodiversity on a Local Scale

Phase 1 Site

Currently the area is open veld that has been severely affected by the grazing regime on the site. Illegal dumping occurs on the site at a large scale.

The two vegetation units that were encountered on the site during the scoping-level Biodiversity Assessment are explained below.

❖ **Unit 1 –**

- This unit is dominated by low growing tussock grasses and a low diversity of forbs and dwarf shrubs. Western Free State Clay Grassland in a well-managed undisturbed state would be characterised by the dominance of *Themeda Triandra*. Instead this unit is dominated by increaser two, pioneer and sub-climax species such as *Eragrostis Lehmanniana*, *E. chloromelas*, *E. trichopora*, *E. superba*, *Aristida congesta* subsp. *Congesta*, *Chloris virgate*, *Cynodon dactylon*, *Tragus berteronianus* etc. All of these species thrive in disturbed land. Within this unit two variations occur depending on the clay content of the soil. *Cynodon dactylon* forms a denser growth pattern where the clay content is a bit higher. In these areas *Aristida congesta* is less prominent. In the second variation *Aristida congesta* is much more abundant to such an extent that it exceeds the cover abundance of *Cynodon dactylon*, other vegetation is more sparsely distributed in these areas.
- The species poor shrub and forb layers is mostly characterized by *Felicia muricata*, *Lycium cinerium*, *Pentzia globose*, *Gazania krebsiana*, *Artriplex semibaccata*, *Boerhavia diffusa*, *Portulaca quadrifida* and *Bulbine narcissifolia*. The bare patches that occur within the area could most probably be attributed to the presence of salt. The patches are surrounded by salt tollerant species such as *Atriplex semibaccata*, *A. nummularia*, *Pentzia globose*, *Tamarix ramosissima*, *Cynodon dactylon*, *Chloris virgata* and *Tragus berteronianus*.
- Across the site there is also the presence of diverse invasive species with a relatively high density in some areas. *Eucalyptus camaldulensis* is probably the most significant invader occurring in clumps or alone throughout the study area.
- The one species that is listed as a protected plant species in the area *Schizocarpus nervosus* (Free State Nature Conservation Ordinance - Act 8 of 1969) were not observed in the study area.

❖ **Unit 2 –**

- This unit is closely related to the low lying areas and the pans on the site. The vegetation is mostly transformed in this unit. The unit is mostly covered by short grasses, especially *Cynodon Dactylon*, *Chloris vergata*, *Panicum coloratum*, *Dactyloctenium aegyptium*, *Urochloa panicoides*, *Paspalum notatum*. Depressions in the area is characterised by *Themeda triandra*, *Cynodon dactylon* and exotic forbs such as *Verbena bonariensis*.

Phase 2

This area consists of one vegetation unit namely *Eragrostis lehmanniana* – *Aristida congesta* subsp. *Congesta*.

Vegetation is dominated by low growing tussock grasses and a low diversity of herbs. The unit is dominated by Increaser 2 pioneer and sub-climax species such as *Eragrostis lehmanniana*, *Aristida congesta* subsp. *Congesta*, *Elionurus muticus*, *Pogonarthria squarrosa*, *Eragrostis superba*, and *Eragrostis obtusa*. These species thrive in disturbed veld, especially overgrazed veld. Other anthropogenic disturbances include historical ploughing. The species poor Forb layer is mostly characterised by: *Indigofera* species, *Rhyncosia adenodes*, *Helichrysum chionospaerum*, *Gazania krebsiana* and the geophyte *Bulbine capitata*. Although Vaal Vet Sandy Grassland is an endangered ecosystem, this unit is in a poor condition and contain little character that needs to be conserved.

11.8.1.5 Wetland Vegetation

Vegetation associated with aquatic habitat types are regarded highly sensitive and all impacts should ideally be avoided within, and near to, these features. A variety of these habitat types feature in the study area, including perennial and non-perennial streams, rivers, small drainage lines, wetlands, hillslope seepages, artificial impoundments, salt pans and un-channelled valley bottoms. It is also important to note that these habitat types are frequently encountered in close proximity to existing land transformation activities, and agricultural areas in particular. The high sensitivity ascribed to these habitat types is mainly a result of high biodiversity associated with them, not only during periods when water is present within the system, but also during the austral winter period.

11.8.2 Fauna

11.8.2.1 Mammals

The International Union for Conservation of Nature (IUCN) Red Data List, lists twelve mammal species with a high probability of occurrence within the area. All of these species are classified as least Concern (LC). These listed species are provided in **Table 13** below.

Table 13: Listed Mammal Species in the Free State (Lidwala, 2015a)

Order	Binomial	Common Name
AFROSORICIDA	<i>Chlorotalpa sclateri</i>	Sclater's Golden Mole
RODENTIA	<i>Graphiurus ocularis</i>	Namtap
RODENTIA	<i>Graphiurus ocularis</i>	Spectacled Dormouse
RODENTIA	<i>Mus orangiae</i>	Free State Pygmy Mouse
RODENTIA	<i>Mus orangiae</i>	Orange Mouse
RODENTIA	<i>Otomys saundersiae</i>	Saunder's Vlei Rat
LAGOMORPHA	<i>Pronolagus rupestris</i>	Smith's Red Rockhare
LAGOMORPHA	<i>Pronolagus rupestris</i>	Smith's Red Rock Hare

Order	Binomial	Common Name
LAGOMORPHA	<i>Pronolagus saundersiae</i>	
LAGOMORPHA	<i>Pronolagus saundersiae</i>	
LAGOMORPHA	<i>Pronolagus saundersiae</i>	Hewitt's Red Rock Hare
LAGOMORPHA	<i>Pronolagus saundersiae</i>	Lapin roux de Hewitt

11.8.2.2 Reptiles

Red listed reptiles within the Free State IUCN Red Data List are indicated in **Table 14** below.

Table 14: Red listed reptiles within the Free State IUCN Red Data List (Lidwala, 2015a)

FAMILY	BINOMIAL	COMMON NAME
GEKKONIDAE	<i>Afroedura nivarica</i>	
GEKKONIDAE	<i>Afroedura nivarica</i>	
GEKKONIDAE	<i>Afroedura nivarica</i>	Drakensberg Flat Gecko
GEKKONIDAE	<i>Afroedura nivarica</i>	Drakensberg Rock Gecko
GEKKONIDAE	<i>Afroedura nivarica</i>	Mountain Flat Gecko
CHAMAELEONIDAE	<i>Bradypodion dracomontanum</i>	Drakensberg Dwarf
CHAMAELEONIDAE	<i>Bradypodion ventrale</i>	
CHAMAELEONIDAE	<i>Bradypodion ventrale</i>	Eastern Cape Dwarf
CHAMAELEONIDAE	<i>Bradypodion ventrale</i>	Southern Dwarf Chameleon
CHAMAELEONIDAE	<i>Chamaeleo dilepis</i>	
CHAMAELEONIDAE	<i>Chamaeleo dilepis</i>	
CHAMAELEONIDAE	<i>Chamaeleo dilepis</i>	
CHAMAELEONIDAE	<i>Chamaeleo dilepis</i>	
CHAMAELEONIDAE	<i>Chamaeleo dilepis</i>	
CHAMAELEONIDAE	<i>Chamaeleo dilepis</i>	Common African Flap-necked
CHAMAELEONIDAE	<i>Chamaeleo dilepis</i>	Flap-necked Chameleon
PSEUDOXYPHIIDAE	<i>Duberria lutrix</i>	
PSEUDOXYPHIIDAE	<i>Duberria lutrix</i>	Common Slug Eater
PSEUDOXYPHIIDAE	<i>Duberria lutrix</i>	Slug-eater
GEKKONIDAE	<i>Pachydactylus vansoni</i>	
GEKKONIDAE	<i>Pachydactylus vansoni</i>	Van Son's Gecko
GEKKONIDAE	<i>Pachydactylus vansoni</i>	Van Son's Thick-toed Gecko

11.8.2.3 Amphibians

Species that may potentially occur within the rivers and wetlands associated with the study area (IUCN) include the Giant Bullfrogs (*Pyxicephalus adspersus*), which are classified as Near Threatened (NT) due to anthropogenic activities resulting in habitat loss.

11.8.2.4 Avifauna

Suitable remaining habitat to support avifaunal biodiversity can only be found along the watercourses (pans, hillslope seepages and the channelled valley wetland) located on site.

A number of water bird species were observed utilising the area for foraging and nesting. The remainder of possible suitable avifaunal habitat have been severely degraded due to anthropogenic impacts from mining and agricultural activities. According to SABAP a number of bird species are known from the broad study area surrounding the sites, which are indicated in the scoping-level Biodiversity Assessment (contained in **Appendix H**).

11.8.2.5 Insects

There are 129 insect species that are listed as Least Concern that occur within the Free State. This list is included in the scoping-level Biodiversity Assessment (contained in **Appendix H**).

11.8.3 Free State Biodiversity Plan

The Free State Biodiversity Plan (2015) (Collins, 2016) shows Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). CBAs are important for conserving biodiversity while ESAs are important to ensure the long term persistence of species or functioning of other important ecosystems. Degradation of CBAs or ESAs could potentially result in the loss of important biodiversity features and/or their supporting ecosystems.

The location of the sites in relation to CBAs and ESAs is shown in **Figure 39** below. CBAs and ESAs are encountered on both the Phase 1 and Phase 2 Sites. Ground truthing of these areas, in terms of their actual status, will be undertaken as part of the Terrestrial Ecological Impact Assessment.

11.8.4 Protected Areas

According to the South Africa Protected Areas Database (SAPAD_OR_2019_Q1), the nearest formally protected areas to the sites include the following (refer to **Figure 40** below):

- ❖ Newlands Game Ranch (± 9km to the east);
- ❖ Thabong Game Ranch (± 11km to the south-east); and
- ❖ De Rust Private Nature Reserve (± 17km to the north-east).

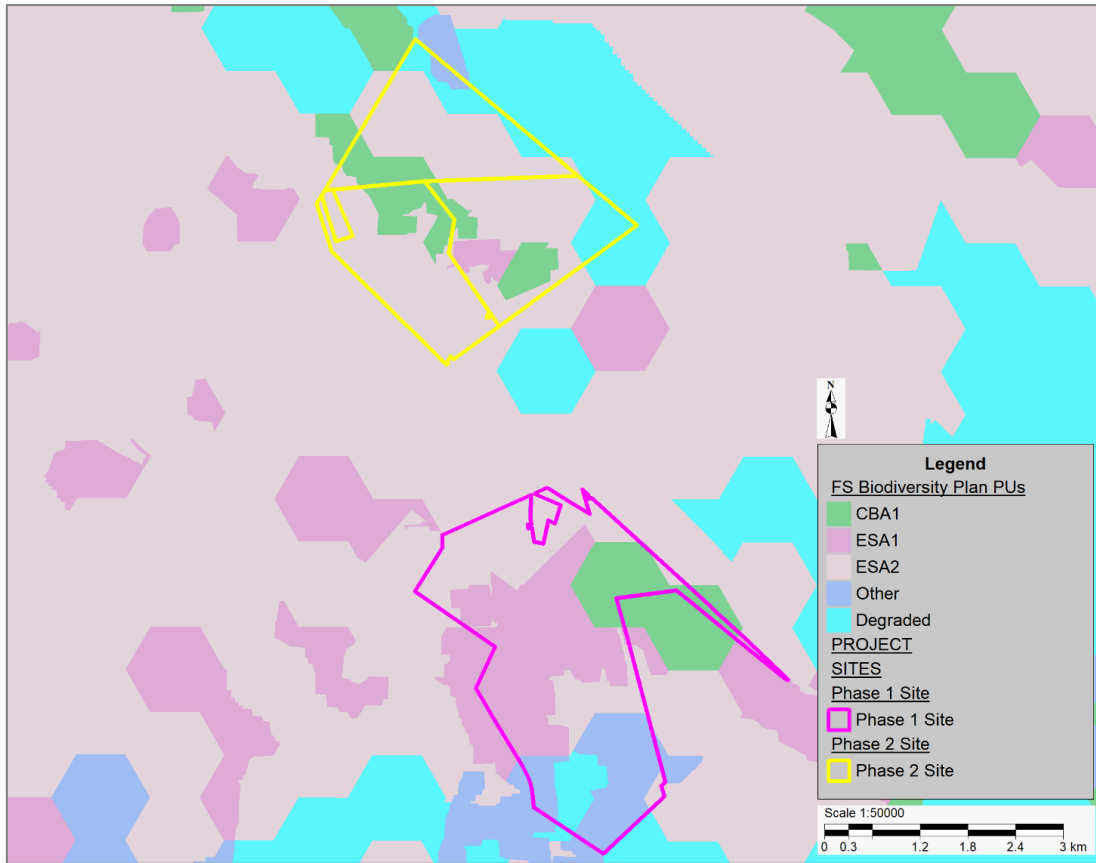


Figure 39: CBAs and ESAs in the study area

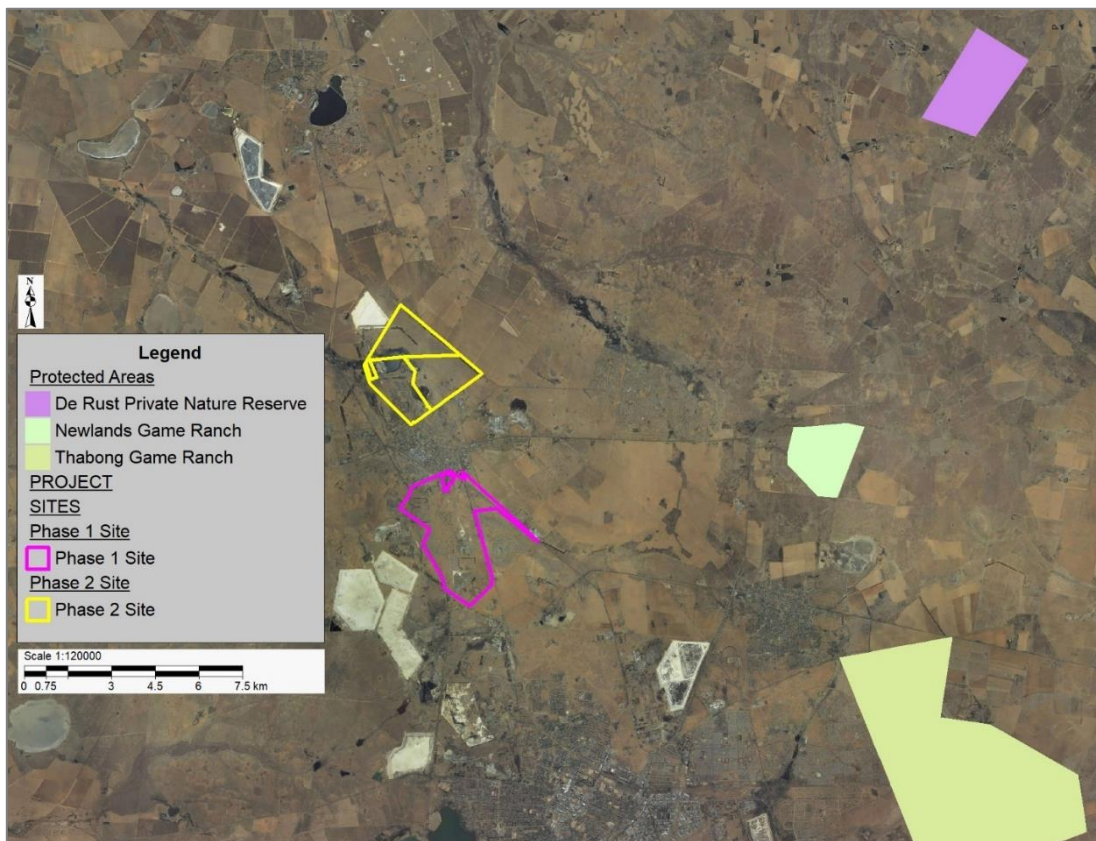


Figure 40: Protected Areas in relation to the study area

Potential Impacts / Implications

- ❖ Construction phase –
 - Clearance of vegetation for site preparation, along access roads and other areas to be disturbed. This could result in habitat loss / fragmentation. The significance of habitat loss will need to consider the total area of habitat affected, the uniqueness of the habitat and the sensitivity and conservation status of the habitat and its associated species.
 - Potential loss, disturbance or displacement of protected fauna and flora species.
 - Human - animal conflicts.
 - Noise and vibration.
 - Nights lights may affect nocturnal faunal species.
 - Illegal harvesting and poaching of faunal and floral species by construction workers.
 - Pollution of the biophysical environment from poor construction practices.
 - Proliferation of invasive alien species in disturbed areas.
- ❖ Operational phase –
 - Habitat fragmentation (e.g. barriers to animal movement).
 - Reflection of sunlight from the solar panels could adversely affect birds, including those species that use the wetlands on the site and surrounding areas.
 - Landscaping, re-seeding and vegetation control is required to remove the risk of vegetation shading modules and reducing performance of the facility.
 - Chemical pollution associated with cleaning the PV panels.
 - Proliferation of invasive alien species in disturbed areas.

Specialist Study Triggered / Additional Investigations

- ❖ The compatibility of the project with the Free State Biodiversity Plan (2015) and other environmental management and planning tools will be considered further during the EIA Phase.
- ❖ The Terrestrial Ecological Impact Assessment in the EIA Phase will assess the status of the sensitive ecological features. Areas to be affected by project activities and infrastructure will be surveyed to identify sensitive and significant floral and faunal species. Suitable mitigation measures will be identified, and recommendations will be made to address potential impacts.
- ❖ The layouts of the Phase 1 and Phase Sites will be refined further to incorporate the findings of the Terrestrial Ecological Impact Assessment and will take into consideration sensitive ecological features. The adjusted layouts will be presented in the EIA Report.
- ❖ Best practices to mitigate impacts to flora and fauna will be included in the EMPr.

11.9 Socio-Economic Environment

Status Quo

11.9.1 *General*

According to the 2019 - 2020 IDP for the MLM, key features of the MLM include the following:

- ❖ MLM is a category B municipality established in terms of Section 12 of the Municipal Structures Act (117 of 1998);
- ❖ The municipality covers an area of 514.4 km² consisting of Welkom, Odendaalsrus, Allanridge, Hennenman, Virginia and Ventersburg;
- ❖ The municipality has a total of 116,712 proclaimed stands for both residential purpose;
- ❖ The rural areas of MLM cover an area of approximately 2500 farms; and
- ❖ MLM is the largest municipality in the District and it contains most of the mining activities, especially gold mining. Recently the mining sector has been on a downward trend as a result of closure of many of the shafts as a result of high costs of production among others and the need for deep mining. The recent decline in world commodity prices, has aggravated the situation in general with many businesses that have traditionally dependent on the mining sector either have closed down or are in the process of closing down.

According to MetroGIS (2015), the sites earmarked for the Project are located within an area that has a distinct rural character. The agricultural areas are interspersed with gold mining operations that are predominantly concentrated between Welkom and Odendaalsrus, and northwards towards Allanridge.

A map showing sub places and the municipal wards is provided in **Figure 41** below. The Phase 1 Site is located in Ward 35 and the Phase 2 Site falls within Ward 36.

The proposed Project Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant. Although there is an existing mining right by Harmony Gold Mining Company Ltd on the area in question, a consent letter was received from the mining company. There is also a Tripartite and Rehabilitation Agreement between Harmony Gold Mining Company Ltd, MLM and the Applicant related to the rehabilitation obligations.

Certain informal uses of the land are taking place, including the grazing of livestock (refer to **Figure 42** below) and informal settling (refer to **Figure 43** below). People are also still residing within the old mining houses on both sites (refer to **Figure 44** below).

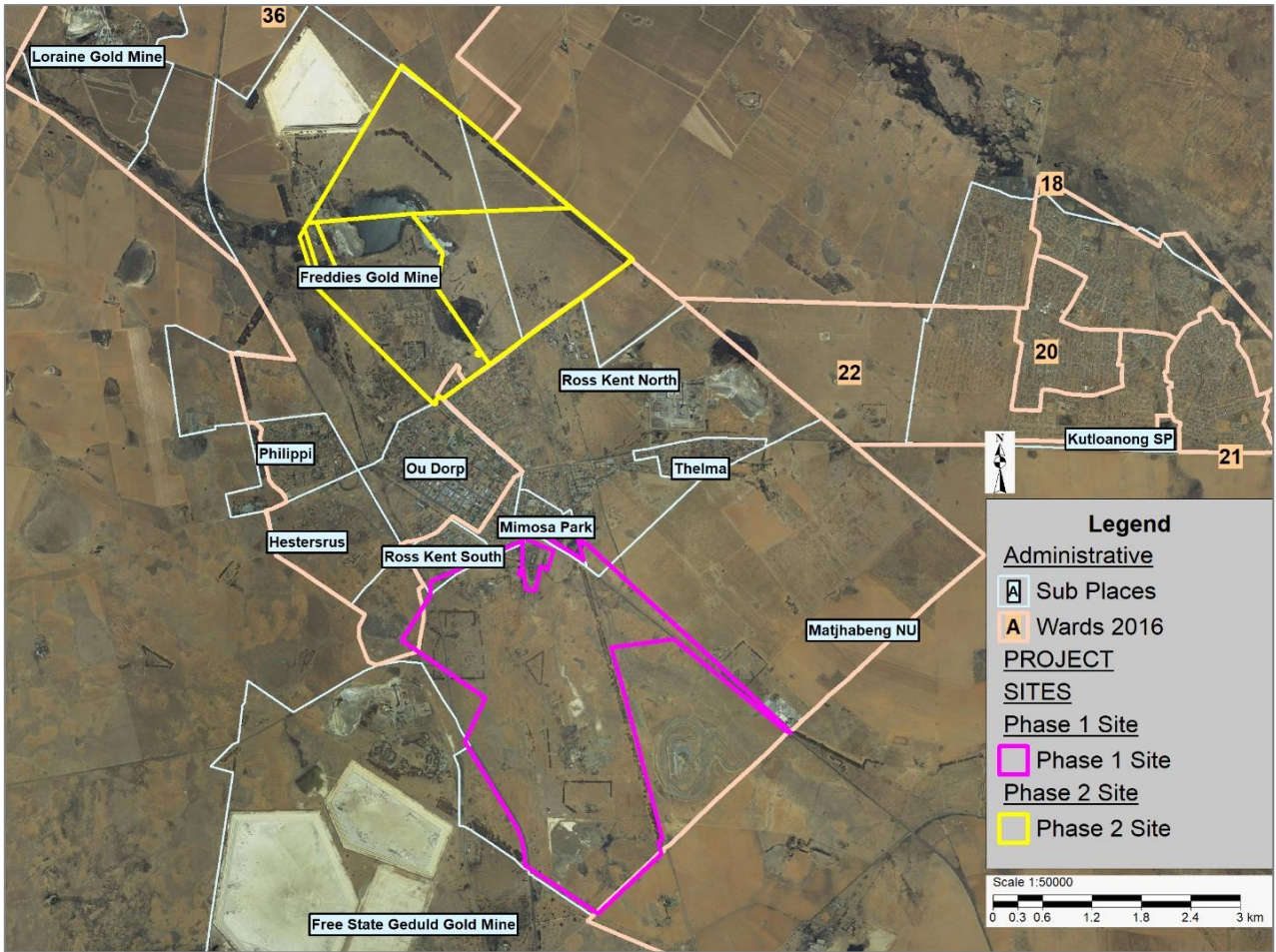


Figure 41: Sub places and the municipal wards



Figure 42: Informal grazing of livestock on Phase 2 Site



Figure 43: Informal dwellings on Phase 1 Site

11.9.2 Settlement Patterns

The population density for the larger part of the study area (i.e. the agricultural land) is less than 4 people per km². Residents within this area are primarily located at homesteads/farmsteads that are scattered throughout the region. Higher population densities occur at the towns and built-up areas of Allanridge, Odendaalsrus, Kutloanong and Welkom (exceeding 600 people per km²) (MetroGIS, 2015).

11.9.3 Socio-Economic Baseline

The information to follow was sourced from the previous Scoping Report (JIS Environmental Engineers, 2019).

11.9.3.1 Population

According to Statistics 2011, the population of MLM is 406,461. There was a slight decline in the population growth (see **Table 15** below), which can be attributed to a number of factors such as migration due to the diminishing mining activities and HIV/AIDS, amongst others. **Table 16** below shows the population groups in the MLM.

Table 15: Population Growth Rate (Stats SA 2011)

Gender	2011	%	2001	%
Male	201 509	49.6	200 370	49.1
Female	204 952	50.4	207 799	50.9
Total	406 461	100	408 169	100

Table 16: Population groups within the MLM (Stats SA 2011)

	Male	Female	Total
Black	180 913	182 467	363 380
Coloured	2 623	2729	5 352
Indian or Asian	766	470	1 236
White	17 613	17 451	35 064
Total	203 915	205 117	406 461

11.9.3.2 Economic Activities

Table 17 below shows the employment levels within MLM in all economic sectors. The table shows both growth and decline from one sector to the other. Of importance to note, is a decline of mining and quarrying sector and agriculture while other sectors have shown growth. The Project intends to promote economic growth.

Table 17: Employment by sector (Stats SA 2011)

Sector	2009	2010	2011	%
Agriculture, forestry and fishing	358	339	381	1.4
Mining and quarrying	7087	10629	11495	42.8
Manufacturing	1332	1342	1429	5.3
Electricity, gas and water	418	502	556	2.1
Construction	442	493	549	2.0
Wholesale and retail trade, catering and accommodation	2162	2479	2793	10.4
Transport, storage and communication	1059	1096	1183	4.4
Finance, insurance, real estate and business services	2472	2737	2943	11.0
Community, social and personal services	2080	2562	2852	10.6
General government	2043	2343	2692	10.0
Total	19452	24522	26873	100

The annual household income in MLM is shown in **Table 18** below.

Table 18: Annual household income (Stats SA 2011)

Annual Household Income	2011	%	2001	%
No income	20 069	16.3	35 646	27.7
R 1 - R 4800	6 606	5.4	12 072	9.4
R 4801 - R 9600	9 081	7.4	19 196	14.9
R 9601 - R 19 600	21 416	17.4	24 583	19.1
R 19 601 - R 38 200	22 394	18.2	17 985	14
R 38 201 - R 76 400	18 854	15.3	9 293	7.2
R 76 401 - R 153 800	11 703	9.5	6 152	4.8
R 153 801 - R 307 600	7973	6.5	2674	2.1
R 307 601 - R 614 400	3 789	3.1	614	0.5
R 614 001 - R 1 228 800	858	0.7	172	0.1
R 1 228 801 - R 2 457 600	262	0.2	149	0.1

Annual Household Income	2011	%	2001	%
R 2 457 601 or more	188	0.2	104	0.1
Unspecified	1	0.001	-	-
Total	123 195	100	128 640	100

11.9.3.3 Education levels

Education levels in MLM are shown in **Table 19** below. There has been considerable progress towards higher education levels since 2001. The proportion of persons with no schooling has dropped from 11.3% to 4%. This has important implications for employment.

Table 19: Education levels (Stats SA 2011)

Education Level	2011	%	2001	%
Grade 0	10 973	2.7	-	-
Grade 1 / Sub A	10 651	2.6	16 074	3.9
Grade 2 / Sub B	10 713	2.6	12 395	3.0
Grade 3 / Std 1/ABET 1	11 206	2.8	16 522	4.0
Grade 4 / Std 2	13 989	3.4	20 957	5.1
Grade 5 / Std 3/ABET 2	14 659	3.6	22 160	5.4
Grade 6 / Std 4	17 170	4.2	25 846	6.3
Grade 7 / Std 5/ ABET 3	21 155	5.2	31 422	7.7
Grade 8 / Std 6 / Form 1	32 268	7.9	34 324	8.4
Grade 9 / Std 7 / Form 2/ABET 4	26 433	6.5	26 826	6.6
Grade 10 / Std 8 / Form 3	37 178	9.1	33 535	8.2
Grade 11 / Std 9 / Form 4	31 023	7.6	22 084	5.4
Grade 12 / Std 10 / Form 5	73 537	18.1	47 387	11.6
NTC 1-6	5 155	1.3	0	0
Certificate with less than Grade 12 / Std 10	3 97	0.1	912	0.2
Diploma with less than Grade 12 / Std 10	448	0.1	505	0.1
Certificate with Grade 12 / Std 10	3 529	0.9	4 527	1.1
Diploma with Grade 12 / Std 10	4 624	1.1	6 062	1.5
Higher Diploma	4 255	1.0	-	-
Post Higher Diploma Masters; Doctoral Diploma	700	0.2	-	-
Bachelors Degree	2 789	0.7	2 066	0.5
Bachelors Degree and Post graduate Diploma	1 022	0.3	849	0.2
Honours degree	1 325	0.3	446	0.1
Higher Degree Masters / PhD	685	0.2	378	0.1
Other	661	0.2	-	-
No schooling	16 172	4	46 157	11.3
Not applicable	53 741	13.2	36 735	9.0
Total	406 461	100	408 167	100

Potential Impacts / Implications

- ❖ Status of land claims to be verified.
- ❖ Informal use of land to be stopped.
- ❖ People residing within the old mining hostel to be relocated.
- ❖ Construction phase:
 - Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes).
 - Safety and security.
 - Use of local road network.
 - Nuisance from dust and noise.
 - Consideration of local labourers and suppliers in area – stimulation of local economy (positive impact).
 - Transfer of skills (positive impact).
- ❖ Operational phase:
 - Once established, the operation of the Solar PV Plant would result in direct and indirect economic opportunities.
 - Refer to **Section 3** above for the Project's benefits to the MLM.

Specialist Study Triggered / Additional Investigations

- ❖ A Socio-Economic Impact Assessment will be undertaken and mitigation measures will need to be identified to manage the impacts to the local social and economic environments. The findings will be included in the EIA Report.

11.10 Agriculture

Status Quo

An extract from the Preliminary Desktop Agricultural Study (Lanz, 2015) (contained in **Appendix H**) follows. A description of the soils found on the sites is provided in **Section 11.5** above.

The site falls within a grain farming agricultural region. There is no current cultivation on any of the sites. The north-eastern part of the Phase 2 Site (land type Ae40) has been cultivated in the past. There has been no cultivation on the southern site for at least the last ten years. A large part of both the Phase 1 and Phase 2 Sites have been impacted by mining activities.

Land capability is defined as the combination of soil suitability and climate factors. The entire area has a land capability classification, according to the 8 category scale of Class 4, which is marginal potential arable land. The major limitation to agriculture, where the soils are suitable, is the limited moisture availability and the variability of rainfall during the growing season.

As an indication of agricultural potential on the site, the land is classified on AGIS as having a low potential maize yield of 1.83 tons per hectare. The natural grazing capacity of the site is given as 11-13 hectares per large stock unit. Agricultural potential varies across the site due to the different soils. Those parts of the site that have been cultivated in the past are likely to have higher agricultural potential and therefore to have higher agricultural sensitivity to development. Their potential is, however, still limited, largely by climatic factors.

A large part of both the Phase 1 and Phase 2 Sites been impacted by mining activity. Informal grazing takes place on the sites.

Potential Impacts / Implications

- ❖ Construction phase:
 - Loss of agricultural land use due to direct occupation by the development footprint. This will take affected portions of land out of agricultural production.
 - Soil erosion by wind or water due to alteration of the land surface characteristics.
 - Alteration of surface characteristics may be caused by construction related land surface disturbance, vegetation removal, panel surfaces and the establishment of hard standing areas, surfaces and roads. Erosion will cause loss and deterioration of soil resources. However, due to the low gradient of the sites, erosion risk is low.
 - Loss of topsoil due to poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's capability for supporting vegetation.
 - Risk of harm to livestock from construction activities (e.g. open excavations). Access for informal grazing to construction site to be prevented.
- ❖ Operational phase:
 - Loss of agricultural land use due to direct occupation by the development footprint. This will take affected portions of land out of agricultural production.
 - Soil erosion by wind or water due to alteration of the land surface characteristics.

Specialist Study Triggered / Additional Investigations

- ❖ An Agricultural Impact Assessment will be conducted and the findings will be included in the EIA Report.

11.11 Air quality

Status Quo

Potential sources of air pollution in the region include the following:

- ❖ Stack, vent and fugitive dust emissions from existing mining operations, as well as windblown dust emissions from tailings storage facilities;

- ❖ Fugitive dust emissions from agricultural activities;
- ❖ Vehicle exhaust emissions from vehicles traveling on paved and unpaved roads, including on the R30 regional road as well as on roads inside the settlements of Allanridge, Nyakallong, Kutlwanong and Odendaalsrus;
- ❖ Biomass burning (veld fires);
- ❖ Domestic fuel burning;
- ❖ Industrial operations;
- ❖ Waste treatment and disposal;
- ❖ Other fugitive dust sources such as wind erosion from exposed areas.

Potential Impacts / Implications

- ❖ The Project proposes the use of a renewable resource (solar), which is a cleaner form of energy generation than using fossil fuels, with environmental benefits.
- ❖ Construction phase:
 - Dust from the use of dirt roads by construction vehicles;
 - Dust from bare areas that have been cleared for construction purposes;
 - Emissions from construction equipment and machinery; and
 - Tailpipe emissions from construction vehicles.
- ❖ Operational phase:
 - Local atmospheric pollution may reduce the irradiation received or contain significant levels of airborne corrosive substances.
 - The efficiency of the solar plant could be reduced if the modules are soiled (covered) by particulates/dust.
 - Impacts to air quality caused by the operation and maintenance of the facility include dust from the use of dirt roads and tailpipe emissions from vehicles.

Specialist Study Triggered / Additional Investigations

- ❖ No specialist air quality study will be undertaken as it is not deemed necessary for the type of activities associated with this project. Mitigation measures will be included in the EMPr to ensure that the air quality impacts during the construction phase are suitably managed and that regulated thresholds are not exceeded.
- ❖ Soiling of modules will require an appropriate maintenance and cleaning plan.

11.12 Noise

Status Quo

In terms of the local acoustical environment, the background noise levels are expected to be typical of a rural area.

Noise in the greater area emanates primarily from mining activities, farming operations (e.g. use of farming equipment), vehicles on the surrounding road network, racing events at the Phakisa Freeway circuit, human activities in surrounding settlements and trains passing on the railway.

Potential Impacts / Implications

- ❖ Construction phase:
 - Localised increases in noise may be caused by –
 - Construction equipment, machinery and vehicles;
 - Construction material delivery vehicles; and
 - General activities at the construction camp.
- ❖ Operational phase:
 - Solar PV facilities produce electricity during the daytime hours, when the sun's rays are collected by the panels. When there is little to no irradiance, noise emitted by the equipment is significantly reduced. The main sources of noise from the Project will be the rack mounted inverters and the central step-up transformer, which are only expected to be audible to operational staff who will come in close proximity to these components.
 - Operation and maintenance vehicles and activities.

Specialist Study Triggered / Additional Investigations

- ❖ Noise that emanates from construction and operational activities will be addressed through targeted best practices for noise monitoring and management in the EMP. The associated regulated standards need to be adhered to.

11.13 Historical and Cultural Features

Status Quo

An extract of the scoping-level Cultural Heritage Impact Assessment (van Schalkwyk, 2015) (contained in **Appendix H**) follows.

11.13.1 *Regional Overview*

The cultural landscape qualities of the larger region surrounding the study area consists two components. The first is a limited Stone Age occupation, which in most cases clustered in the vicinity of the various water sources as well as preferred habitable areas such as hills and outcrops. This period, spanning many thousands of years, was followed by a much shorter Late Iron Age occupation and an even shorter farming component. Urban centres that evolved as part of this latter period of occupation, e.g., only came into being since the 1880s.

11.13.1.1 Stone Age

Habitation of the larger geographical area took place since Early Stone Age times. This is confirmed by the occurrence of stone tools dating to the Early, Middle and Late Stone Age found in a number of places. However, these are mostly located in the vicinity of rivers, such as the Doring Spruit north of Kroonstad and the Vals River south of Kroonstad.

11.13.1.2 Iron Age

Sites dating to the Late Iron Age are known to occur in the larger region, especially to the south, in the vicinity of the Sandrivier. These are typical stone walled sites that are linked with Sotho-speakers and date to the period after 1600.

11.13.1.3 Historic Period

The historic period started with the arrival, in the late 18th century by Korana raiders in the area. They were soon followed, in the early 19th century, by traders, explorers and missionaries. By the middle of the 19th century, farms were taken up and later towns were developed – Theunessin was established in 1907 and named Smaldeel, which was changed to Theunissen in 1912. Towns such as Virginia (1954) and Welkom (1946) were only established as part of the development of the gold mining industry in the region. Infrastructural development, such as the development of roads, bridges and railway lines also took place. One of the original stations was called Virginia and was established in 1892. This makes the former town actually much older (Nienaber & le Roux 1982).

The farm Kalkkuil was first settled by the trekker H.W. Huyser. In 1878 he sold the farm to J.J. Odendaal, after whom the town is named. The first stands in the town were sold in 1899. Although gold was discovered in 1896 north of the town, it was only after the discovery of the ore body on the farm Geduld, located south of Odendaalsrus that development took off.

Most farmsteads were burned down during the Anglo-Boer War, with the result that very little of the built environment dates to the 19th century. A significant number of battles and skirmishes took place in the region, mostly to the east of the study area.

11.13.2 Site-specific Information

Site specific findings from the scoping-level Cultural Heritage Impact Assessment are as follows:

- ❖ No sites, features or object dating to the pre-colonial era were identified in the study area.
- ❖ A wide variety of structures and features dating to the recent past have been identified in the study area. All of this relates to former gold mining activities. Unfortunately, all of these features have been vandalised and gutted for any usable fittings and equipment and even the building material is now being taken away by local people.

- As a result of the above mentioned degeneration of the features, the remains are viewed to have a low significance and are viewed to be fully documented after incorporation into the Cultural Heritage Impact Assessment Report.
- ❖ A number of houses that used to be part of the compound for housing mine workers are still being occupied (see **Figure 44** below). These houses are located inside the development area.
 - As these are the only 'complete' structures on the property, it is recommended that if the people are to be relocated, some of the houses should be documented (photographed and mapped).
 - As these houses are probably older than 60 years, a permit is required from SAHRA before they can be demolished.
- ❖ One small informal burial place with three graves was identified (see **Figure 44** below). It is located right on the eastern boundary of the development area. It would therefore be possible to retain it in place. If the burial place is retained, it should be properly fenced off, with a gate allowing access to the graves. A buffer zone of at least five metres from the outer edge of the graves should be kept. If the graves cannot be retained, it should be relocated, but only on condition of following the correct procedures.

Potential Impacts / Implications

- ❖ Construction phase:
 - Possible direct impacts on below-ground archaeological deposits and fossils as a result of ground disturbance.
 - Possible impacts to the cultural landscape as a result of the introduction of incompatible structures and infrastructure to the rural landscape.

Specialist Study Triggered / Additional Investigations

- ❖ A Phase 1 Heritage Impact Assessment, in accordance with the National Heritage Resources Act (Act No. 25 of 1999), will be conducted during the EIA Phase and will be submitted to the FSHRA for decision-making. The site will also be screened further against the Fossil Sensitivity Map on SAHRIS. All the relevant protocols need to be abided by and permits will need to be obtained with regard to heritage resources (where necessary).

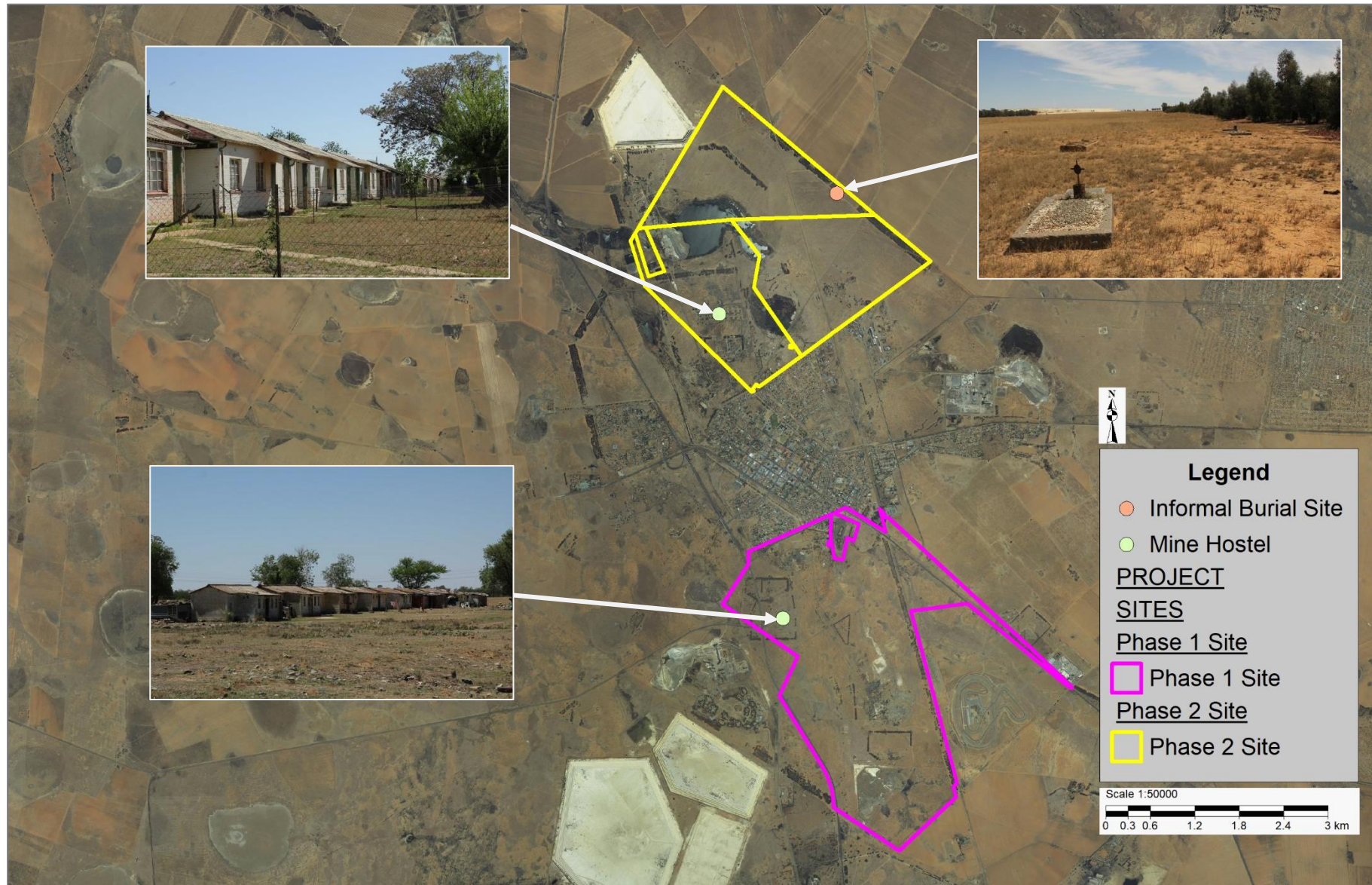


Figure 44: Informal burial site and mine hostels (inserted photographs sourced from van Schalkwyk, 2015)

11.14 Planning

Status Quo

The map of MLM's spatial vision, which forms part of the municipal SDF, is shown in **Figure 45** below. The following is noted with regards to the Project's location in relation to the MLM's spatial vision:

- ❖ Phase 1 Site –future land use shown as “future urban development”; and
- ❖ Phase 2 Site – existing land use indicated as “commonage”, with no future land use designation.

A map showing sub places and the municipal wards is provided in **Figure 41** above. The Phase 1 Site is located in Ward 35 and the Phase 2 Site falls within Ward 36.

Potential Impacts / Implications

The proposed Project Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant. MLM's Council has formally classified this Project as an “Emergency Economic Priority Project”. The MLM thus supports the Project and did not identify any conflicts with the municipality's future planning for the Phase 1 and Phase 2 Sites.

Specialist Study Triggered / Additional Investigations

The Applicant will adhere to the regulatory planning requirements pertaining to the Project.

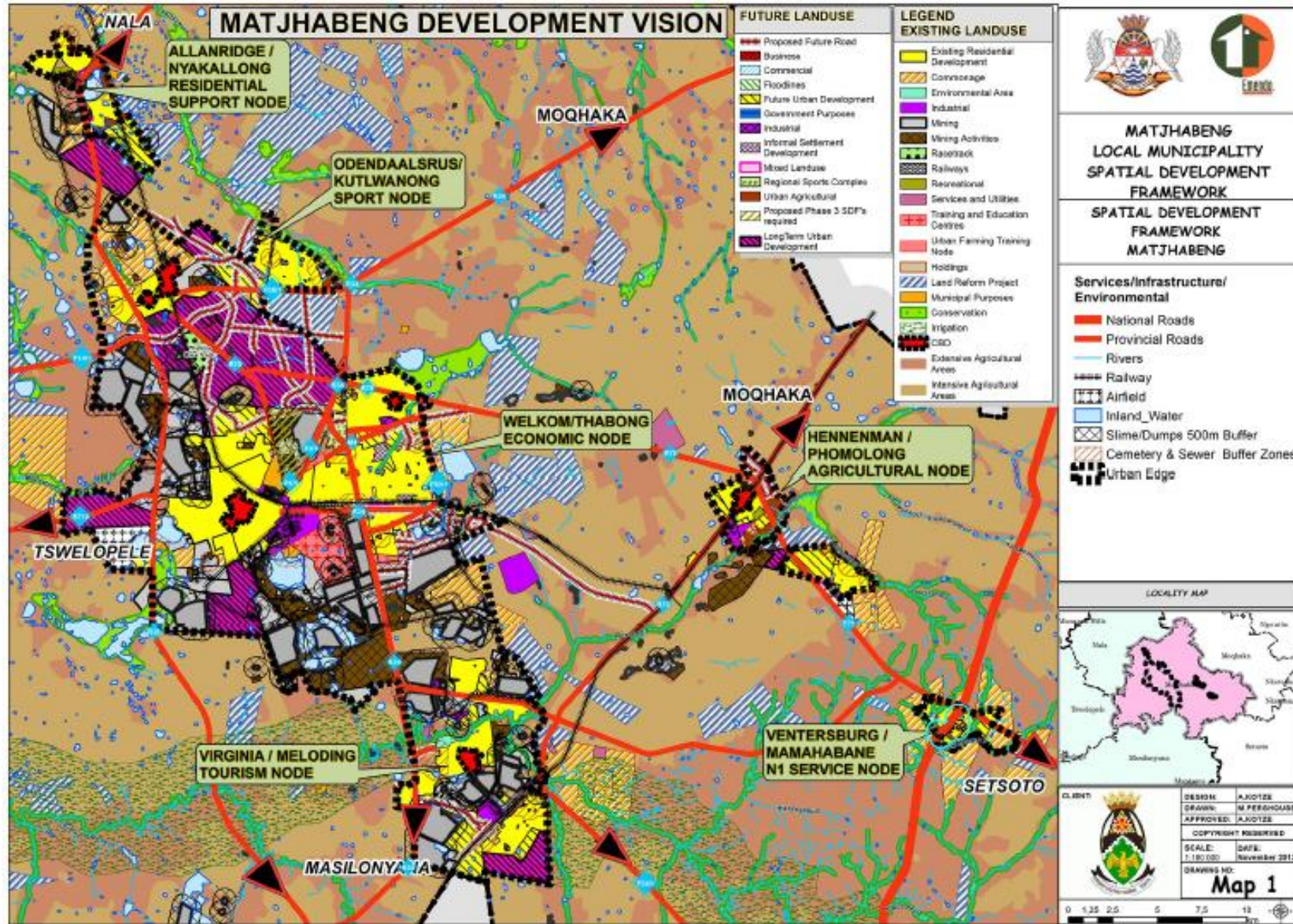


Figure 45: MLM SDF

11.15 Existing Structures and Infrastructure

Status Quo

The following is noted with regards to existing structures and infrastructure that occur within the Project's sites or near their boundaries:

❖ Phase 1 Site –

- Structures and infrastructure related to the previous mining activities are present on the site (see **Figure 46** below and **Figure 44** above). Of these, the vent shaft and sub-station (see **Figure 47** below) are still operational and will remain;
- The R70 runs along the north-eastern part of the site (see **Figure 48** below) and traverses a small section of the north-western part of the overall site;
- The R30 runs along the western part of the site (see **Figure 49** below) and traverses a small section of the north-western part of the overall property;
- The R34 (Findley Ave) runs along the north-western boundary of the site (see **Figure 50** below);
- The S289 gravel road runs to the south of the site (see **Figure 51** below);
- A regional railway line runs along the south-eastern part of the site and traverses the north-eastern part of the overall property (see **Figure 52** below);
- A water pipeline runs along the eastern part of the site;
- Powerlines traverse the site;
- Internal access roads associated with the previous land uses traverse the site; and
- Refer also to features shown in **Figure 26** above.



Figure 46: Old mining administration block – Phase 1 Site (van Schalkwyk, 2015)



Figure 47: Vent shaft and sub-station – Phase 1 Site



Figure 48: North-western view along the R70 (primary site located to the left) (Google Earth image)

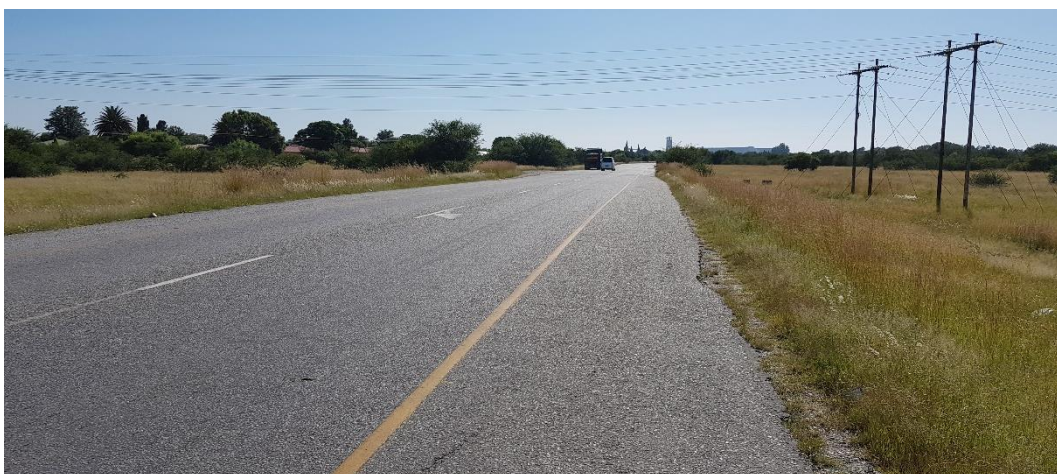


Figure 49: Northern view along the R30 (site located to the right)



Figure 50: South-eastern view along the R34 (site located to the left) (Google Earth image)



Figure 51: North-eastern view along the S289 gravel road

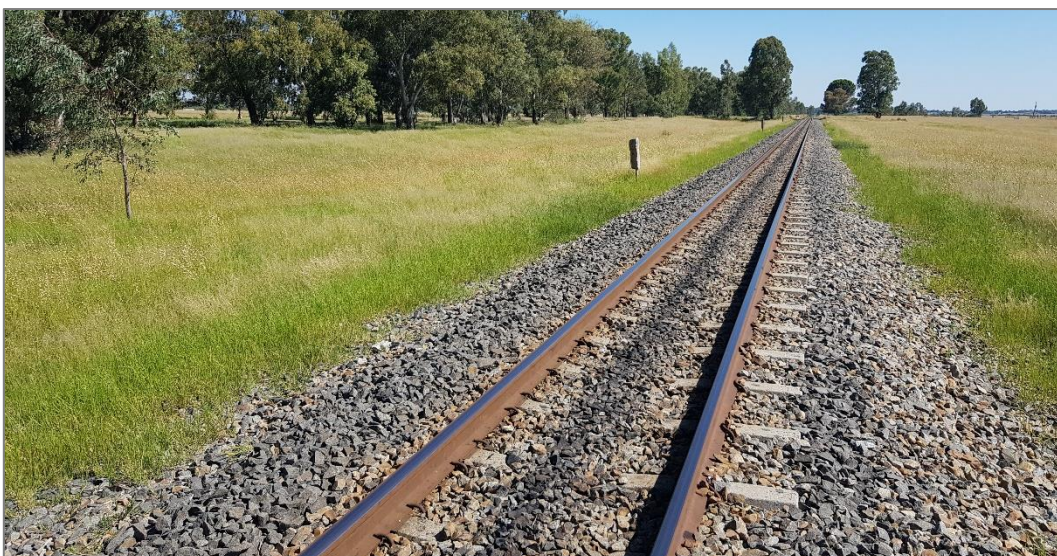


Figure 52: Southern view along the railway line (primary site located to the right)

❖ Phase 2 Site –

- Structures and infrastructure related to the previous mining activities are present on the site (see **Figure 53** below and **Figure 44** above);
- A regional railway line traverses the eastern-central part of the overall site (see **Figure 54** below);
- The primary access road to the site is from the R30, which runs to the west of the site (see **Figure 55** below);
- The S86 road traverses the site (see **Figure 56** below);
- Powerlines traverse the site;
- A furrow / canal traverses the site;
- Internal access roads associated with the previous land uses traverse the site; and
- Refer also to features shown in **Figure 28** above.



Figure 53: Old mining administration block – Phase 2 Site (van Schalkwyk, 2015)



Figure 54: North-western view along the railway line (site located on both sides of the railway lines)



Figure 55: Northern view along the R33 (main access to site located to the left) (Google Earth image)



Figure 56: North-eastern view along the S86 road (site located on both sides of the road)

Apart from the abovementioned infrastructure, there is a possibility that other infrastructure may also occur on the sites.

Potential Impacts / Implications

- ❖ As mentioned in **Section 11.2.3** above, various rehabilitation measures need to be implemented with regards to the previous mining activities on the sites.
- ❖ The Project will need to comply with the requirements of the custodians of existing linear infrastructure, including roads, power lines and railway lines, that traverse the sites or run along the boundaries of the sites.

Specialist Study Triggered / Additional Investigations

- ❖ The layout will make provision for the vent shaft and sub-station that will remain on the Phase 1 Site.
- ❖ Engage further with the owners, custodians and authorities associated with existing infrastructure, including (amongst others):
 - Eskom;
 - Transnet;
 - Free State Department of Police, Roads and Transport (DPRT);
 - South African Civilian Aviation Authority (SACAA);
 - The Square Kilometre Array (SKA);
- ❖ Mitigation measures to be included in the EMPr to manage potential impacts to existing structures and infrastructure.

11.16 Transportation

Status Quo

The transportation network in the project area is shown in **Figure 57** below. Noteworthy roads in the immediate area of the Project's sites are discussed in **Section 11.15** above.

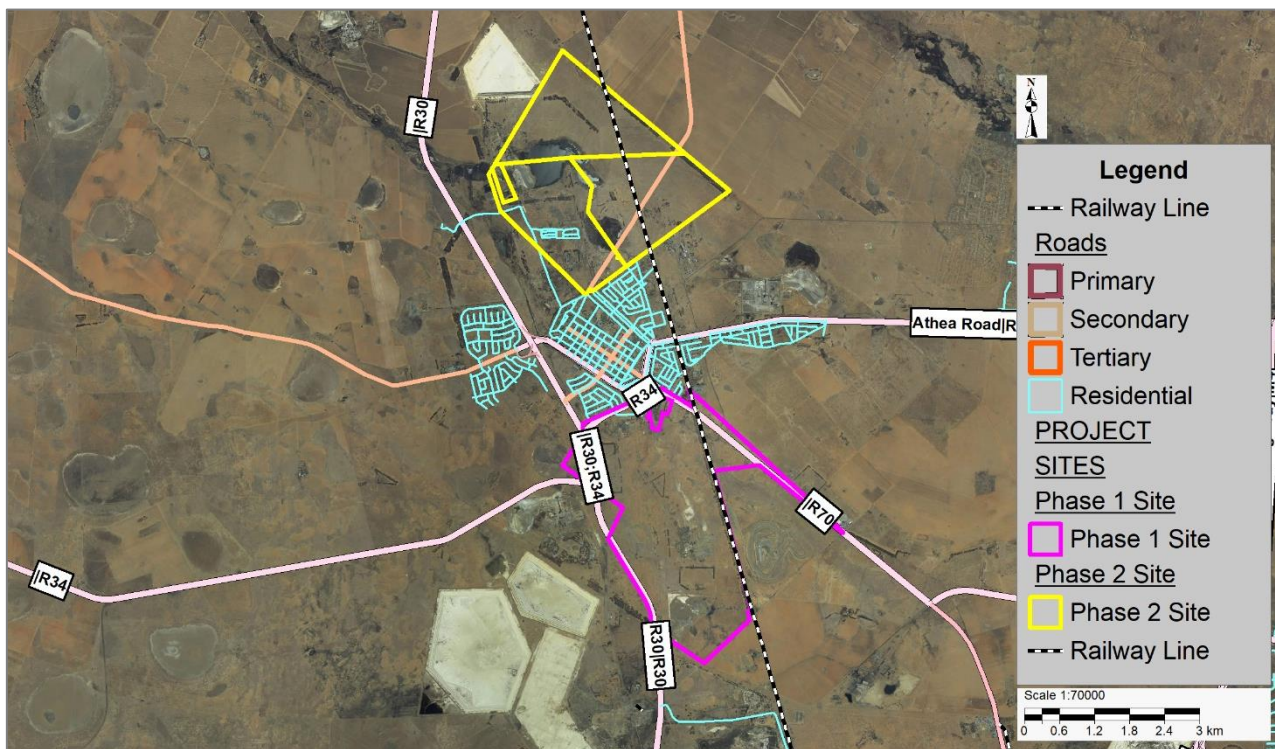


Figure 57: Transportation network in Project area

A regional railway line traverses both sites. The Welkom Airport is located approximately 9 km to the south-west of the Phase 1 Site.

Potential Impacts / Implications

- ❖ One of the factors considered in determining the suitability of the Project's sites was their accessibility in terms of the existing road network.
- ❖ Construction phase:
 - Transportation of materials and construction personnel to site.
 - Impacts to road conditions.
 - Speeding and reckless driving by construction personnel.
 - Construction vehicles accessing and leaving the sites via provincial roads.
 - Use of oversized vehicles/abnormal loads, as required.
- ❖ Operational phase:
 - Transportation of maintenance materials, as well as operational and maintenance personnel, to site.

Specialist Study Triggered / Additional Investigations

- ❖ The Project will need to comply with the requirements of the DPRT.
- ❖ Suitable mitigation measures in terms of traffic and the use of roads will be included in the EMP.

11.17 Aesthetic Qualities

Status Quo

Refer to the descriptions of the land use (**Section 11.2** above), topography (**Section 11.6** above), surface water (**Section 11.7** above) and flora (**Section 11.8.1** above) for additional context to the visual quality of the sites and their surrounds.

The following observations were extracted from the scoping-level Visual Assessment (MetroGIS, 2015) (contained in **Appendix H**), based on the preliminary viewshed analyses (see **Figure 58** below):

- ❖ The proposed facility would have a fairly contained area of potential visibility (i.e. within a 3km radius of the sites), especially to the south and west of the site. This is attributed to the location of the mine dump west and south of the Kalkkuil Section (Phase 1 Site). The northern section (Phase 2 Site) is similarly shielded to the north by mine dumps.
- ❖ The core area of exposure for the Kalkkuil Section (Phase 1 Site) is obviously located to the south, while the Northern Section's (Phase 2 Site) exposure is concentrated further north. There are however some areas, especially areas located further afield and on higher lying land (e.g. towards Riebeeckstad), from where both facilities may be visible, potentially increasing the cumulative visual impact.
- ❖ **0 - 3km:**

- Theoretical visibility within a 3km radius of the proposed sites includes mainly mining land, sections of the R30, R34 and R70 arterial roads, sections of secondary (local) roads traversing near or over the sites and a number of homesteads/residences located beyond the mining land. Residents living along the northern and southern outskirts of Odendaalsrus may have short distance views of respectively the northern site and the Kalkkuil site (Phase 1 Site). Residents and road users within the 3km visible area are seen as potential sensitive visual receptors.
- ❖ **3 – 6km:**
 - The area of potential visual exposure subsides dramatically within the 3 – 6km buffer from Project's sites. This is due to the presence of mine dumps, dense vegetation (planted trees/wind breaks) and the generally constrained vertical dimensions (height) of the PV structures. The only significant area of potential cumulative exposure occurs along the higher lying land west of Riebeeckstad.
- ❖ **6 – 12km:**
 - The intensity of visual exposure is expected to diminish beyond a 6km radius with the predominant visibility expected to the north-east (predominantly vacant farm land) and the south-east, towards Riebeeckstad.
- ❖ **Greater than 12km:**
 - Visibility beyond 12km from the proposed development is expected to be negligible and highly unlikely due to the distance between the object (development) and the observer.

Potential Impacts / Implications

- ❖ Visual impacts associated with landscape transformation.
- ❖ Solar panels are designed to absorb, not reflect, irradiation. However, glint and glare may cause a potential impact from an aviation perspective.
- ❖ Visual impacts identified as part of the scoping-level Visual Assessment (MetroGIS, 2015):
 - The visibility of the facility to, and potential visual impact on, observers travelling along the R30, R34 and R70 arterial roads and the local roads traversing near the proposed facility.
 - The visibility of the facility to, and potential visual impact on observers residing in towns and homesteads (farm residences) located within close proximity of the sites.
 - The potential visual impact of the construction of ancillary infrastructure (i.e. the substation at the facility, associated power line and access roads) on observers in close proximity of the facility.
 - The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the facility.
 - It is envisaged that the structures, where visible from shorter distances (e.g. less than 3km), may constitute a high visual prominence, potentially resulting in a high visual impact.

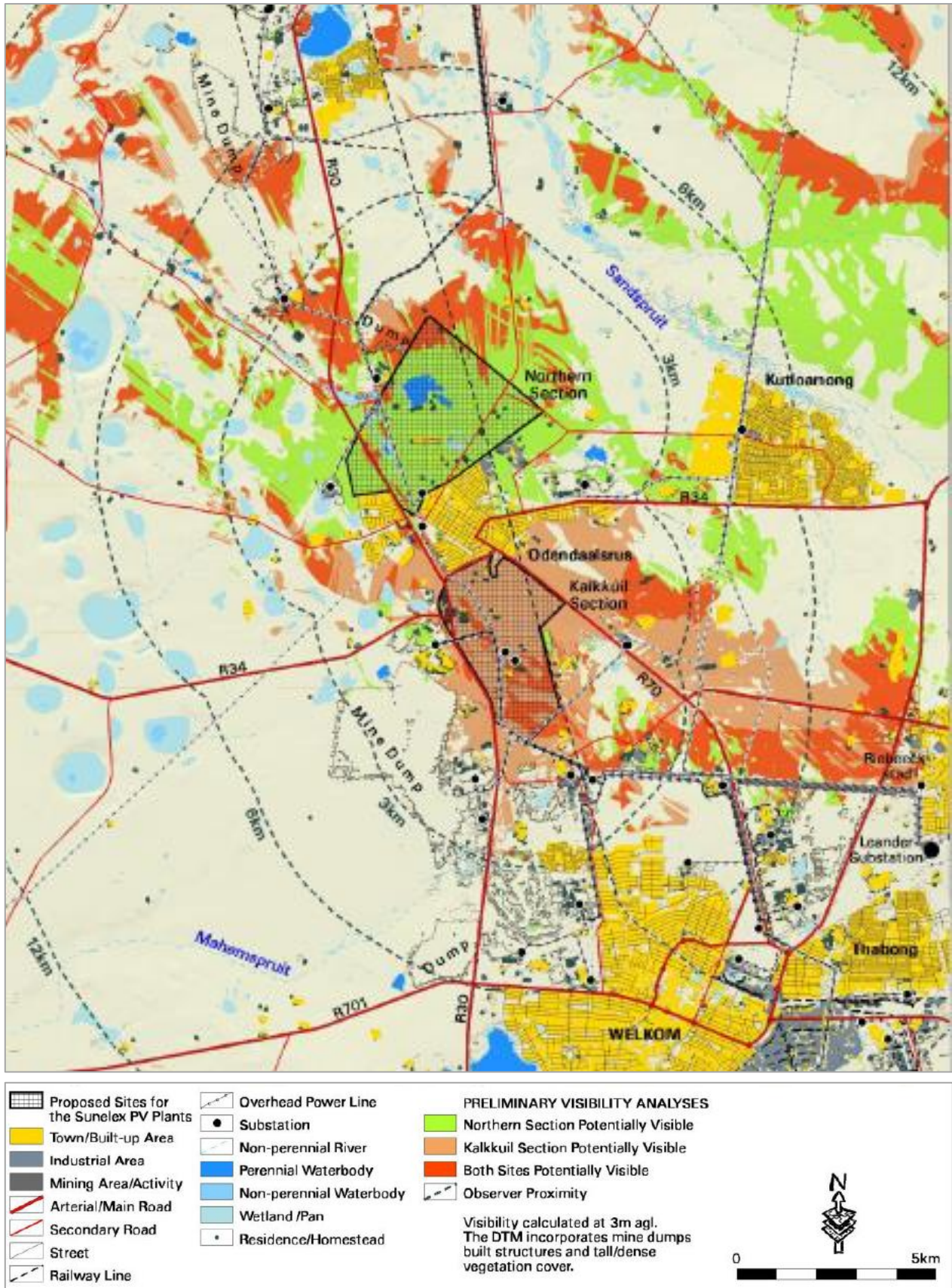


Figure 58: Map indicating the potential (preliminary) visual exposure of the proposed facility (MetroGIS, 2015)

Specialist Study Triggered / Additional Investigations

- ❖ A Visual Impact Assessment will be undertaken and the findings will be included in the EIA Report.

11.18 Health

Status Quo

11.18.1 Health Care Facilities

Health care facilities in Odendaalsrus include the Thusanong District Hospital and Bophelong Clinic.

11.18.2 Health Risks

The primary health risks identified for the sites are associated with the previous mining activities, which include mining infrastructure, excavations and other land disturbances, dump sites and contamination (refer to **Section 11.2.2** above regarding radiological sources).

Potential Impacts / Implications

- ❖ Construction phase:
 - Hazards related to previous mining activities.
 - Hazards related to construction work.
 - Increased levels of dust and particulate matter.
 - Increased levels of noise.
 - Water (surface and ground) contamination.
 - Poor water and sanitation.
 - Communicable diseases.
 - Psychosocial disorder (e.g. social disruptions).
 - Safety and security.
 - Lack of suitable health services.
- ❖ Operational Phase:
 - Hazards related to operation and maintenance work.
 - Fire and explosion risks during BESS operation.

Specialist Study Triggered / Additional Investigations

- ❖ Solar PV Plant and BESS to comply with the necessary design standards, with appropriate safety considerations taking into consideration factors such as placement criteria, access control to containers, fire and explosion preventative measures, emergency response requirements.

- ❖ The recommendations from the radiological survey need to be implemented. In addition, the sites need to be adequately rehabilitated.
- ❖ Health-related risks will be addressed through mitigation measures that will be identified under other environmental features, such as socio-economic environment, surface water, air quality, noise and vibration, climate, as well as best practices included in the EMPr.
- ❖ Additional management requirements associated with health will be included in the Project's Occupational Health and Safety System.

12 PUBLIC PARTICIPATION

12.1 General

The purpose of public participation includes the following:

1. To provide IAPs with an opportunity to obtain information about the Project;
2. To allow IAPs to express their views, issues and concerns with regard to the Project;
3. To grant IAPs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the Project; and
4. To enable the Applicant to incorporate the needs, concerns and recommendations of IAPs into the Project, where feasible.

The public participation process that was followed for the proposed Project is governed by NEMA and GN No. R 982 of 4 December 2014 (as amended). **Figure 59** below outlines the public participation process for the Scoping Phase (current) and EIA Phase (pending). Note that the dates may change due to the dynamic nature of the EIA process.

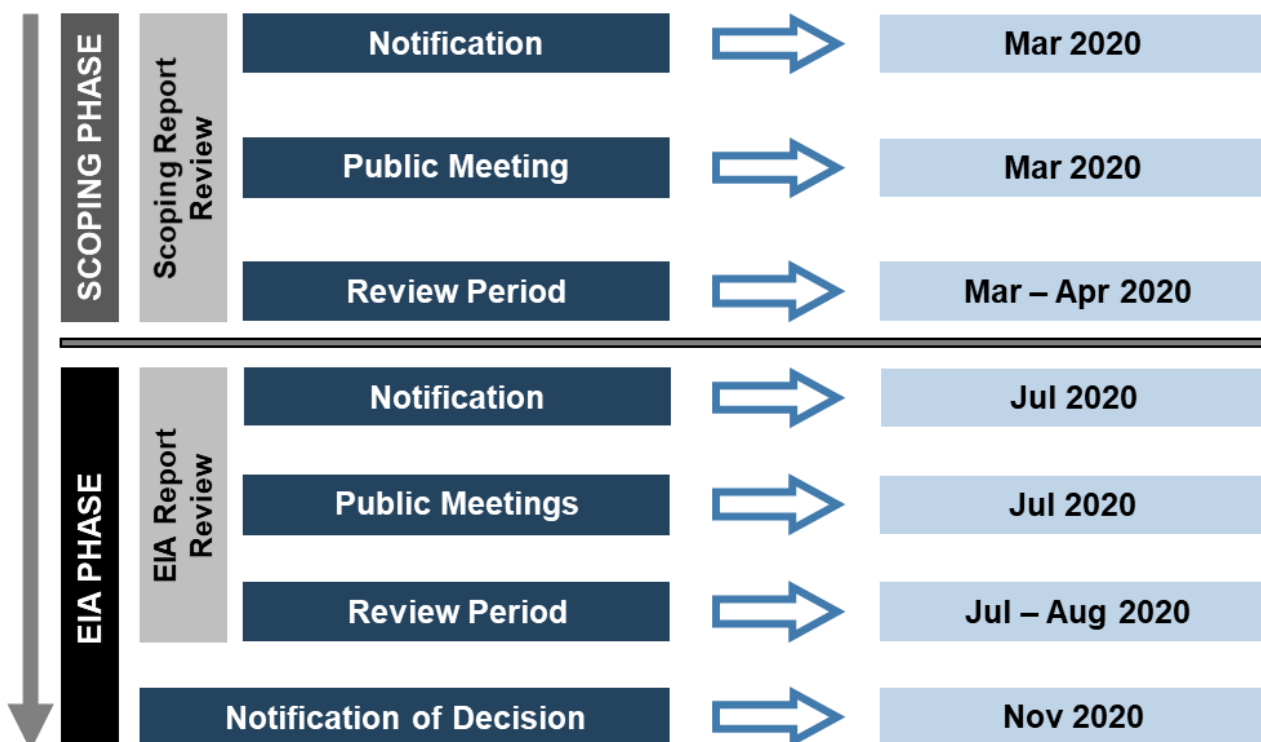


Figure 59: Outline of Public Participation Process

12.2 Database of IAPs

A database of IAPs, which includes authorities, different spheres of government (national, provincial and local), parastatals, ward councillors, stakeholders, landowners, interest groups and members

of the general public, was prepared for the Project and is contained in **Appendix I**. This database will be updated and maintained during the course of the EIA.

12.3 Landowner Consent

The properties that are directly affected by the proposed development are shown in **Figure 4** (Phase 1 Site) and **Figure 5** (Phase 2 Site) and are listed in **Table 2** above. The details of the affected landowners are included in the IAP database.

According to Regulation 39(1) of GN No. R 982 of 4 December 2014 (as amended), if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an Environmental Authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land. This requirement does not apply *inter alia* for linear developments (e.g. pipelines, power lines, roads) or if it is a SIP as contemplated in the Infrastructure Development Act, 2014.

The proposed Project Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant. Although there is an existing mining right by Harmony Gold Mining Company Ltd on the area in question, a consent letter was received from the mining company.

Landowner consent is appended to the Application Form, which is included in **Appendix C**.

12.4 Review of Draft Scoping Report

12.4.1 Notification of Review of Draft Scoping Report

In accordance with Regulation 43(1) of GN No. R 982 of 4 December 2014 (as amended), IAPs are granted an opportunity to review and comment on the Draft Scoping Report.

The following notifications were provided with regards to the review of the Draft Scoping Report (proof to be included in the Final Scoping Report):

- ❖ IAPs were notified via email;
- ❖ Letters were distributed to properties that form part of the Odendaalsrus Town, which are located to the north of the Phase 1 Site and to the south of the Phase 2 Site;
- ❖ Notices were placed in the following newspapers (copies of the newspaper advertisements to be contained in the Final Scoping Report) -
 - Vista local newspaper;
 - Volksblad provincial newspaper; and
 - Daily Sun national newspaper.

- ❖ Onsite notices (English and Afrikaans) were placed at strategic points for the Phase 1 Site (refer to **Table 20** and **Figure 60** below) and the Phase 2 Site (refer to **Table 20** and **Figure 61** below). Onsite notices were primarily placed in proximity to the project components, based on the availability of public access.

Table 20: Locations of onsite notices

No.	Coordinates	Description
Phase 1 Site		
1	27°52'50.37"S; 26°41'35.63"E	Entrance to recreational facility to the north, on Findley Ave
2	27°52'48.26"S; 26°41'38.93"E	Corner of Church St and Findley Ave
3	27°53'10.39"S; 26°42'15.55"E	T-junction of R34 with the R70
4	27°53'43.34"S; 26°43'0.03"E	Entrance to Phakisa Freeway racing circuit
5	27°53'56.22"S; 26°43'17.90"E	Opposite to entrance to Phakisa Mine
6	27°54'5.41"S; 26°43'31.05"E	Entrance to gravel road from R70
7	27°55'26.80"S; 26°42'22.83"E	Along the S289
8	27°55'19.03"S; 26°42'3.15"E	Along the S289
9	27°55'20.92"S; 26°41'39.57"E	T-junction of S289 with the R30
10	27°54'59.36"S; 26°41'37.08"E	Along the R30
11	27°54'10.76"S; 26°41'11.81"E	Main entrance to the site from R30 (opposite entrance to Phakisa Mine Nyala Shaft and Tshepong Hostel)
12	27°53'40.29"S; 26°41'0.95"E	T-junction of R34 with the R30
13	27°53'11.40"S; 26°40'53.95"E	26°41'8.07"E Ave with the R30
14	27°53'0.59"S; 26°41'12.06"E	T-junction of Nelson St with Findley Ave
15	27°52'55.42"S; 26°41'25.12"E	T-junction of Van der Vyfer St with Findley Ave
Phase 2 Site		
1	27°51'17.07"S; 26°39'39.36"E	Main entrance to the site from R30
2	27°52'21.02"S; 26°40'32.45"E	Along Van der Vyfer St
3	27°51'56.18"S; 26°40'54.23"E	Corner of Cooke Blvd and Hauptfleisch St
4	27°51'11.20"S; 26°41'26.42"E	Along S86 gravel road (near railway line crossing)
5	27°50'36.97"S; 26°41'52.21"E	Along S86 gravel road
6	27°51'0.14"S; 26°42'21.44"E	Along gravel road
7	27°51'49.15"S; 26°41'55.21"E	2 nd St, Ross Kent North
8	27°51'48.98"S; 26°41'8.07"E	T-junction of Elysia Ave with Frank St
9	27°51'41.20"S; 26°41'19.87"E	T-junction of Brian Ave with Frank St
10	27°51'32.85"S; 26°41'32.96"E	Along Frank St

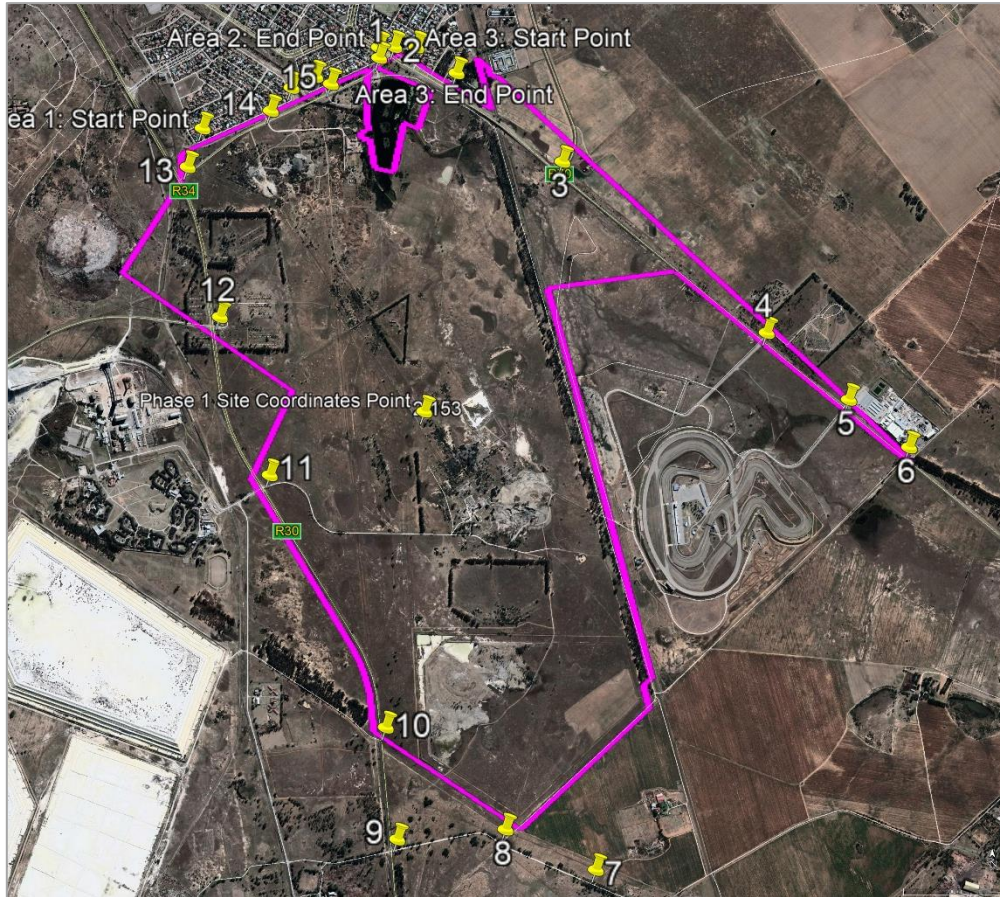


Figure 60: Map indicating locations of onsite notices for the Phase 1 Site (Google Earth image)

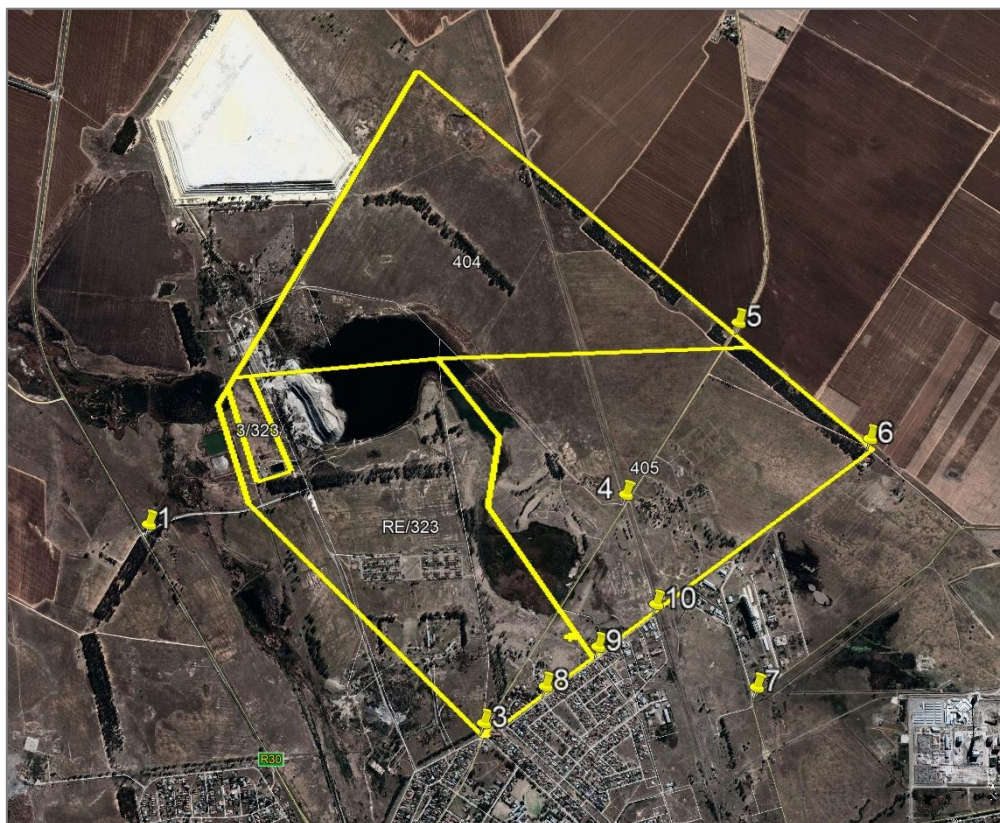


Figure 61: Map indicating locations of onsite notices for the Phase 2 Site (Google Earth image)

12.4.2 Accessing the Draft Scoping Report

Copies of the Draft Scoping Report were placed at the Welkom Public Library and Odendaalsrus Public Library. A 30-day review period, from 20 March until 24 April 2020, was provided.

Copies of the Draft Scoping Report were provided to the following parties, which include key regulatory and commentary authorities:

- ❖ DEFF;
- ❖ DESTEA;
- ❖ DWS Free State Regional Office;
- ❖ DPRT;
- ❖ FSHRA;
- ❖ DMRE;
- ❖ LDM; and
- ❖ MLM.

The Draft Scoping Report was also uploaded to the following website, for downloading purposes - <https://nemai.co.za/environmental/downloadable-documents/>.

A Comment Sheet is provided in **Appendix K**, which can be used to provide comments on the Draft Scoping Report.

12.4.3 Public Meeting to Present the Draft Scoping Report

The details of the public meeting that is scheduled to present the Draft Scoping Report are as follows:

- ❖ Date: 20 April 2020;
- ❖ Time: 13:30 – 16:00; and
- ❖ Venue: Odendaalsrus Town Hall (entrance on Church Street).

The minutes of the meeting will be included in the Final Scoping Report.

12.4.4 Comments Received on the Draft Scoping Report

Comments received from authorities and IAPs during the review period for the Draft Scoping Report will be included in the Comments and Responses Report, which will be appended to the Final Scoping Report.

12.5 Issues raised by IAPs

The Scoping Phase serves to identify and prioritise issues for further assessment during the EIA Phase. Accordingly, the comments received from authorities and IAPs during public participation as part of Scoping will be afforded due consideration and further investigation during the pending EIA stage. A Comments and Responses Report will be included in the Final Scoping Report, which will summarise the salient issues raised by IAPs and the project team's response.

13 POTENTIALLY SIGNIFICANT ENVIRONMENTAL ISSUES

In accordance with the purpose of the Scoping exercise as part of the overall environmental assessment, this section aims to identify potentially significant environmental issues for further consideration and prioritisation during the EIA stage. This allows for a more efficient and focused impact assessment in the ensuing EIA Phase, where the analysis is largely limited to significant issues and reasonable alternatives.

13.1 Approach

13.1.1 *Predicting Significant Environmental Issues*

The potential environmental issues associated with the proposed Project were identified during the Scoping Phase through an appraisal of the following:

- ❖ Project-related components and infrastructure;
- ❖ Activities associated with the project life-cycle;
- ❖ Resources required for construction and operation;
- ❖ Nature and profile of the receiving environment and potential sensitive environmental features and attributes (see **Section 11** above);
- ❖ Input received during public participation from authorities and IAPs; and
- ❖ Legal and policy context (see **Section 5** above).

Apart from explaining the receiving environment, **Section 11** above succinctly discusses possible impacts during primarily the construction and operational phases of the Project. The significant environmental issues were distilled from this information and are summarised in **Section 13.2** below. Cumulative impacts that were identified during the Scoping Phase are presented in **Section 13.3** below.

13.1.2 *Mitigation of Impacts*

During the EIA Phase a detailed assessment will be conducted to evaluate all potential impacts (paying particular attention to the significant issues listed in the Scoping Report), with input from the project team, requisite specialist studies and IAPs and through the application of the impact assessment methodology contained in **Section 13.4** below.

Suitable mitigation measures will be identified to manage the environmental impacts according to the following hierarchy:

1. Initial efforts will strive to **prevent** the occurrence of the impact;
2. If this is not possible, mitigation will include measures that reduce or **minimise** the significance of the impact to an acceptable level;

3. **Remediation** and **rehabilitation** will take place if measures cannot suitably prevent or reduce the impacts, or to address the residual impacts; and
4. As a last measure, **compensation** will be employed as a form of mitigating the impacts associated with the Project.

The mitigation measures will be incorporated into the EMPr, which will form part of the EIA Report. The EMPr, together with the Environmental Authorisation (if issued), can act as a standalone document that can be used to *inter alia* monitor against compliance of the Project with its pre-determined objectives, targets and management actions.

13.2 Summary of Potentially Significant Environmental Issues

Pertinent environmental issues, which will receive specific attention during the EIA Phase through a detailed quantitative assessment and relevant specialist studies (where deemed necessary), are listed in **Table 21** below.

Table 21: Potentially Significant Environmental Issues for prioritisation during the EIA Phase

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts	Investigations / EIA Provisions
Land Use	<ul style="list-style-type: none"> ▪ Risks posed by previous mining activities 	<ul style="list-style-type: none"> ▪ Sterilisation of land for future mining or agricultural land uses ▪ Servitude restrictions 	<ul style="list-style-type: none"> ▪ Agricultural Impact Assessment ▪ Socio-economic Impact Assessment ▪ Optimisation of layouts to account for land use restrictions ▪ Radiological Survey ▪ EMPr
Geology	<ul style="list-style-type: none"> ▪ Suitability of geological conditions to support the Solar PV Plant 	<ul style="list-style-type: none"> ▪ Suitability of geological conditions to support the Solar PV Plant 	<ul style="list-style-type: none"> ▪ Geotechnical Study ▪ EMPr
Geohydrology	<ul style="list-style-type: none"> ▪ Groundwater pollution due to spillages and poor construction practices 	<ul style="list-style-type: none"> ▪ Groundwater pollution due to poor operation and maintenance practices 	<ul style="list-style-type: none"> ▪ EMPr
Topography	<ul style="list-style-type: none"> ▪ Visual impact ▪ Crossing topographic features (watercourses) 	<ul style="list-style-type: none"> ▪ Visual impact ▪ Crossing topographic features (watercourses) 	<ul style="list-style-type: none"> ▪ Optimisation of layouts to account for topographical features ▪ EMPr
Soil	<ul style="list-style-type: none"> ▪ Soil erosion due to clearance and inadequate stormwater management ▪ Soil compaction ▪ Soil contamination due to spillages and poor construction practices ▪ Loss of topsoil 	<ul style="list-style-type: none"> ▪ Soil erosion due to inadequate stormwater management ▪ Soil contamination due to poor operation and maintenance practices 	<ul style="list-style-type: none"> ▪ EMPr
Surface Water	<ul style="list-style-type: none"> ▪ Alteration of drainage over sites ▪ Surface water pollution due to spillages and poor construction practices ▪ Encroachment of construction activities into riparian zones / wetlands 	<ul style="list-style-type: none"> ▪ Sedimentation through silt-laden runoff, caused by inadequate stormwater management ▪ Damage to the facility from major flood events 	<ul style="list-style-type: none"> ▪ Aquatic Impact Assessment and Delineation ▪ Optimisation of layouts to avoid delineated riparian habitats and

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts	Investigations / EIA Provisions
	<ul style="list-style-type: none"> ▪ Impacts where access roads and ancillary infrastructure cross watercourses (e.g. sedimentation, loss of vegetation, destabilisation of watercourse structure) 	<ul style="list-style-type: none"> ▪ Water resources could be contaminated through inadequate storage and handling of hazardous materials, leaks from the BESS and poor management of waste and wastewater ▪ Water use requirements of the Project need to be satisfied 	<p>wetlands, as well as their respective buffers zones</p> <ul style="list-style-type: none"> ▪ Flood risks to be determined and layouts to be optimised to avoid the 1:100 year floodlines ▪ EMPr
Flora & Fauna	<ul style="list-style-type: none"> ▪ Habitat loss / fragmentation ▪ Potential loss, disturbance or displacement of protected fauna and flora species ▪ Human - animal conflicts ▪ Noise and vibration impacts to fauna ▪ Nights lights may affect nocturnal faunal species ▪ Illegal harvesting and poaching of faunal and floral species by construction workers ▪ Pollution of the biophysical environment from poor construction practices ▪ Proliferation of invasive alien species in disturbed areas 	<ul style="list-style-type: none"> ▪ Habitat fragmentation (e.g. barriers to animal movement) ▪ Reflection of sunlight from the solar panels could adversely affect birds, including those species that use the wetlands on the site and surrounding areas ▪ Chemical pollution associated with cleaning the PV panels ▪ Proliferation of invasive alien species in disturbed areas 	<ul style="list-style-type: none"> ▪ Terrestrial Ecological Impact Assessment ▪ Optimisation of layouts to avoid sensitive ecological features ▪ EMPr
Socio-economic Environment	<ul style="list-style-type: none"> ▪ Informal use of land to be stopped ▪ People residing on the sites to be relocated ▪ Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes) ▪ Safety and security ▪ Use of local road network ▪ Nuisance from dust and noise ▪ Consideration of local labourers and suppliers in area – stimulation of local economy (positive impact) ▪ Transfer of skills (positive impact) 	<ul style="list-style-type: none"> ▪ Direct and indirect economic opportunities as a result of the Project 	<ul style="list-style-type: none"> ▪ Socio-Economic Impact Assessment ▪ EMPr
Air Quality	<ul style="list-style-type: none"> ▪ Dust from the use of dirt roads by construction vehicles ▪ Dust from bare areas that have been cleared for construction purposes ▪ Emissions from construction equipment and machinery ▪ Tailpipe emissions from construction vehicles 	<ul style="list-style-type: none"> ▪ Local atmospheric pollution may reduce the irradiation received or contain significant levels of airborne corrosive substances ▪ The efficiency of the solar plant could be reduced if the modules are soiled (covered) by particulates/dust ▪ Impacts to air quality caused by the operation and maintenance of the facility include dust from the use of dirt roads and tailpipe emissions from vehicles 	<ul style="list-style-type: none"> ▪ EMPr
Noise	<ul style="list-style-type: none"> ▪ Localised increases in noise may be caused by construction activities 	N/A	<ul style="list-style-type: none"> ▪ EMPr

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts	Investigations / EIA Provisions
Agriculture	<ul style="list-style-type: none"> ▪ Loss of fertile soil through land clearance ▪ Soil erosion ▪ Loss of topsoil ▪ Risk of harm to livestock (associated with informal grazing) from construction activities 	<ul style="list-style-type: none"> ▪ Loss of possible future agricultural land use due to direct occupation by the development footprint ▪ Soil erosion due to inadequate stormwater management 	<ul style="list-style-type: none"> ▪ Agricultural Impact Assessment ▪ Socio-economic Impact Assessment ▪ EMPr
Historical and Cultural Features	<ul style="list-style-type: none"> ▪ Possible direct impacts on below-ground archaeological deposits and fossils as a result of ground disturbance ▪ Possible impacts to the cultural landscape as a result of the introduction of incompatible structures and infrastructure to the rural landscape 	N/A	<ul style="list-style-type: none"> ▪ Heritage Impact Assessment ▪ EMPr
Existing Structures & Infrastructure	<ul style="list-style-type: none"> ▪ Rehabilitation measures need to be implemented with regards to the previous mining activities on the sites ▪ Restrictions regarding servitudes of existing infrastructure ▪ Restrictions regarding the vent shaft and sub-station that are to remain on the Phase 1 Site 	<ul style="list-style-type: none"> ▪ Restrictions regarding servitudes of existing infrastructure ▪ Restrictions regarding the vent shaft and sub-station that are to remain on the Phase 1 Site 	<ul style="list-style-type: none"> ▪ Satisfy requirements of infrastructure owners (including Eskom, Transnet, FS DPRT) ▪ EMPr
Transportation	<ul style="list-style-type: none"> ▪ Increase in traffic on the local road network ▪ Transportation of materials and construction personnel to site. ▪ Impacts to road conditions. ▪ Speeding and reckless driving by construction personnel. ▪ Construction vehicles accessing and leaving the sites via provincial roads. ▪ Use of oversized vehicles/abnormal loads, as required ▪ Risks to other road users 	<ul style="list-style-type: none"> ▪ Transportation of maintenance materials, as well as operational and maintenance personnel, to site 	<ul style="list-style-type: none"> ▪ EMPr
Aesthetics	<ul style="list-style-type: none"> ▪ Landscape transformation ▪ Visual impacts associated with construction activities 	<ul style="list-style-type: none"> ▪ Landscape transformation ▪ Light pollution ▪ Glint and glare from facility 	<ul style="list-style-type: none"> ▪ Visual Impact Assessment ▪ EMPr
Health	<ul style="list-style-type: none"> ▪ Hazards related to previous mining activities ▪ Hazards related to construction work ▪ Increased levels of dust and particulate matter ▪ Increased levels of noise ▪ Water (surface and ground) contamination. ▪ Poor water and sanitation ▪ Communicable diseases ▪ Psychosocial disorder (e.g. social disruptions) ▪ Safety and security ▪ Lack of suitable health services 	<ul style="list-style-type: none"> ▪ Hazards related to operation and maintenance work ▪ Fire and explosion risks during BESS operation 	<ul style="list-style-type: none"> ▪ Radiological Survey ▪ EMPr

13.3 Cumulative Impacts

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

Cumulative impacts can be identified by combining the potential environmental implications of the Project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the project area.

The following potential cumulative impacts will be considered as part of the EIA:

- ❖ Other renewable energy applications in relation to the Project are discussed in **Section 6.8** above. According to the REEA Database, renewable energy applications have been made for the properties to the immediate south and west of the Phase 1 Site and to the south-east of the Phase 2 Site. The EIA Report will consider the proposed hectares of cumulatively transformed land by Solar PV Projects in the area.
- ❖ The cumulative loss of land for possible mining or agricultural land uses will be considered. This will be undertaken in light of the release of the land for the Project by the MLM (landowner) and by Harmony Gold Mining Company Ltd (holder of existing mining right on land). The agricultural potential of the sites will also be determined to assess the significance of potential cumulative impacts in terms of the regional loss of agricultural resources and production.
- ❖ Cumulative impacts with regards to habitat loss and fragmentation, as well as cumulative risks to protected fauna and flora species.
- ❖ Potential cumulative visual impacts with specific reference to the existing power line infrastructure traversing the Project's sites, the mining activities and infrastructure within the area, as well as the construction of the Project.
- ❖ The proposed Solar PV Plant will increase hardened surfaces and will also alter the drainage from the two earmarked sites, with resultant cumulative impacts to stormwater.
- ❖ The clearance and disturbances associated with the construction phase could lead to cumulative impacts in terms of the proliferation of invasive alien species.
- ❖ Cumulative impacts could lead to initial, incremental or augmentation of existing types of environmental degradation, including impacts on the air, soil and water.
- ❖ Although the water use associated with the operation of a Solar PV Plant is relatively low, it could contribute towards the cumulative impact on water demand for developments in the area.
- ❖ The construction period may cause traffic-related impacts in terms of the local road network, which will be associated with heavy vehicle construction traffic for the delivery of material and the transportation of construction workers. This may compound traffic impacts if other large-scale projects are planned during the same period.

13.4 Methodology to Assess the Identified Impacts

The EIA quantitative impact assessment will further focus on the direct and indirect impacts associated with the project. All impacts will be analysed with regard to their nature, extent, magnitude, duration, probability and significance. The following definitions and criteria apply:

Nature (/Status)

The project could have a positive, negative or neutral impact on the environment.

Extent

- Local - extend to the site and its immediate surroundings.
- Regional - impact on the region but within the province.
- National - impact on an interprovincial scale.
- International - impact outside of South Africa.

Magnitude

Degree to which impact may cause irreplaceable loss of resources.

- Low - natural and social functions and processes are not affected or minimally affected.
- Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way.
- High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.

Duration

- Short term - 0-5 years.
- Medium term - 5-11 years.
- Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention.
- Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Probability

- Almost certain - the event is expected to occur in most circumstances.
- Likely - the event will probably occur in most circumstances.
- Moderate - the event should occur at some time.
- Unlikely - the event could occur at some time.
- Rare/Remote - the event may occur only in exceptional circumstances.

Significance

Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows-

- 0 – Impact will not affect the environment. No mitigation necessary.
- 1 – No impact after mitigation.
- 2 – Residual impact after mitigation.
- 3 – Impact cannot be mitigated.

14 PLAN OF STUDY FOR EIA

14.1 General

This Plan of Study, which explains the approach to be adopted to conduct the EIA for the proposed Project, was prepared in accordance with Appendix 2 of R 982 of 4 December 2014 (as amended).

14.2 Potentially Significant Environmental Issues identified during Scoping Phase

The Scoping exercise aimed to identify and qualitatively predict potentially significant environmental issues for further consideration and prioritisation. During the EIA stage a detailed quantitative impact assessment will be conducted via contributions from the project team and requisite specialist studies, and through the application of the impact assessment methodology contained in **Section 13.4** above. Suitable mitigation measures will be identified to manage (i.e. prevent, reduce, rehabilitate and/or compensate) the environmental impacts, and will be incorporated into an EMP.

Pertinent environmental issues identified during Scoping, which will receive specific attention during the EIA Phase are listed in **Table 21** above (construction and operational phases).

14.3 Feasible Alternatives to be assessed during EIA Phase

The EIA Phase will include a detailed comparative analysis of the project's feasible alternatives that emanate from the Scoping exercise, which will include environmental (with specialist input) and technical evaluations. This will ultimately result in the selection of a BPEO. The feasible alternatives to be assessed in the EIA Phase will include design/layout alternatives, as well as technology alternatives.

14.4 Specialist Studies

14.4.1 Overview

According to Münster (2005), a 'trigger' is "*a particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an issue and/or potentially significant impact associated with that proposed development that may require specialist input*". The requisite specialist studies 'triggered' by the findings of the Scoping process, aimed at addressing the key issues and compliance with legal obligations, include the following:

1. Aquatic Impact Assessment and Delineation;
2. Terrestrial Ecological Impact Assessment;
3. Heritage Impact Assessment;
4. Agricultural Impact Assessment;

5. Socio-Economic Impact Assessment; and
6. Visual Impact Assessment.

The findings from any other studies undertaken for the proposed Project, such as the Radiological Survey and Geotechnical Investigation, will also be incorporated into the EIA Report.

The Terms of Reference (ToR), both general and specific, for the abovementioned specialist studies follow in the sub-sections below. Amongst others, the *Guideline for determining the scope of specialist involvement in EIA processes* (Münster, 2005) was used in compiling the general Terms of Reference for the specialist studies. The following guidelines were also employed to prepare the specific ToR for the respective specialists (where appropriate):

- ❖ Guideline for involving biodiversity specialists in EIA processes (Brownlie, 2005);
- ❖ Guideline for involving heritage specialists in EIA processes (Winter & Baumann, 2005); and
- ❖ Guideline for involving social assessment specialists in EIA processes (Barbour, 2007).

In addition to the above guidelines, the relevant specialists need to satisfy specific requirements of the following mandated environmental authorities (amongst others):

- ❖ DEFF;
- ❖ DESTEA;
- ❖ DWS;
- ❖ DAFF; and
- ❖ SAHRA and FSHRA.

For the inclusion of the findings of the specialist studies into the EIA report, the following guideline will be used: *Guideline for the review of specialist input in EIA processes* (Keatimilwe & Ashton, 2005). Key considerations will include:

- ❖ Ensuring that the specialists have adequately addressed IAPs' issues and specific requirements prescribed by environmental authorities;
- ❖ Ensuring that the specialists' input is relevant, appropriate and unambiguous; and
- ❖ Verifying that information regarding the receiving ecological, social and economic environment has been accurately reflected and considered.

14.4.2 Terms of Reference – General

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

1. Address all triggers for the specialist studies contained in the subsequent specific ToR.
2. Consider the findings of all the scoping-level specialist studies undertaken as part of the previous Scoping exercise for the Project.

3. Address issues raised by IAPs and conduct an assessment of all potentially significant impacts.
4. Ensure that the requirements of the environmental authorities that have specific jurisdiction over the various disciplines and environmental features are satisfied.
5. Approach to include desktop study and site visits, as deemed necessary, to understand the affected environment and to adequately investigate and evaluate salient issues. Indigenous knowledge (i.e. targeted consultation) should also be regarded as a potential information resource.
6. Assess the impacts (direct, indirect and cumulative) in terms of their significance (using suitable evaluation criteria) and suggest suitable mitigation measures. In accordance with the mitigation hierarchy, negative impacts should be avoided, minimised, rehabilitated (or reinstated) or compensated for, whereas positive impacts should be enhanced. A risk-averse and cautious approach should be adopted under conditions of uncertainty.
7. Consider time boundaries, including short to long-term implications of impacts for project life-cycle (i.e. pre-construction, construction, operation and decommissioning).
8. Consider spatial boundaries, including:
 - a. Broad context of the proposed project (i.e. beyond the boundaries of the specific site);
 - b. Off-site impacts; and
 - c. Local, regional, national or global context.
9. The provision of a statement of impact significance for each issue, which specifies whether or not a pre-determined threshold of significance (i.e. changes in effects to the environment which would change a significance rating) has been exceeded, and whether or not the impact presents a potential fatal flaw or not. This statement of significance should be provided for anticipated project impacts both before and after application of impact management actions.
10. Recommend a monitoring programme to implement mitigation measures and measure performance. List indicators to be used during monitoring.
11. Appraisal of alternatives (including the No-Go option) by identifying the BPEO with suitable justification.
12. Advise on the need for additional specialists to investigate specific components and the scope and extent of the information required from such studies.
13. Engage with other specialists whose studies may have bearing on your specific investigation.
14. Present findings and participate at public meetings, as necessary.
15. Information provided to the EAP needs to be signed off.
16. Review and sign off on EIA Report prior to submission to DEFF to ensure that specialist information has been interpreted and integrated correctly into the report.
17. Sign a declaration stating independence.
18. The appointed specialists must take into account the policy framework and legislation relevant to their particular studies.

19. All specialist reports must adhere to Appendix 6 of GN No. R 982 of 4 December 2014 (as amended).

14.4.3 Terms of Reference – Specific

14.4.3.1 Aquatic Impact Assessment and Delineation

Summary of Key Issues & Triggers Identified During Scoping

- ❖ Impacts posed by the Project's infrastructure to surface water, in terms of:
 - Watercourse crossings (access roads and ancillary infrastructure); and
 - Encroachments into riparian habitats and wetlands.

Approach

- ❖ Undertake desktop study (literature review, topographical maps and aerial photographs) and baseline aquatic survey and describe affected aquatic environments/watercourses within the Project's footprint.
- ❖ Determine ecological status of the receiving aquatic environment, including the identification of endangered or protected species.
- ❖ Delineate riparian habitat and all wetlands in accordance with the guideline: *A practical field procedure for identification and delineation of wetlands and riparian areas* (DWAF, 2005) (or any prevailing guidelines prescribed by DWS). This includes assessing terrain, soil form, soil wetness and vegetation unit indicators to delineate permanent, seasonal and temporary zones of the wetlands. Allocate conservation buffers from the outer edge of the temporary zones of the wetlands.
- ❖ Provide a concise description of the importance of the affected aquatic environments/watercourses in terms of pattern and process, ecosystem goods and services, as appropriate.
- ❖ Assess impacts of proposed Project to aquatic environments/watercourses.
- ❖ Provide suitable mitigation measures to protect the aquatic ecosystems during project life-cycle.
- ❖ Recommend monitoring programme and indicators for project life-cycle, where findings from survey would serve as baseline data.

Nominated Specialist

Organisation:	The Biodiversity Company
Name:	Andrew Husted
Qualifications:	MSc Aquatic Health
No. of years' experience:	11
Affiliation (if applicable):	South African Council for Natural Scientific Professions (SACNASP) Professional Natural Scientist (Registration No.: 400213/11)

14.4.3.2 Terrestrial Ecological Impact Assessment

Summary of Key Issues & Triggers Identified During Scoping

- ❖ Encroachment of project infrastructure into CBAs and ESAs.
- ❖ The potential loss of significant flora and fauna species, as well as habitat loss and fragmentation.
- ❖ Proliferation of invasive alien species, which could spread beyond the construction domain.

Approach

- ❖ Undertake baseline survey and describe affected environment within the Project's footprint from a biodiversity perspective.
- ❖ Take into consideration the provincial conservation goals and targets.
- ❖ Assess the current ecological status and the conservation priority within the Project's footprint and adjacent area (as deemed necessary). Provide a concise description of the importance of the affected area to biodiversity in terms of pattern and process, ecosystem goods and services, as appropriate.
- ❖ Identify protected and conservation-worthy species. Prepare a biodiversity sensitivity map with the use of GIS, based on the findings of the study.
- ❖ Assess impacts to fauna and flora, associated with the project. Consider cause-effect-impact pathways for assessing impacts to biodiversity related to the project.
- ❖ Comply with specific requirements and guidelines of DEFF and DESTEA.
- ❖ Consider the FS Biodiversity Plan (2015) and other relevant policies, strategies, plans and programmes.

Nominated Specialist (to be reviewed by an external specialist)

Organisation:	Nemai Consulting
Name:	Avhafarei Phamphe
Qualifications:	MSc Botany
No. of years' experience:	10
Affiliation (if applicable):	<ul style="list-style-type: none"> ❖ SACNASP Professional Natural Scientist (Registration No.: 400349/12) ❖ Professional member of South African Institute of Ecologists and Environmental Scientists (SAIEES) ❖ Professional member of South African Association of Botanists (SAAB)

14.4.3.3 Heritage Impact Assessment

Summary of Key Issues & Triggers Identified During Scoping

- ❖ Potential occurrence of heritage resources, graves and structures older than 60 years within project footprint.

Approach

- ❖ Undertake a Heritage Impact Assessment in accordance with the National Heritage Resources Act (Act No. 25 of 1999).
- ❖ Identify and map all heritage resources in the area affected, as defined in Section 2 of the National Heritage Resources Act (Act No. 25 of 1999), including archaeological and palaeontological sites on or close (within 100 m) of the proposed developments.
- ❖ Undertake a desktop palaeontological assessment (evaluate site in terms of SAHRIS).
- ❖ Assess the significance of such resources in terms of the heritage assessment criteria as set out in the regulations.
- ❖ Assess the impacts of the Project on such heritage resources.
- ❖ Prepare a heritage sensitivity map (GIS-based), based on the findings of the study.
- ❖ Identify heritage resources to be monitored.
- ❖ Comply with specific requirements and guidelines of FSHRA and SAHRA.

Nominated Specialist

Name:	J van Schalkwyk
Qualifications:	D Litt et Phil
No. of years' experience:	40
Affiliation (if applicable):	Association for Southern African Professional Archaeologists (ASAPA) Registration No.: 168

14.4.3.4 Agricultural Impact Assessment

Summary of Key Issues & Triggers Identified During Scoping

- ❖ Loss of possible future agricultural land use due to direct occupation by the development footprint.
- ❖ Loss of fertile soil.
- ❖ Soil erosion due to inadequate stormwater management.

Approach

- ❖ Determine agricultural potential in the Project's footprint.
- ❖ Determine impacts of project from an agricultural perspective.

- ❖ Suggest suitable mitigation measures to address the identified impacts.

Nominated Specialist

Name:	Dr Andries Gouws
Qualifications:	PhD Integrated Land Use Modelling
No. of years' experience:	29
Affiliation (if applicable):	<ul style="list-style-type: none"> ❖ Council of Natural Sciences.No:400036/93, Category: Agricultural sciences. ❖ Member of the Soil Science Society of South Africa

14.4.3.5 Socio-Economic Impact Assessment

Summary of Key Issues & Triggers Identified During Scoping

- ❖ Informal use of land to be stopped.
- ❖ People residing on the sites to be relocated.
- ❖ Construction-related impacts.

Approach

- ❖ Collect baseline data on the current socio-economic environment.
- ❖ Assess socio-economic impacts (positive and negative) of the Project, and quantify the economic impacts.
- ❖ Undertake a thorough review of the following:
 - Minutes of public meetings; and
 - Comments and Responses Report.
- ❖ Suggest suitable mitigation measures to address the identified impacts.
- ❖ Make recommendations on preferred options from a socio-economic perspective.

Nominated Specialist

Organisation:	Nemai Consulting
Name:	Ciaran Chidley
Qualifications:	BA (Economics); BSc Eng (Civil); MBA
No. of years' experience:	12
Affiliation (if applicable):	N/A

14.4.3.6 Visual Impact Assessment

Summary of Key Issues & Triggers Identified During Scoping

- ❖ Visual impacts associated with landscape transformation and the proposed Solar PV Plant.
- ❖ Potential impacts during operational phase:

Approach

- ❖ Determine the visibility of the proposed Project's components. This analysis should also take into account the existing visual characteristics of the Project area in relation to the surrounding areas as well as whether or not the Project is compatible with the visual characteristics of the area.
- ❖ Determine the specific aesthetic implications of the project, by considering the following:
 - Determine visual distance/observer proximity to the facility;
 - Determine viewer incidence/viewer perception;
 - Determine the Visual Absorption Capacity of the landscape;
 - Determine the Visual Impact Index.
- ❖ Suggest suitable mitigation measures to address the identified impacts.

Nominated Specialist

Organisation:	SAS Environmental Group of Companies
Name:	Stephen van Staden
Qualifications:	MSc Environmental Management
No. of years' experience:	10 years
Affiliation (if applicable):	SACNASP

14.5 Public Participation – EIA Phase

14.5.1 Updating of IAP Database

The IAP database will be updated as and when necessary during the execution of the EIA.

14.5.2 Review of Draft EIA Report

A 30-day period will be provided to IAPs to review the Draft EIA Report, and copies of the document will be lodged for public review at the Welkom Public Library and Odendaalsrus Public Library.

Copies of the Draft EIA Report will be provided to the regulatory and commenting authorities listed in **Section 12.4.2** above. The Draft EIA Report will also be placed on the following website - <https://nemai.co.za/environmental/downloadable-documents/>.

All parties on the IAPs database will be notified via email, fax or post of the opportunity to review the Draft EIA Report at the abovementioned locations, the review period and the process for submitting comments on the report. The public will also be notified in this regard via advertisements in the following newspapers:

- ❖ Vista local newspaper;

- ❖ Volksblad provincial newspaper; and
- ❖ Daily Sun national newspaper.

All comments received from IAPs and the responses thereto will be included in the final EIA Report, which will be submitted to DEFF.

14.5.3 Public Meeting

A public meeting will be held during the review period for the Draft EIA Report. The aims of this meeting will be as follows:

- ❖ To present the project details;
- ❖ To explain the EIA process;
- ❖ To present the findings of the specialist studies;
- ❖ To address key issues raised during the Scoping Phase;
- ❖ To elaborate on the potentially significant environmental impacts (qualitative and quantitative), and the proposed mitigation of these impacts; and
- ❖ To allow for queries and concerns to be raised, and for the project team to respond.

14.5.4 Comments and Responses Report

A Comments and Responses Report will be compiled and included in the EIA Report, which will record the date that issues were raised, a summary of each issue, and the response of the team to address the issue.

In addition, any unattended comments from the Scoping Phase or where the status of the previous responses has changed, will also be addressed in the Comments and Responses Report for the EIA Phase.

14.5.5 Notification of DEFF Decision

All IAPs will be notified via email, fax or post after having received written notice from DEFF on the final decision on the application. Advertisements will also be placed in the newspapers listed in **Section 14.5.2** above. These notifications will also provide details of the appeal procedure to the decision.

14.6 EIA Report

The EIA Report will contain the information that is necessary for DEFF to consider and come to a decision on the application. As a minimum, the EIA Report will contain the information stipulated in Appendix 3 of GN No. R 982 of 4 December 2014 (as amended).

The following critical components of the EIA Report are highlighted:

- ❖ A description of the policy and legislative context;
- ❖ A detailed description of the proposed development (full scope of activities);
- ❖ A detailed description of the proposed development site, which will include a plan that locates the proposed activities applied for as well as the associated structures and infrastructure;
- ❖ A description of the environment that may be affected by the activity and the manner in which physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed development;
- ❖ The methodology of the stakeholder engagement process;
- ❖ The Comments and Responses Report and IAPs Database will be provided as an appendix to the EIA Report;
- ❖ A description of the need and desirability of the proposed development and the identified potential alternatives to the proposed activity;
- ❖ A summary of the methodology used in determining the significance of potential impacts;
- ❖ A description and comparative assessment of the project alternatives;
- ❖ A summary of the findings of the specialist studies;
- ❖ A detailed assessment of all identified potential impacts;
- ❖ A list of the assumptions, uncertainties and gaps in knowledge;
- ❖ An environmental impact statement;
- ❖ Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;
- ❖ A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
- ❖ An opinion by the consultant as to whether the development is suitable for approval within the proposed site;
- ❖ An EMPr that complies with Appendix 4 of GN No. R 982 of 4 December 2014 (as amended);
- ❖ Copies of all specialist reports appended to the EIA report; and
- ❖ Any further information that will assist in decision making by the authorities.

14.7 Authority Consultation

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

An authorities meeting will be scheduled during the EIA public participation process to present the Draft EIA Report and salient findings from the EIA Phase. In addition, copies of the Draft EIA Report will be provided to the following key regulatory and commenting authorities:

- ❖ DEFF;
- ❖ DESTEA;

- ❖ DWS Free State Regional Office;
- ❖ FS DPRT;
- ❖ FSHRA;
- ❖ DMRE;
- ❖ LDM; and
- ❖ MLM.

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

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

- ❖ Submission of the Final Scoping Report;
- ❖ Meet with designated DEFF Environmental Officer to explain the project and arrange a site visit (if required by DEFF);
- ❖ Address comments on Scoping Report;
- ❖ Arrange an authorities' meeting during the EIA Phase;
- ❖ Submit EIA Report;
- ❖ Address comments on EIA Report;
- ❖ Obtain a decision; and
- ❖ Notify IAPs of the appeal process through DEFF's Appeals Unit.

14.8 EIA Timeframes

Table 22 below presents the proposed timeframes for the EIA process. *Note that these dates are subject to change as the EIA process unfolds.*

Table 22: EIA Timeframes
(Note: dates may change during the course of the EIA)

EIA Milestone	Start	Finish
Submit Application Form and Draft Scoping Report to DEFF	19/03/20	
Review of Draft Scoping Report by authorities & IAPs	20/03/20	24/04/20
DEFF Review and Decision	04/05/20	18/06/20
Review of Draft EIA Report by authorities & IAPs	02/07/20	03/08/20
Submit Final EIA Report & EMPr to DEFF	17/09/18	
DEFF Review and Decision	10/08/20	24/11/20

15 CONCLUSION

The scope of an environmental assessment is defined by the range of issues and alternatives it considers, the nature of the receiving environment, and the approach towards the assessment.

Key outcomes of the Scoping Phase for the proposed Solar PV Plant are as follows:

- ❖ Alternatives for achieving the objectives of the proposed activity were considered;
- ❖ Potentially significant issues pertaining specifically to the pre-construction, construction and operational phases of the Project were identified;
- ❖ Sensitive elements of the environment that may be affected by the Project were identified. A preliminary sensitivity map is provided in **Figure 62** below;
- ❖ Stakeholders were effectively identified to allow for their participation in the Scoping process;
- ❖ A Plan of Study was developed to explain the approach to executing the EIA Phase, which also includes the Terms of Reference for the identified specialist studies; and
- ❖ The scoping exercise set the priorities for the ensuing EIA Phase.

No fatal flaws were identified in terms of the proposed activities and the receiving environment that would prevent the environmental assessment from proceeding beyond the Scoping Phase. It is the opinion of the EIA team that Scoping was executed in an objective manner and that the process and report conform to the requirements of Regulation 21 and Appendix 2 of GN No. R 982 of 4 December 2014 (as amended), respectively. It is also believed that the Plan of Study for EIA is comprehensive and will be adequate to address the significant issues identified during Scoping, to select the BPEO, and to ultimately allow for informed decision-making.

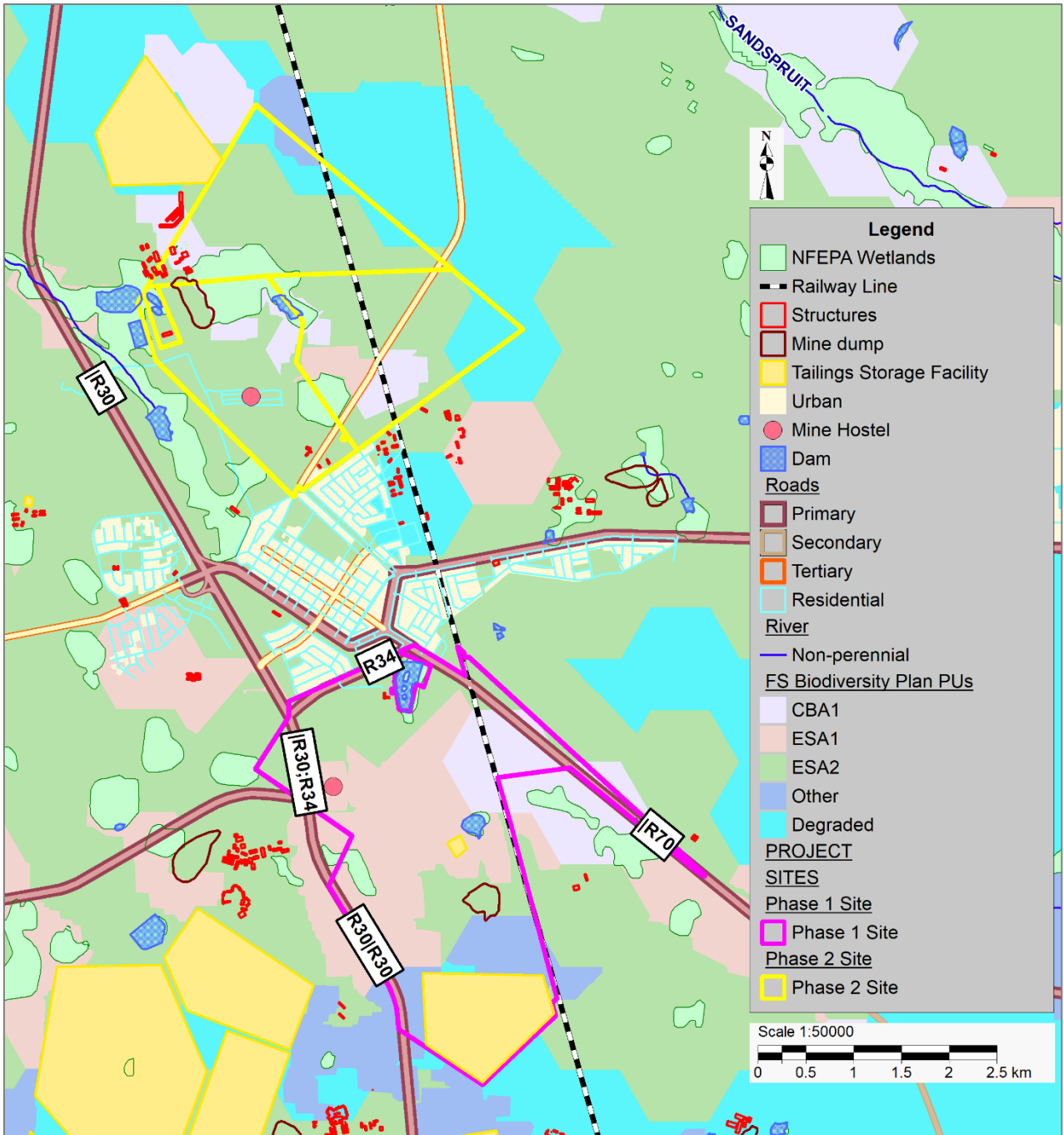


Figure 62: Preliminary Sensitivity Map

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APPENDICES
