APPENDIX E5: Phase 1 Cultural Heritage Impact Assessment

OSLAAGTE SOLAR 3 (PTY) LTD

PROPOSED 480MW OSLAAGTE SOLAR 3 PHOTOVOLTAIC PROJECT, SOUTHEAST OF KROONSTAD, FREE STATE PROVINCE

HERITAGE IMPACT ASSESSMENT

29 MAY 2023

Submitted to : Nemai Consulting

Prepared by:

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2194

The heritage impact assessment report has been compiled considering the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

Requirements of Appendix 6 – GN R326 EIAs Regulations (2014, amended 2017)	**Relevant section in report**
1.(1) (a) (i) Details of the specialist who prepared the report	Section 1.1.3 of Report
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1.1.3 and of Report and **Appendix 2**
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page iii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
(cA) An indication of the quality and age of base data used for the specialist report	N/A
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 5
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 6
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 7
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 5.2 and 5.4, Section 6
(g) An identification of any areas to be avoided, including buffers	Section 6, Section 12
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	**Appendix 1**
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Sections 6, 8
(k) Any mitigation measures for inclusion in the EMPr	Sections 11, 12
(l) Any conditions for inclusion in the environmental authorisation	N/A
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	N/A
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 12
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 11, 12
(o) A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. A public consultation process will be handled as part of the EIAs and EMPr process.

Requirements of Appendix 6 – GN R326 EIAs Regulations (2014, amended 2017)	**Relevant section in report**
(p) A summary and copies if any comments that were received during any consultation process	Not applicable. To date no comments have been raised regarding heritage resources that require input from a specialist.
(q) Any other information requested by the competent authority.	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 38(3) of the NHRA

Declaration of Independence

The report has been compiled by Nitai Consulting (Pty) Ltd, an appointed Heritage Specialist for Nemai Consulting for the Proposed 480MW Oslaagte Solar 3 Photovoltaic Project, Southeast of Kroonstad, Free State Province. The views contained in this report are purely objective and no other interests are displayed during the Heritage Impact Assessment Process.

I, Jennifer Kitto, declare that –

General declaration:

- *I act as the independent heritage specialist for this project*
- *I will perform the work relating to the project in an objective manner, even if this results in views and findings that are not favourable to the applicant*
- *I declare that there are no circumstances that may compromise my objectivity in performing such work;*
- *I have expertise in conducting heritage impact assessments, including knowledge of the National Heritage Resources Act, No 25 of 1999 (NHRA), associated Regulations and any guidelines that have relevance to the proposed activity;*
- *I will comply with the NHRA, associated Regulations and all other applicable legislation, including the National Environmental Management Act, No 107 of 1998 (NEMA);*
- *I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;*
- *I have no, and will not engage in, conflicting interests in the undertaking of the activity;*
- *I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;*
- *I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;*
- *I will provide the competent authority with access to all information at my disposal regarding the project, whether such information is favourable to the applicant or not*
- *All the particulars furnished by me in this form are true and correct;*
- *I will perform all other obligations as expected of a heritage specialist in terms of the NHRA and the constitutions of my affiliated professional bodies; and*
- *I realise that a false declaration is an offence in terms of regulation 71 of the NEMA Regulations and is punishable in terms of section 24F of the NEMA.*

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the NEMA Regulations;

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ACKNOWLEDGEMENT OF RECEIPT

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Executive Summary

Oslaagte Solar 3 (Pty) Ltd (the “Applicant”) has proposed the development of the 480MW Oslaagte Solar 3 Photovoltaic (PV) Project near Kroonstad, in the Free State Province (the “Project”). The electricity generated by the Project will be transferred via 33kV or 132kV cabling or powerline between the facility substation and the proposed132 kV powerlines, Eskom collector switching station/Main Transmission Substation (MTS). The Applicant also proposed proposes the development of the 400/132kV Main Transmission Substation (MTS) and 400 kV LILO Powerlines between the new MTS and existing Eskom 400kV Powerlines. The Project is located approximately 20km to the south east of Kroonstad central business district (CBD) and falls within Ward 1 of the Moqhaka Local Municipality, in the Free State Province. The R76 runs along the eastern boundary of the site

Nemai Consulting has been appointed as the independent Environmental Assessment Practitioner (EAP) to conduct the Environmental Authorisation (EA) process for the Proposed Oslaagte Solar 3 PV Project. Nitai Consulting has been appointed by Nemai Consulting to conduct the specialist studies, one of which is the Heritage Impact Assessment (HIA).

.Methodology/ Significance Assessment

The Site Survey fieldwork provided confirmation of the existence of heritage resources occurring adjacent to the Oslaagte Solar 3 PV and MTS/LILO Corridor footprints.

The survey of the Oslaagte Solar 3 PV footprint identified six heritage resources within or adjacent to the general footprint. Four are located within and two outside or adjacent to the PV project footprint (Alternative 1). These include: a historical farmhouse with an outbuilding and a stone kraal (Os3-01), a railway culvert (Os3-04) and a disused road culvert (Os3-05), two areas with demolished structure remains (Os3-02 and Os3-06) and a possible grave (at Os3-02). One site could be the remains of a farm dam wall (Os3-03). The Alternative 2 layout avoids the heritage rsources.

The survey of the MTS/LILO Corridor footprint identified a total of six heritage resources within or adjacent to the footprint. Two of these sites are located just outside the project footprint: the remains of a homestead which may contain potential graves (LILO-03) and two informal graveyards located adjacent to each other (LILO-06A and LILO 6B). The remaining four sites are located within the Corridor footprint (Alternative 1 and Alternative 2) and include two potential graves (LILO-01, LILO-02) and two sites with historical structure remains (LILO-04 and LILO-05).

Identification of Activities, Aspect and Impacts

The project area that will be impacted by the proposed Oslaagte Solar 3 PV and MTS/LILO Corridor footprints contains some areas that are currently disturbed by farming (cattle and game) activities.

The impact significance of the project on graves and cemeteries is Medium (before mitigation) and Low (after mitigation) as three potential graves were identified within the combined Oslaagte Solar 3

PV (Alternative 1 and Alternative 2) and MTS/LILO Corridor footprints. The only clear grave sites are situated outside the LILO corridor footprint. Implementation of the mitigation measures required (set out in Table 10, below) will retain the impact as low.

The impact significance of the proposed project on protected historical structures is Medium (before mitigation) and Low (after mitigation) as three extant historical structure sites were identified within the Oslaagte Solar 3 PV footprint (Alternative 1). Two sites containing historical structure remains were identified within the Solar PV footprint (Alternative 1) and two sites containing historical structure remains were identified within the MTS/LILO Corridor footprint (Alternative 1 and Alternative 2).

Mitigation Measures

The proposed Oslaagte Solar 3 PV and MTS/LILO Corridor projects could impact on twelve heritage resources identified within and adjacent to the combined project footprints. The recommendations below are provided to mitigate the potential impact of the proposed project on the identified heritage resources:

Historical Structures

- The sites with extant historical structures (Site Os3-01, Os3-04, Os3-05) must be avoided and a buffer of at least 30m must be implemented;
- The materials demarcating the 30m buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the PV site so that work crews are aware of the sites.
- If any impact on the historical structures is anticipated, then a permit will be required for the alteration or destruction of any of the structures (from FS PHRA);
- If a permit is required, as above, then a photographic record of the structures should be undertaken by an architectural historian;
- The sites with remains of Historical structures (Os3-02, Os3-06, LILO-04, LILO-05) are protected by section 34 of the NHRA and will require a permit from FSPHRA before any historical-archaeological materials or remains can be destroyed;

Informal Graveyard / Potential Graves

- A buffer of at least 30m must be placed around the informal graves at LILO-06 to ensure that during construction, the graves are not damaged
- The materials demarcating the 30m buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the PV site so that maintenance crews are aware of the sites.
- If, for any reason, the identified graveyard (or potential graves) cannot be avoided, then a Phase 2 mitigation process can be considered. During this process, the family and relevant communities will have to be engaged with to obtain their permission and discuss to where the remains are to be moved. In addition, application will have to be made to SAHRA for the necessary permits.

- Sub-sections (4) and (5) of section 36 of the NHRA regarding the removal of graves must be adhered to. The exhumation and removal of graves is strongly discouraged as graves are highly significant to many people and there are many traditional, cultural and personal sensitivities concerning the removal of graves.

Palaeontology

- A separate palaeontological study is being undertaken by a professional palaeontologist. The assessment will indicate if significant/sensitive fossils would be impacted by the proposed project and provide mitigation measures.

No fatal flaws were identified during this study, therefore, it is the considered opinion of the heritage specialist that the construction of the proposed Oslaagte Solar 3 PV project and MTS/LILO Corridor within the project footprints can proceed. There are no objections from a heritage perspective provided the recommendations and mitigation measures contained in this report and in the palaeontological assessment are implemented where necessary. It should be noted that the original layout for the Oslaagte Solar 3 PV footprint (Alternative 1) has been revised to exclude certain environmentally and heritage sensitive areas (Alternative 2). The Alternative 2 layout avoids the identified heritage resources that would be impacted by the Alternative 1 layout. Therefore, from a heritage perspective, Alternative 2 is the preferred layout. However, some of these heritage resources still could be subject to indirect impact, specifically during site clearance or construction activities, therefore the mitigation measures set out above and below will still apply.

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List of Abbreviations

APHP	Association of Professional Heritage Practitioners
ASAPA	Association of Southern African Professional Archaeologists
BESS	Battery Energy Storage System
CRM	Cultural Resources Management
DALRRD	Department of Agriculture, Land Reform & Rural Development
DFFE	Department of Forestry, Fisheries and Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EAP	Environmental Assessment Practitioner
EIA	Early Iron Age
EMPr	Environmental Management Programme
ESA	Early Stone Age
GIS	Geographic Information System
ha	Hectare
HIA	Heritage Impact Assessment
IAP	Interested and Affected Party
IAIAsa	International Association for Impact Assessment South Africa
km	Kilometre (1 000m)
LIA	Late Iron Age
kV	Kilo Volt
LSA	Later Stone Age
MSA	Middle Stone Age
MTS	Main Transmission Station
NEMA	National Environmental Management Act (No. 107 of 1998)
NHA	National Health Act, (No. 61 of 2003)
NHRA	National Heritage Resources Act (No 25 of 1999)
NHS	National Heritage Site
PHRA	Provincial Heritage Resources Authority
PV	Photo Voltaic
FSHRA	Free State Heritage Resources Authority
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAHRA	South African Heritage Resources Agency

1 INTRODUCTION

Nemai Consulting CC (Nemai) was appointed by Oslaagte Solar 3 (Pty) Ltd (the "Applicant") to conduct the Environmental Impact Assessment (EIA) for the proposed Solar PV Project (up to 480MW) south east of Kroonstad, in the Free State Province (the "Project"), including 400/132 kV Main Transmission Substation (MTS) and 400kV Loop in Loop out (LILO) Powerlines between the new MTS and existing Eskom 400kV Powerlines.

Oslaagte Solar 3 (Pty) Ltd (the "Applicant") has proposed the development of the 480MW Oslaagte Solar 3 Photovoltaic (PV) Project near Kroonstad, in the Free State Province (the "Project"). The electricity generated by the Project will be transferred via 33kV or 132kV cabling or powerline between the facility substation and the proposed Eskom collector switching station/Main Transmission Substation (MTS) he applicant has also proposed the development of the 400/132kV Main Transmission Substation (MTS) and 400kV Loop in Loop Out (LILO) Powerlines between the new MTS and existing Eskom 400kV Powerlines, south east of Kroonstad, Free State Province (the "Project").

The Oslaagte Solar 3 PV-project will be located on the Farm Oslaagte 2564, approximately 20 km southeast of Kroonstad. The project footprint covers a combined area of approximately 810 hectare (ha) including the 132 kV powerlines, 3.35km in length, from the facility substation to a new 132/400 kV Main Transmission Substation (MTS). The proposed 400/132 kV MTS and the 400 kV LILO Powerlines between the new MTS and existing Eskom 400kV Powerlines are located on various properties.

1.1 Scope & Terms of Reference for the HIA report

1.1.1 Summary of Key Issues & Triggers Identified During Scoping

In terms of the NHRA, the following proposed activities trigger the need for a Heritage Impact Assessment (HIA):

- Potential occurrence of heritage resources, graves, and structures older than 60 years within the Project's footprint.
- Proposed development that is more than 5000m^2
- Proposed linear development that is longer than 300m.
- Proposed development where an impact assessment is triggered in terms of NEMA.

1.1.2 Approach

- Undertake a Heritage Impact Assessment in accordance with the NHRA.
- Identify and map all heritage resources in the area affected, as defined in Section 2 of the NHRA, including archaeological sites on or near (within 100m of) the proposed developments.
- 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.

1.1.3 Nominated Specialist Details

Organisation:	Nitai Consulting
Name:	Jennifer Kitto
Qualifications:	BA Archaeology and Social Anthropology; BA (Hons) Social Anthropology
No. of years' experience:	24
Affiliation (if applicable):	Association of Southern African Professional Archaeologists (ASAPA) - Technical member No.444 International Association for Impact Assessment (IAIAsa) – Member No. 7151

1.2 Project Description

Oslaagte Solar 3 (Pty) Ltd (the "Applicant") has proposed the development of the up to 480MW Oslaagte Solar 3 Photovoltaic (PV) Project near Kroonstad, in the Free State Province (the "Project"). The electricity generated by the Project will be transferred via 132 kV powerlines from the facility substation to a new 132/400 kV Main Transmission Substation (MTS). The applicant has also proposed the development of the 400/132kV Main Transmission Substation (MTS) and 400kV Loop in Loop Out (LILO) Powerlines between the new MTS and existing Eskom 400kV Powerlines.

2 LEGISLATION

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by various pieces of legislation, including the National Heritage Resources Act, 25 of 1999 (NHRA) and associated Regulations, National Environmental Management Act, Act 107 of 1998 (NEMA) and associated Regulations and, as well as the National Health Act, Act No. 61 of 2003 (NHA), specific Regulations governing human remains.

2.1 National Heritage Resources Act, No 25 of 1999 (NHRA)

The NHRA is the defines cultural heritage resources (section 3), provides protection to specific types of heritage resources (sections 34, 35, 36) and also requires an impact assessment of such resources for specific development activities (section 38(1)). Section 38(8) further allows for cooperation and integration of the management of such impact assessment between the national or provincial heritage authority (SAHRA or a PHRA) and the national environmental authority (DEFF).

In terms of section 38(1)(a) of the NHRA, the specific types of development activity that may require a Heritage Impact Assessment (HIA) include: the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length. As the proposed PV project is larger than 5000m^2 and the proposed powerline is km long, this study falls under s38(8) and requires comment from the relevant heritage resources authority. (South African Heritage Resources Authority-SAHRA and/or the Free State Provincial Heritage Authority).

Sections 34-36 of the NHRA further stipulate the protections afforded to specific types of heritage resources, *i.e*. structures older than 60 years (s34); archaeological, palaeontological, meteorites (s35); graves and burial grounds (s36), as well as the mitigation process to be followed if these resources need to be disturbed. The construction of the solar PV project and powerline may result in impacts to any of these types of heritage resources.

2.2 National Environmental Management Act, Act 107 of 1998 (NEMA)

NEMA states that an integrated Environment Management Plan (EMP) should, (23 -2 (b)) "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage". In addition, the NEMA and associated Regulations GNR 982 (Government Gazette 38282, 14 December 2014, amended 2017) state that, "the objective of an environmental impact assessment process is to, … identify the location of the development footprint within the preferred site … focussing on the geographical, physical, biological, social, economic, *cultural and heritage aspects* of the environment" (GNR 982, Appendix 3(2)(c), emphasis added).

The EIA Regulations, 2014 (as amended), published in GNR 982 of 2014 (Government Gazette 38282) promulgated under the (NEMA) contain specific requirements to be addressed in the different types or impact assessment repots (Regulations 19, 21 and 23) as well as requirements for Specialist Reports (Appendix 6).

2.2 The National Health Act, No. 61 of 2003 (NHA), Regulations 2013

In the case of graves and/or burial grounds that could be impacted by a proposed development, and which are identified through an impact assessment, specific Regulations relating to the Management of Human Remains (GNR 363 of 2013 in Government Gazette 36473) address the exhumation and reburial of human remains: Regulations 26, 27 and 28.

3 ASSUMPTIONS AND CONSTRAINTS

This assessment assumes that all the information provided by the Environmental Assessment Practitioner (EAP) regarding the project footprint (Including the powerline) is correct and current.

The project area traverses various properties separated by fences, and access was often restricted by heavily eroded farm roads, localised flooding due to the rainy (summer) season and extremely dense vegetation (acacia thicket) in some areas.

The large area of the project footprint meant that it was not feasible to undertake a pedestrian survey of the whole area and the fieldwork therefore comprised a combination of vehicle and pedestrian investigation. The extremely dense and long vegetation in several areas meant that archaeological and heritage visibility was low in those areas. Therefore, there is a possibility that some heritage resources were not identified, specifically, graves or burial sites.

4 PROJECT DESCRIPTION

4.1 Location

The Oslaagte Solar 3 PV Project is located approximately 20km to the south east of Kroonstad's central business district (CBD) and falls within Ward 1 of the Moqhaka Local Municipality (MLM), within the Fezile Dabi District Municipality in the Free State Province. The R76 runs along the eastern boundary of the site. The project footprint is located on the Farm Oslaagte 2564 and covers a combined area of approximately 810 hectare (ha). The electricity generated by the Project will be transferred via 33kV or 132kV cabling or powerline between the facility substation and the proposed Eskom collector switching station/Main Transmission Substation (MTS) The associated 400kV Powerlines are located immediately south of the Oslaagte Solar 3 PV project footprint on certain portions of the Farms Oslaagte 2564, Mooidraai 953, Wolvekop 314, Klein Geluk 2088, Fraaiuitzicht 576, Zonderweg 1699.

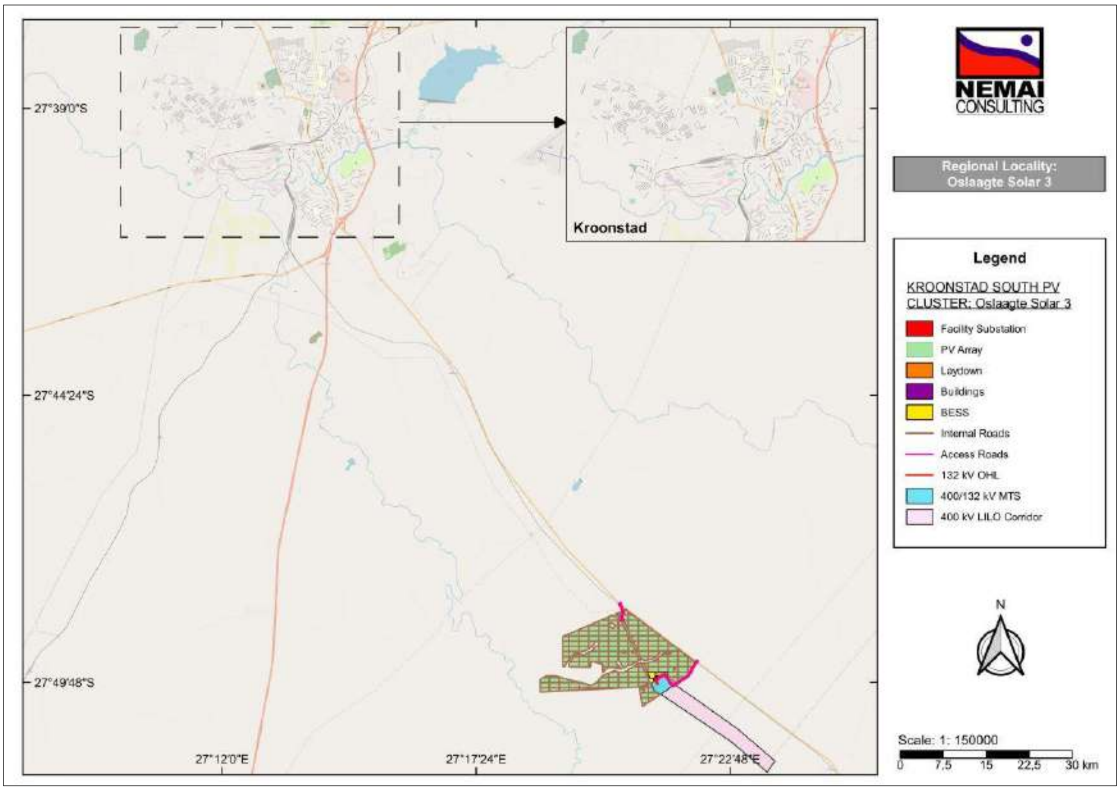


Figure 1: Oslaagte Solar 3 PV Project Locality south of Kroonstad (Nemai 2023)

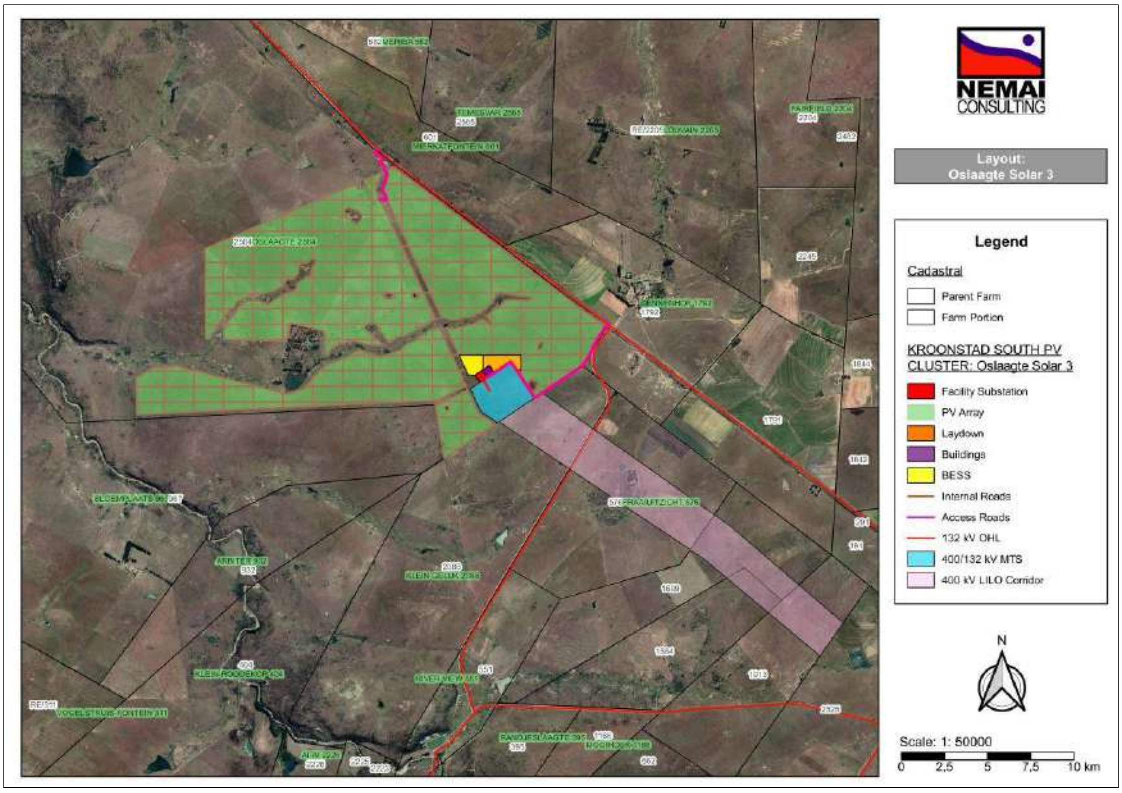


Figure 2: Oslaagte Solar 3 PV Project Layout – Alternative 1 (Nemai 2023)

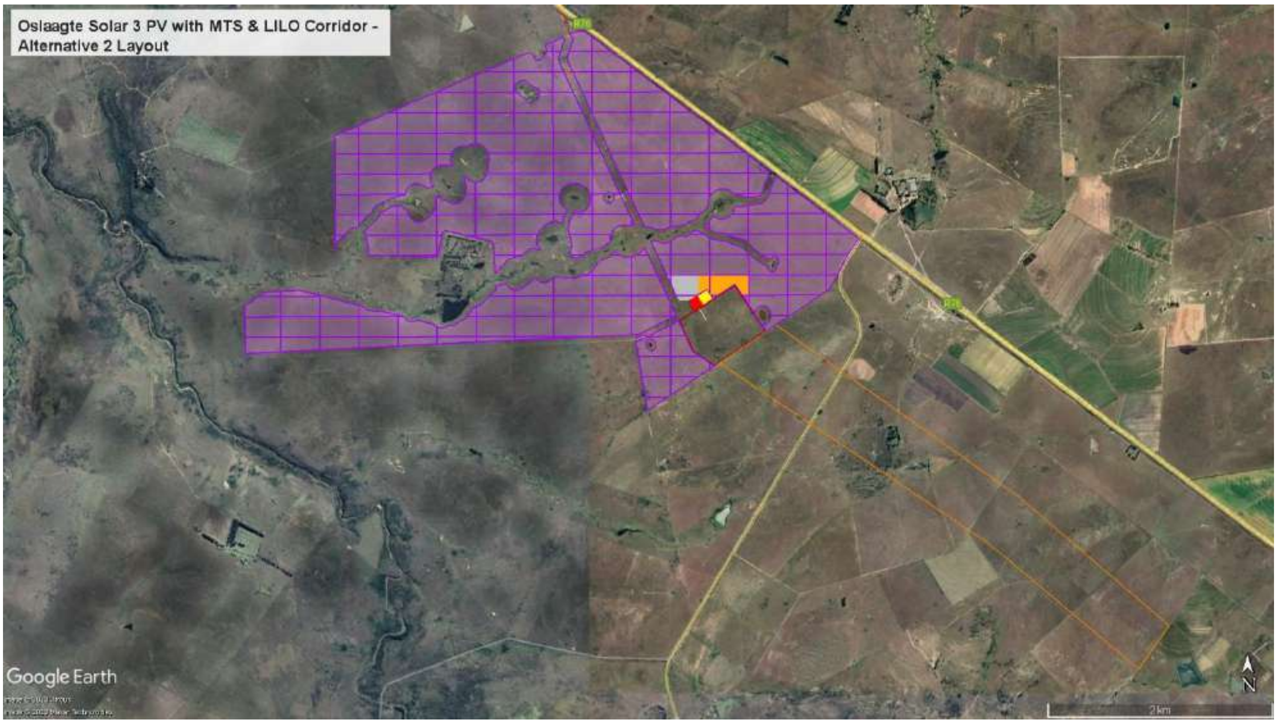


Figure 3: Oslaagte Solar 3 PV Project Layout – Alternative 2

4.2 Project Technical Details

4.2.1 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.

4.2.2 PV Technology Overview

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 4** below, provides an overview of a typical Solar PV Power Plant.

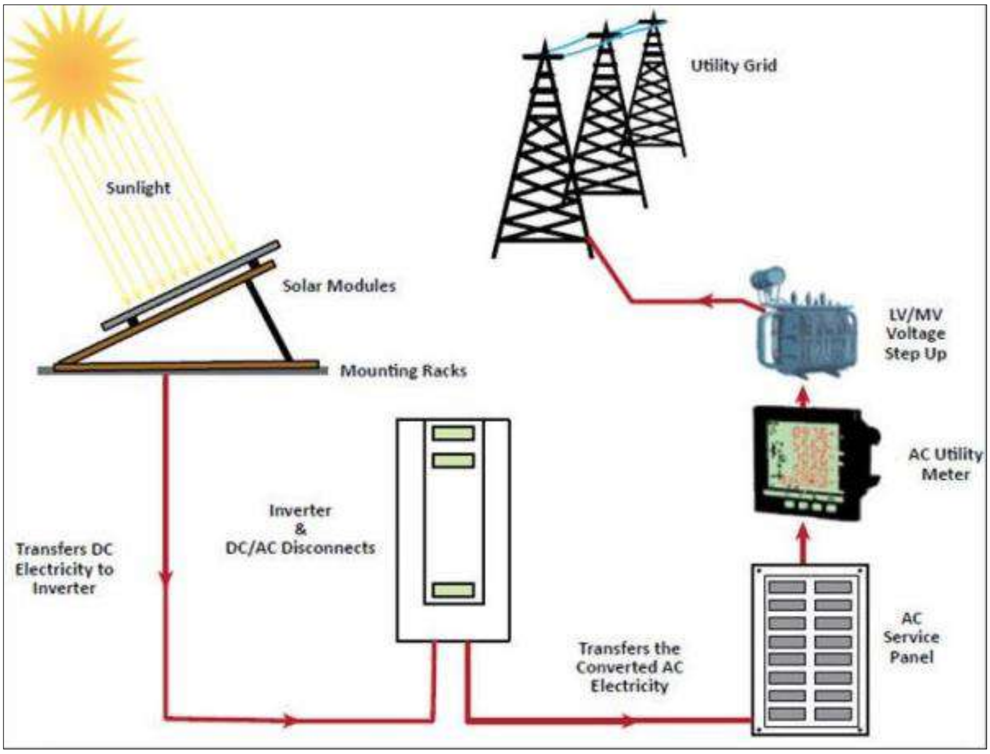


Figure 4: Overview of Solar PV Power Plant (International Finance Corporation, 2015. Utility-Scale Solar Photovoltaic Power Plan.)

4.2.3 Overview of Technical Details: Oslaagte 3 Solar PV Project

The technical details of the proposed Solar PV Plant are captured in **Table 1** below.

Table 1: Technical details of the proposed PV Plant

No.	Component	Alternative 1 - Description / Dimensions	Alternative 2 - Description / Dimensions
1.	Height of PV panels	Up to 5 m	Up to 5.5 m
2.	Area of PV Array	Up to approximately 445.5 ha	Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems. Area: Up to 760 ha
3.	Area occupied by inverter / transformer stations / substations	Up to 1 ha	It is estimated that the maximum size of the facility substation will not exceed 2 ha. Each facility will require inverter-stations, transformers, switchgear and internal electrical reticulation (underground cabling).

No.	Component	Alternative 1 - Description / Dimensions	Alternative 2 - Description / Dimensions
4.	Capacity of on-site substation	High voltage (132 kV)	The facility substation will collect the power from the facility and transform it from medium voltage (up to 33 kV) to high voltage (132 kV).
5.	BESS	Area up to ± 5ha	Area: up to ± 5 ha
6.	Area occupied by both permanent and construction laydown areas	Temporary: Up to 7ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)	Temporary construction laydown area up to 10 ha. Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
7.	Area occupied by buildings	Up to 1.5 ha	Up to 1.5 ha
8.	Length of internal roads	Up to 33 km	Up to 33 km
9.	Width of internal roads	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.
10.	Height of fencing	Up to 3.5m	Up to 3.5m
11.	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing	Type will vary around the site, welded mesh, palisade and electric fencing

4.2.4 Solar PV Project Layout

The layout of the Solar PV Plant is shown in **Figure 2** and **Figure 3** above. The desirability of the earmarked site for the development of the proposed Solar PV Plant is due to the following key characteristics:

- Solar Irradiation: The feasibility of a solar facility is dependent on the direct solar irradiation levels.
- Topography: The suitability of the surface area is an important characteristic for the construction and operation of solar facilities. Most of the site has a low gradient slope and is suitable for this development.
- Proximity to Grid
- Extent of site: The overall extent of the site is sufficient for the installation of the PV facility.
- Site access: The site can be accessed via the R76, which runs along the eastern boundary of the site

4.2.5 Components of the Proposed Solar PV Plant

The Project consists of the following systems, sub-systems or components (amongst others):

- PV modules and mounting structures which will consist of either Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems.
- Inverters and transformers.
- Battery Energy Storage System (BESS) area up to 5ha.

- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance.
- Facility grid connection infrastructure, including:
  - 33kV cabling between the project components and the facility substation
  - A 132kV facility substation
  - 33kV or 132kV cabling or powerline between the facility substation and the proposed Main Transmission Substation or the Kroonstad Switching Station.
  - 400kV LILO powerlines between the Eskom Collector Switching Station/Main Transmission Substation (MTS) and the existing Eskom 400 kV powerlines
- Temporary construction laydown area up to 5 ha.
- Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
- Internal roads will be up to 6 m wide, to allow access to the Solar PV modules for operations and maintenance activities.
- Main access road is up to 8 m wide. The site is accessible via the R76.

4.2.6 Overview of Technical Details of the Main Transmission Substation and 400kV Powerlines

The technical details of the proposed Project are captured in **Table 2** below.

Table 2: Technical details of the proposed project

Component	Description / Dimensions
New MTS	Maximum 600meters (m) x 600m i.e 36ha
400kV Powerlines	400kV within a 500m corridor

4.2.7 400kV Powerlines

A power line typically consists of pylons, which are tower-like structures that support electrical cables above the ground. The distance between each pylon is dependent on the type of terrain the lines cross. The standard width of a servitude for a 400kV Transmission line is 55m (27.5m on either side of the power line). There are several types of towers/pylons. The types of pylons chosen for the project depend on several factors, these include:

- Terrain;
- Expense; and
- Recommendations from the visual specialist.

In order for maintenance staff to access the lines and undertake routine maintenance or repair faults, it may be necessary to construct access roads. To protect the surrounding landscape from soil erosion stormwater infrastructure may be required. Very few new access roads may be required during installation of some sections of the towers and powerline; however, Eskom have advised that these access roads do not exceed any thresholds in terms of the EIA Regulations. Below are several examples of 400kV power line types, which might be used (**Figure 5**, Error! Reference source not found., **Figure 7**: and **Figure 8**:).

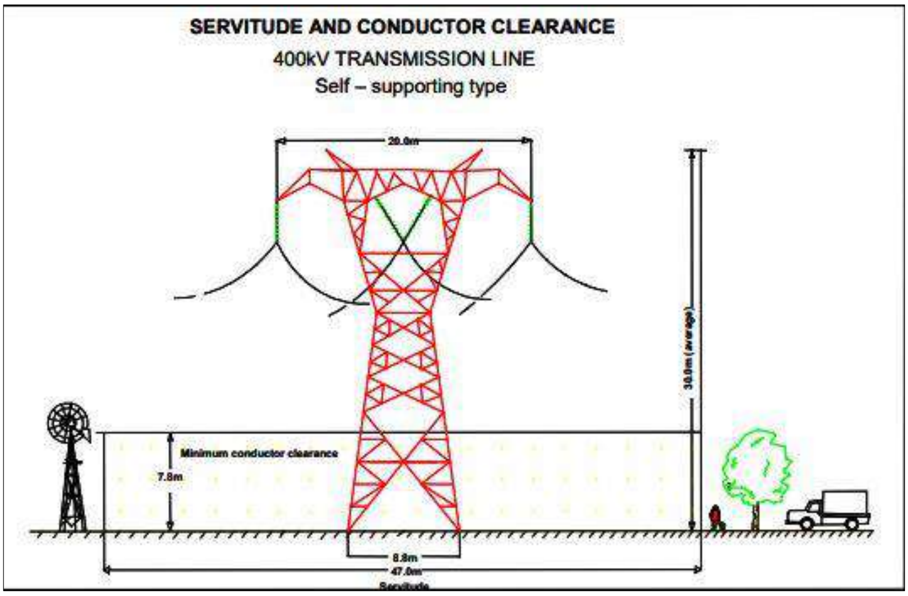


Figure 5: Servitude and Conductor Clearance for a 400kV Transmission Line, Self – Supporting Type Tower/Pylon

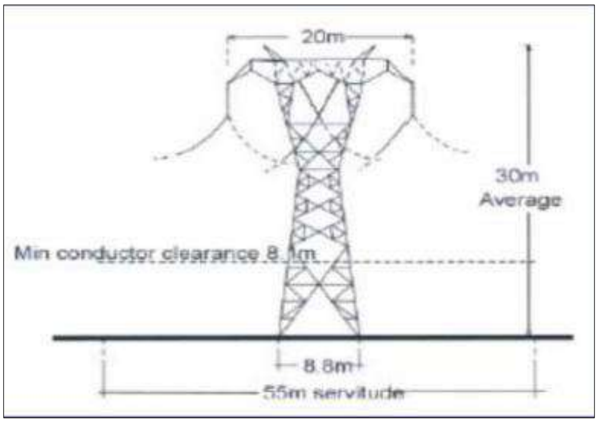
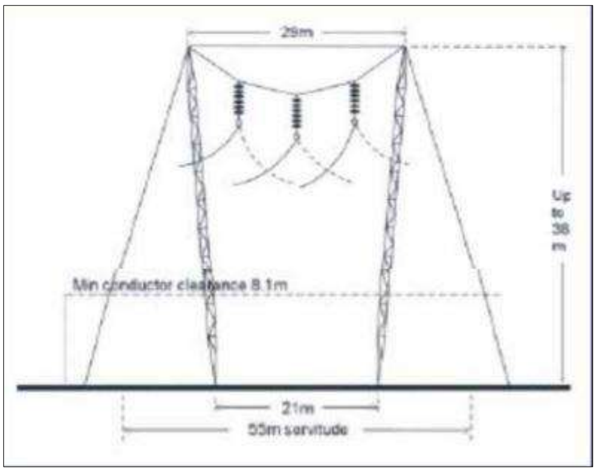


Figure 6: Strain Tower Lines



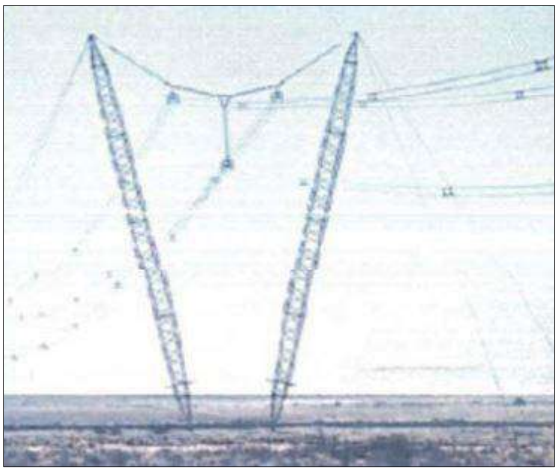


Figure 7: Cross Rope Suspension Lines

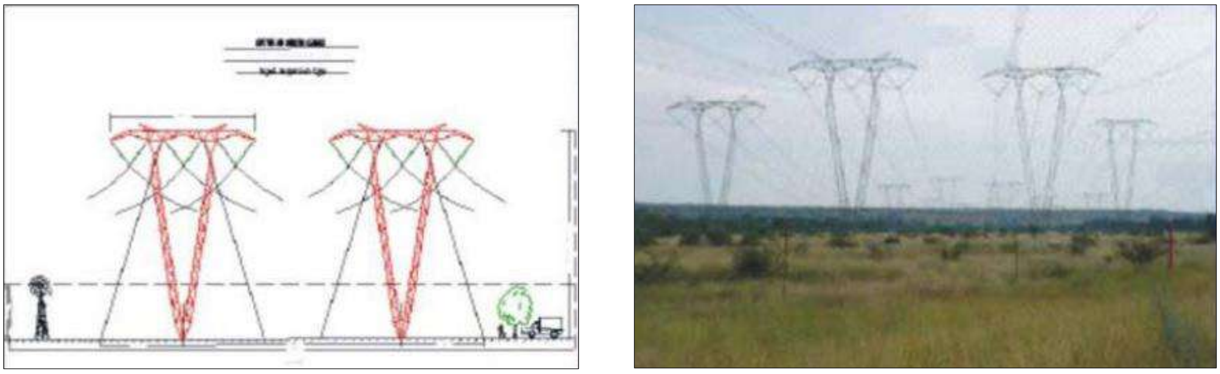


Figure 8: 400kV guyed V-Tower Structures

5 Status Quo Analysis

5.1 General Existing Condition of Receiving Environment

The Oslaagte Solar 3 PV project footprint is situated on the southern portion of the farm Oslaagte 2564 A railway line runs along the eastern boundary of the site, adjacent to the R76 road. The general area is covered with a combination of acacia thickets and grassland which varies from shorter to long dense grass. Several farm dams occur and there are several outcrops of sandstone. There are also many termite mounds occurring on the property. The topography varies from relatively flat to gently undulating. The project area is currently used for cattle grazing. The property is currently used for cattle grazing with some game (gemsbok and springbok) present as well. **Figure 9** to **Figure 14** provide views of the general terrain and vegetation cover.

The MTS and LILO lines corridor footprint is located immediately south of the Oslaagte Solar 3 PV footprint and situated over certain portions of the following farms: Oslaagte 2564, Mooidraai 953, Wolvekop 314, Klein Geluk 2088, Fraaiuitzicht 576, Zonderweg 1699. The general area is covered with a combination of acacia thickets and meadow grassland which varies from shorter to long and dense. Several farm dams occur and there are outcrops of sandstone present. There are also several wetland areas and streams running through the project footprint (**Figure 15** to **Figure 22**).

Figure 9: View of the north-east section of the Oslaagte Solar 3 PV Project area, showing varying grass coverage

Figure 10: View of the north-west section of the Oslaagte Solar 3 PV project footprint, showing long dense grass coverage with scattered acacia shrubs

Figure 11: View of stand of eucalyptus trees on the central west boundary of Oslaagte Solar 3 PV footprint

Figure 12: View of part of the southern section of the Oslaagte Solar 3 PV footprint, showing an area with shorter grass coverage

Figure 13: Another view of the southern section of the Oslaagte Solar 3 PV footprint

Figure 14: View of the south-west section of Oslaagte Solar 3, looking North from the southern boundary

Figure 15: View of grassland vegetation interspersed with occasional stands of acacia, over the northern section of the LILO Corridor

Figure 16: View of the northern section of the LILO Corridor footprint, looking into the MTS area

Figure 17: View of wetland situated on the southern portion of the northern section of the LILO Corridor footprint

Figure 18: View of dense vegetation and acacia thickets in the northern area of the southern section of the LILO Corridor footprint

Figure 19: View of grassland area around an existing powerline servitude on the southern section of the LILO Corridor footprint

Figure 20: View of vlei/wetland with areas of very long dense grass, situated in the central area of the southern section of the LILO Corridor footprint

Figure 21: View of a stream that crosses the central area of the southern section of the LILO Corridor footprint

Figure 22: View towards the existing powerline servitude in the southernmost section of the LILO Corridor, showing the mainly grassland vegetation in this section

5.2 Cultural-Heritage Receiving Environment

5.2.1 DFFE Environmental Screening Tool

The DFFE Environmental Screening Tool was accessed for information on the cultural-heritage sensitivity of the general region. This tool indicated that the Archaeological and Cultural Heritage Sensitivity of the general region is Low (**Figure 23**); however, the Palaeontological Sensitivity of the underlying geology of the solar PV project and LILO Corridor footprints is indicated as Very High (**Figure 24**).

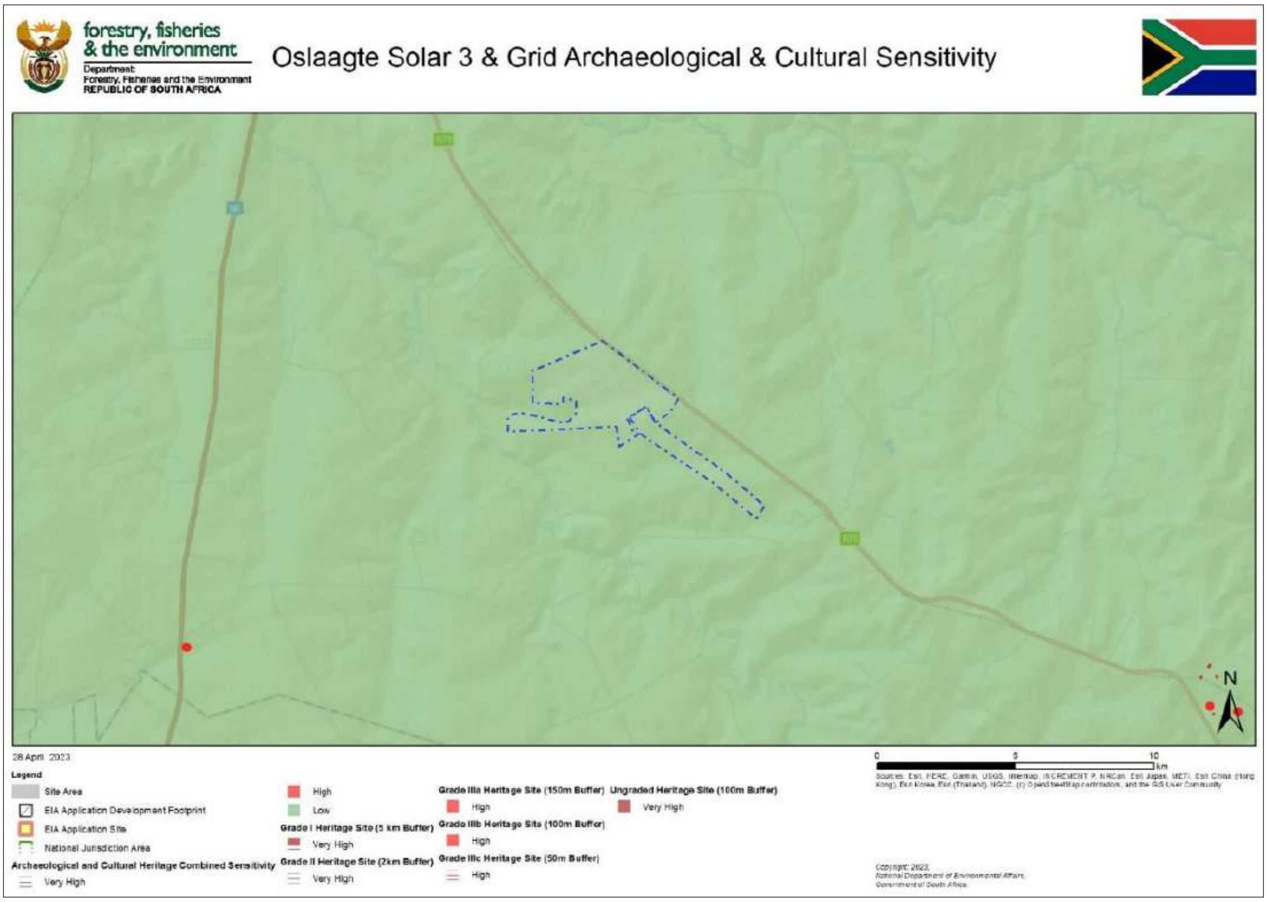


Figure 23: Archaeological Cultural Sensitivity Map indicating that the project footprint is located within a region of low heritage sensitivity (DFFE Screening Tool)

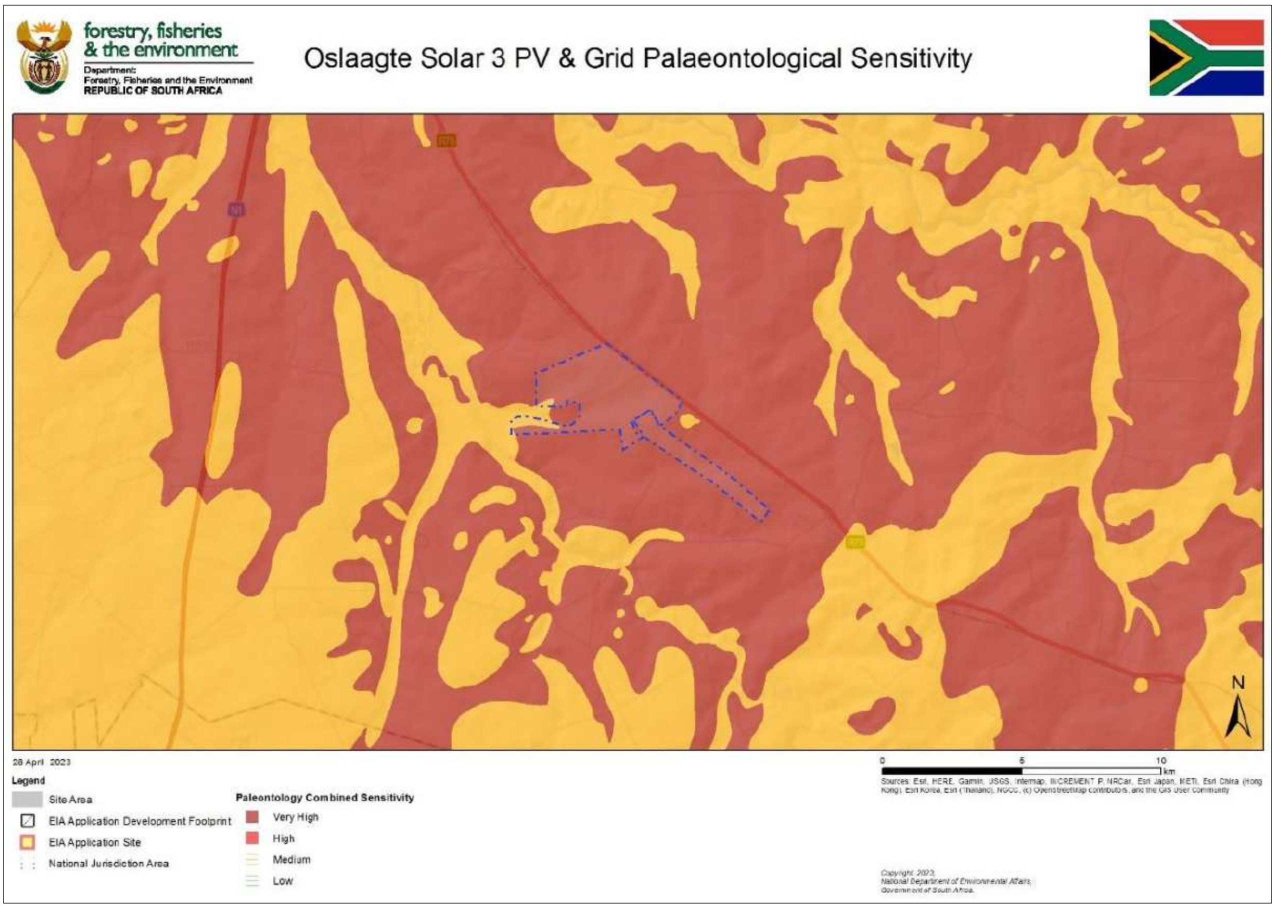


Figure 24: Palaeontological Sensitivity Map indicating that the project footprint is located within a region of Very High sensitivity

5.2.2 Historical Background of Surrounding Region (archaeological and historical literature survey)

The Free State is rich in archaeological and historical resources and includes significant aspects such as Later Stone Age rock art, Battlefields and Iron Age stonewalled enclosures. The general region of the project area was a frontier region where San hunter-gatherers, Nguni and Sotho-Tswana agro-pastoralists, Dutch Voortrekkers and British Colonists all interacted.

The archaeological history of the area can broadly be divided into a Stone Age, Iron Age and Historic or Colonial Period. An overview of the general region is presented below.

The Stone Age

The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and the material culture of the earliest people comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian which is comprised of more refined stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates to approximately 1.5 million years ago. No ESA sites are known from the study area and surrounding region (Fourie 2021; Angel and Kitto 2018).

The Middle Stone Age (MSA) material culture is associated with flakes, points and blades manufactured by means of the prepared core technique. This phase is furthermore associated with modern humans and complex cognition (Wadley, 2013). Not many sites are known in the immediate area of the project footprint, however, research fieldwork by the National Museum in Bloemfontein, recorded ten sites where MSA and/or Later Stone Age lithics were identified in association with mammal fossil remains from erosion channels along the Sand, Vet and Doring Rivers (De Ruiter *et. al*. 2011; Fourie 2021; Angel and Kitto 2018).

The Later Stone Age (LSA) is the third archaeological phase and is characterised by very small stone tools known as microliths. This period is associated with hunter-gatherers (San) as well as early pastoralists (Khoekhoe) and lasted until the arrival of Iron Age and European communities (and in some areas, for a considerable period). Apart from the occurrence of LSA stone tools along the Sand, Vet and Doring Rivers (see above), no other LSA sites are known from the surroundings of the study area.

The Later Stone Age is also associated with the production of rock engravings and rock paintings. Rock engravings are known from the wider vicinity of the study area (Bergh, 1999). The closest rock art site in the general area is Spitskop. Spitskop is located 12 km west of Verkeerdevlei on the link road to the N1 in the Brandfort District. The Spitskop site consists of three San or 'Bushman', as well as Khoe or 'Khoi' rock-engraving sites located on adjacent farms which are all relatively close to a sandstone mountain known as Spitskop. There are images of eland, geometric forms, human figures, and ostrich (Ouzman, S. 2001); http://www.nasmus.co.za/departments/rock-art/public-rock-art-sites).

The Iron Age

The Iron Age in South Africa (c.AD 1600 – c.AD 1840) is associated with pre-colonial farming communities and includes both agricultural and pastoralist farming activities, metal working and stone-walled settlements known as the 'Central Cattle Pattern' (Huffman, 2007), as well as cultural customs such as lobola. According to the distribution map for Iron Age settlements on the Southern Highveld as published in Maggs (1976:38-39), the project area is located within the western boundary of the known distribution of such Late Iron Age sites. The distribution maps as published by Huffman (2007) also indicate that the project area is located very close to the periphery of two Iron Age ceramic typological sub-groups known as facies. These two Iron Age facies are known as Thabeng and Makgwareng.

The Thabeng facies of the Moloko Branch of the Urewe Tradition is one of the facies identified within the study area. The decoration on the ceramics associated with this facies is characterised by incised triangles, coloured chevrons and arcades. The Tlhaping at Dithakong, Rolong at Platberg and the Kubung from the Free State form a Southwestern Sotho-Tswana cluster that is associated with this Thabeng facies pottery and so-called 'Type Z' settlement layouts (Huffman, 2007). The Type Z settlements are one of the Late Iron Age stonewalled settlement types identified initially by Tim Maggs during his extensive archaeological research project on the Iron Age of the southern Highveld (Maggs, 1976), which includes the present project area. These Type Z sites are characterised by large primary enclosures surrounded by characteristic dwellings, the layout of which comprises two sections or lobes, one being larger than the other. Each of these 'bilobial' dwellings comprises a hut at its front with a semi-circular courtyard at the back. While a number of Type Z sites are located within the general region of the project area, one of the more well-known ones is OXF1, situated a short distance north-west of the town of Ventersburg. Ventersburg is located approx.45km south of Kroonstad. This site was excavated by Tim Maggs during the 1970s as part of his overall research project (Maggs, 1976).

The next known Iron Age period within the surroundings of the study area is represented by the Makgwareng facies of the Blackburn Branch of the Urewe Ceramic Tradition (Huffman 2007). The decoration on the ceramics from this sub-group is characterised by finely stamped triangles, rim notching and appliqué (Huffman, 2007). This sub-group developed from Ntsuanatsatsi south of the Vaal River and can be associated with the so-called 'Type V' stone walling settlement type (Huffman, 2007). Dreyer (1990) also conducted excavations on Type V Late Iron Age stonewalled settlements located a short distance south-west of Winburg, which is approx. 100km south of Kroonstad. The Type V settlements comprise a core of cattle enclosures surrounded by beehive huts. Corbelled stone huts are associated with this walling type. They are low stone huts located at the edge of the cattle enclosures (Huffman 2007).

The best known site of this type found within the surroundings of the study area, is a site known as "Early Sotho Settlement, Waterval, Sandrivierhoogte" that was originally declared a National Monument and which is now registered as a Provincial Heritage Site in terms of the National Heritage Resources Act (No 25 of 1999). The site is located roughly 42km south-east of the present study area. The original declaration as a national monument was on 17 December 1982. In the declaration, the site is described as a "Leghoya Village" comprising corbelled huts and stonewalls (Govt. Gazette No. 8481, 1982).

Historical/Colonial Period

From roughly the 1820s, there was a period characterised by conflict across the Southern Highveld. This resulted from the migration of three Nguni groups from the current Kwazulu-Natal province into the present-day Free State province which was a result of the expansion of the Zulu kingdom under King Shaka. The three Nguni groups were the Hlubi of Mpangazitha, the Ngwane of Matiwane and the Khumalo Ndebele (Matabele) of Mzilikazi. The migrations of all three groups would have had a definite impact on the northern Free State (Fourie 2021).

During the early Colonial Period (early 1800s) the study area and surroundings became known as Transorangia. The people called the Griqua had moved into the area in the years prior to 1804. Then a few white Trekboers started moving across the Orange River from the Cape Colony in search of better grazing for their livestock during times of drought. At first the farmers requested permission from the Cape authorities before crossing the river. However, later groups moved into the Transorangia region without permission (Fourie 2021, citing Schoeman, 1980). During the 1830s, this occasional movement developed into a mass migration of Afrikaner families from the Cape Colony to the interior. This mass migration became known as the 'Great Trek' and the families were known as Voortrekkers (Fourie 2021, citing Visagie, 2011). The first Voortrekker party of some 70 wagons crossed over the Orange River during early 1836. More groups followed and established themselves along the Vet River (Fourie 2018, citing Schoeman, 1980).

In 1841 the town of Winburg was established on the banks of the Vet River. It was laid out on the farm Waaifontein in 1841 and became a municipality in 1872. Raper (2014) notes that the name, originally spelt Wenburg, which means 'town of winning'. He considered that this original spelling may refer to a military victory over the Matabele at Mosega on 17 January 1837, or to the triumph of those residents of the town who were in favour of Waaifontein as the site of the town (Raper 2014). After the annexation of Natal by the British in 1843 and the subsequent dissolution of the Voortrekker Republic of Natalia, Winburg became the capital of the Voortrekkers in what is today known as the Free State (Erasmus, 2014). Winburg is located nearly 83km south-west of the project area.

In 1846, Major H.D. Warden was appointed British Resident of the area between the Orange and the Vaal rivers, to maintain peace between the various population groups. In 1848, General Harry Smith annexed the area between the Orange and Vaal rivers as British territory and named it the Orange River Sovereignty. However, due to ongoing conflict between the Boers, the Griqua people and the Basotho people, the British government subsequently withdrew from the Orange River Sovereignty in 1854 and the area became an Afrikaner republic, the Orange Free State, with JP Hoffman as first Afrikaner State President and Bloemfontein as the state capital (Afrikaans community 1820-1899 | South African History Online (sahistory.org.za)).

On 16 January 1852, the Sand River Convention was signed between the British Government and the Transvaal Boers. This convention formally recognised the existence and independence of a Boer Republic north of the Vaal River by the British Government, namely the Zuid-Afrikaansche Republiek (South African Republic). The site where the signing of the convention took place, was declared a monument and for many years was marked by a stone cairn and plaque (Fourie 2021, citing Oberholster, 1972). The site is located near the bridge where the N1 highway passes over the Sand River and is located approximately 53.36 km south- west of the present project area.

The Town of Kroonstad was laid out on the farm Klipplaatsdrift in 1855. It is generally accepted to have been named after Kroondrift, a ford on the Vals/Valsch River, so called because a horse named Kroon broke its leg there (Raper 2014).

After the end of the Anglo-Transvaal War (also referred to the First South African War) which ended the two-year British annexation of the Zuid-Afrikaansche Republiek (ZAR), the Pretoria Convention of 1881 redefined the western boundary of the ZAR which was moved from the Makwassie Spruit to roughly the Harts River. In 1884, the western boundary of the Z.A.R. was again moved further west following the recommendations of the London Convention (Bergh, 1999).

The railway line between Bloemfontein and Johannesburg was built during the early 1890s, and eventually reached Johannesburg during September 1891 and Pretoria in January 1892 (Fourie 2021, citing Schoeman, 1980).

The Second South African War (1899 – 1902) was fought between the Boer Republics of the Transvaal and Free State against Great Britain but the victims and participants of the war were not excluded to British or Boer citizens alone.

During this war, a concentration camp was located at Kroonstad, somewhere in the vicinity of the Valsch Rivier. This was at first divided into two sections, with people from the Lindley district on the south side of the river and those from other districts on the north side. However, flooding of the river cut off the Lindley people completely and made it impossible to provide them with rations, so the Lindley people were transferred to the main section south of the river. The camp at Kroonstad seems to have been formed between September and November 1900. Quite a few farms had been burnt by 1900, resulting in a substantial influx of homeless families into the town. A camp for black people was also established but information on the location and other details is lacking (British Concentration Camps of the South African War 1900-1902 (uct.ac.za).

At the beginning of the First World War (1914-1918) when the South African Government of General Louis Botha notified Great Britain of their willingness to support that country against Germany several former Boer Generals, such as Christiaan de Wet, JCG Kemp and General Christiaan Frederik Beyers led an armed rebellion. An incident which occurred close to Kroonstad was an attempt by De Wet with about 1500 or more men to capture the railway station at Virginia, roughly 55km southwest of Kroonstad, which was held by about 250 government troops. The troops held off the rebels until government reinforcements and a train arrived (The-Boer-Rebellion-in-South-Africa-pdf.pdf (moltenofamily.net). Several casualties of the Rebellion are buried in the old Kroonstad Cemetery (SJ de Klerk 2021, Battlefields Route – Koppies to Kroonstad | The Heritage Portal).

In 1975, Winnie Mandela was incarcerated at the Kroonstad Prison. In February 1975, our founding President, the late Nelson Mandela, wrote her a letter where he was encouraging her not to let Prison break her down (www.sahistoryonline).

In 2014 the Kroonstad Correctional Centre was officially renamed to the 'Bizzah Makhate Correctional Centre". This name pays tribute to the late Comrade; Wilfred Sefularo ‘Bizzah’ Makhate who was incarcerated at this facility in the eighties (https://www.gov.za/kroonstad-correctional-centre-officially-renamed-bizzah-makhate-correctional-centre).

Reverend Zaccheus Richard “ZR” Mahabane, lived and worked in Kroonstad for most of his long career, and is buried in Seeisoville Cemetery in Maokeng, although he was born in Thaba Nchu. Rev. Mahabane was one of the Founding Fathers of the ANC, and was elected ANC President in 1924. He constantly strove for black unity and together with Mr A Abdurahman established the non-European Unity Movement (NEUM) between 1927 and 1934. In 1935 he served as an executive committee member of the All Africa Convention (AAC), a federal body that gave expression to the aspirations of black people and fought against the Native trust and Land Act promulgated in 1936. He was elected as ANC President for the second time from 1936 – 1940. He also played a prominent role in the development of the Methodist Church in South Africa and helped draft the church’s constitution and define the equal status of all in the church (Verwey 1995, SA History Online). His grave in Seeisoville Cemetery was recently declared as a National Heritage Site (Govt Gazette Notice No.380 2019).

5.2.3 Cartographic findings

An assessment of available historical topographical maps was undertaken to establish a historic layering for the study area. Overlays of the maps were made on Google Earth. These historic maps are valuable resources in identifying possible heritage sites and features located within the study area. It should be noted that the earliest edition of the map sheets for this area dates to 1960, it was not considered necessary to examine the later edition map sheets. Any heritage resources that are 60 years or older would be depicted on the 1960 edition sheet. The topographical maps were obtained from the Department of Agriculture, Land Reform and Rural Development (DALRRD) in Cape Town

The following 1:50 000 map sheet was assessed for the Oslaagte Solar 3 PV and LILO Corridor footprints: 2727CD Wonderhoek Edition 1 1960. The map was surveyed in 1960 and drawn in 1962 by the Trigonometrical Survey Office of the Republic of South Africa from aerial photographs taken in 1951.

Figure 25 and **Figure 26,** below, both show an enlarged view of the 1960 edition map which depicts two heritage features within the Oslaagte Solar 3 PV footprint – Alternative 1 and Alternative 2 layout (both are homesteads) and one historical farmstead just on/outside the western central boundary.

Figure 27, below, shows a second enlarged view of the 1960 edition map which depicts two heritage features within the MTS and LILO Corridor footprint. One shows structures of a historical farmstead and the other shows homesteads. There are also two homestead clusters located outside the LILO Corridor footprint.

Therefore, a total of six heritage features are depicted on the 1960 edition of the topographic map, four which are located within the combined footprints for the Oslaagte Solar 3 PV project and the LILO Connection corridor and three are located outside the respective footprints.

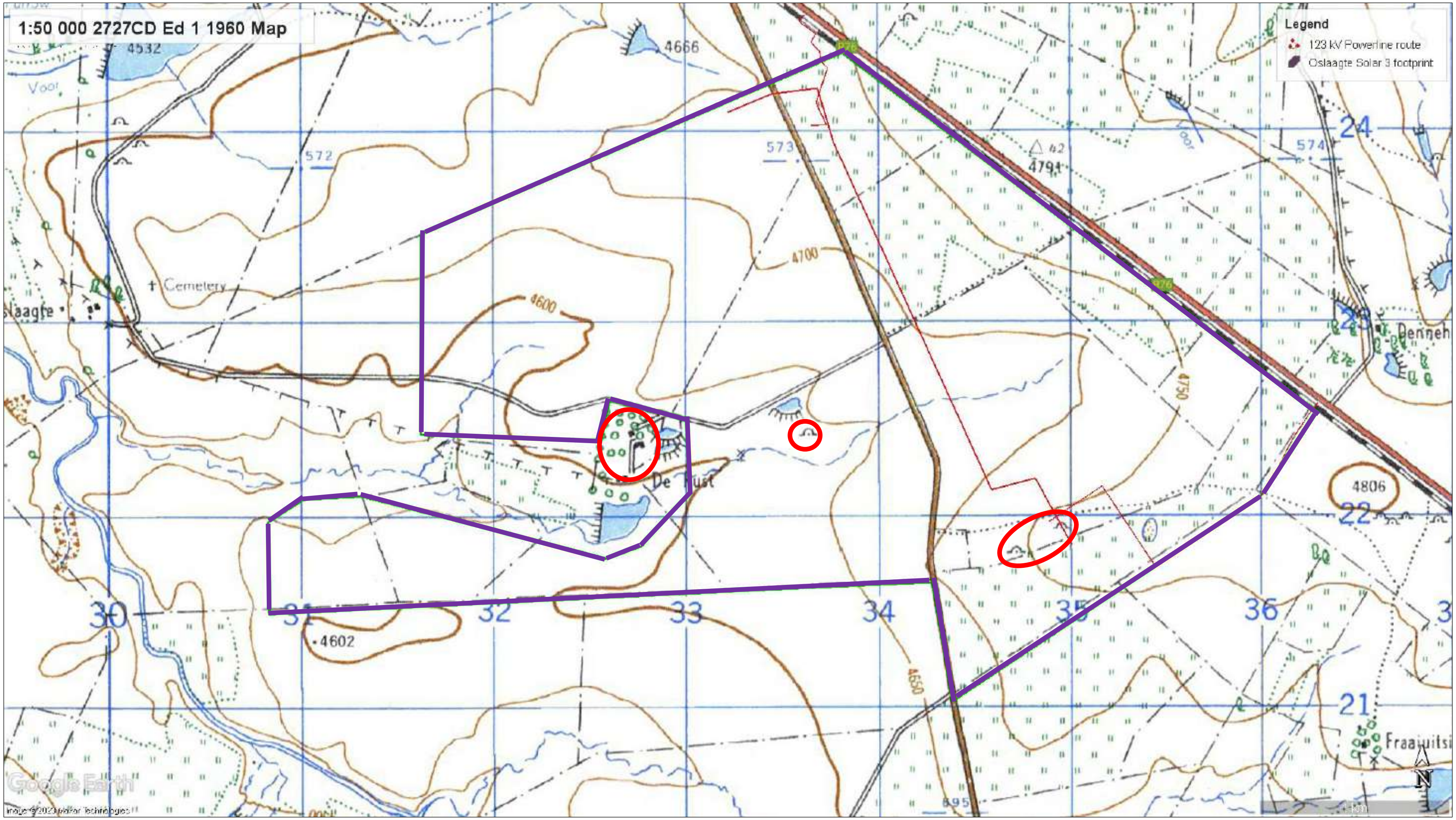


Figure 25: Enlarged view of topographic map 2727CD Ed 1 1960, depicting two heritage features within the Oslaagte Solar 3 PV footprint – Alternative 1 layout. One single homestead and a group of two homesteads are depicted in the southern section of the footprint area. A historical farmstead is depicted just outside the western central boundary of the project footprint (red polygons).

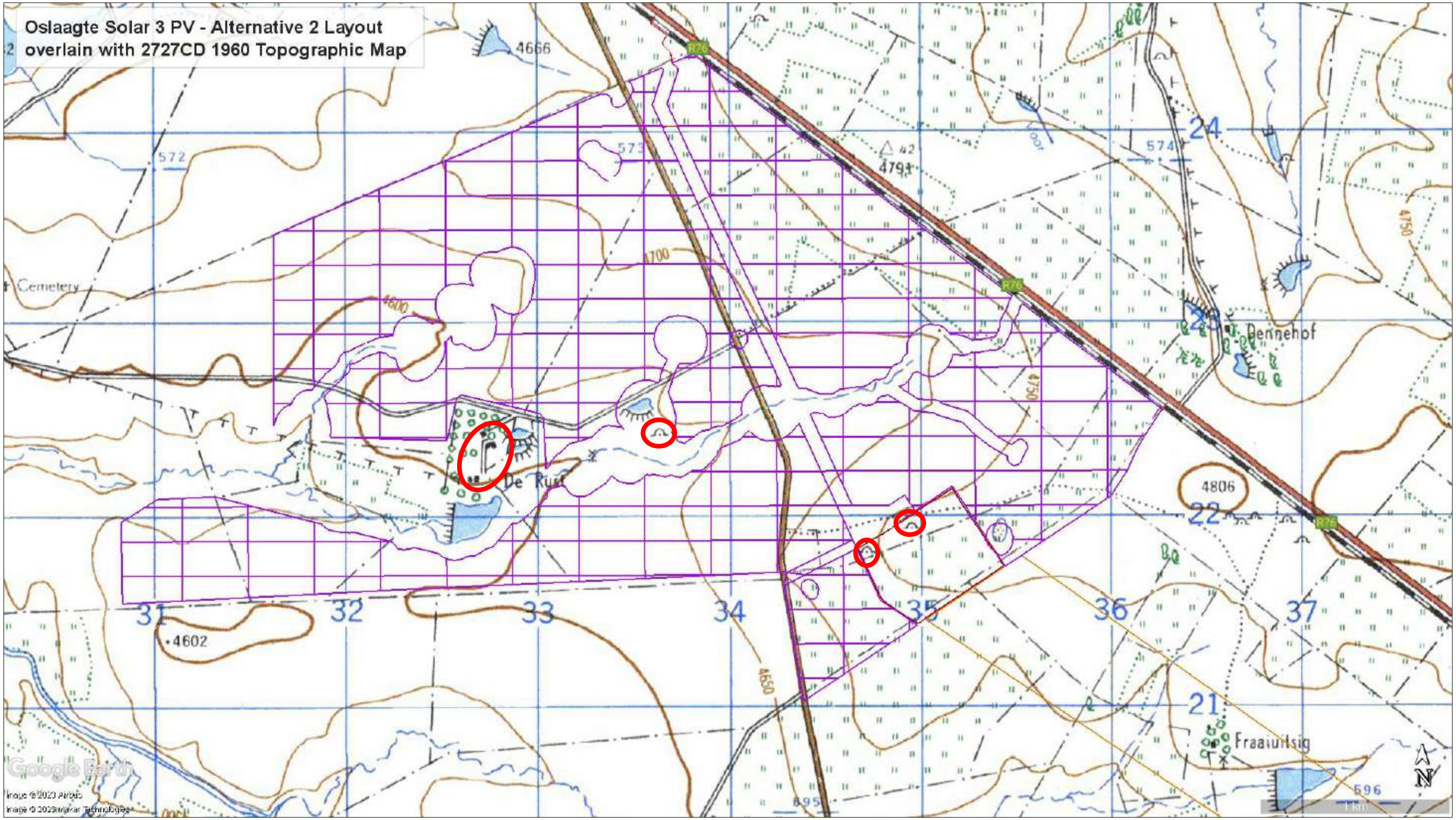


Figure 26: Enlarged view of topographic map 2727CD Ed 1 1960, depicting two heritage features adjacent to the Oslaagte Solar 3 PV footprint – Alternative 2 layout red polygons); A historical farmstead is depicted just outside the western central boundary of the project footprint and a single homestead is depicted close to a farm dam. Two single homesteads are depicted in the MTS footprint area (red polygons).

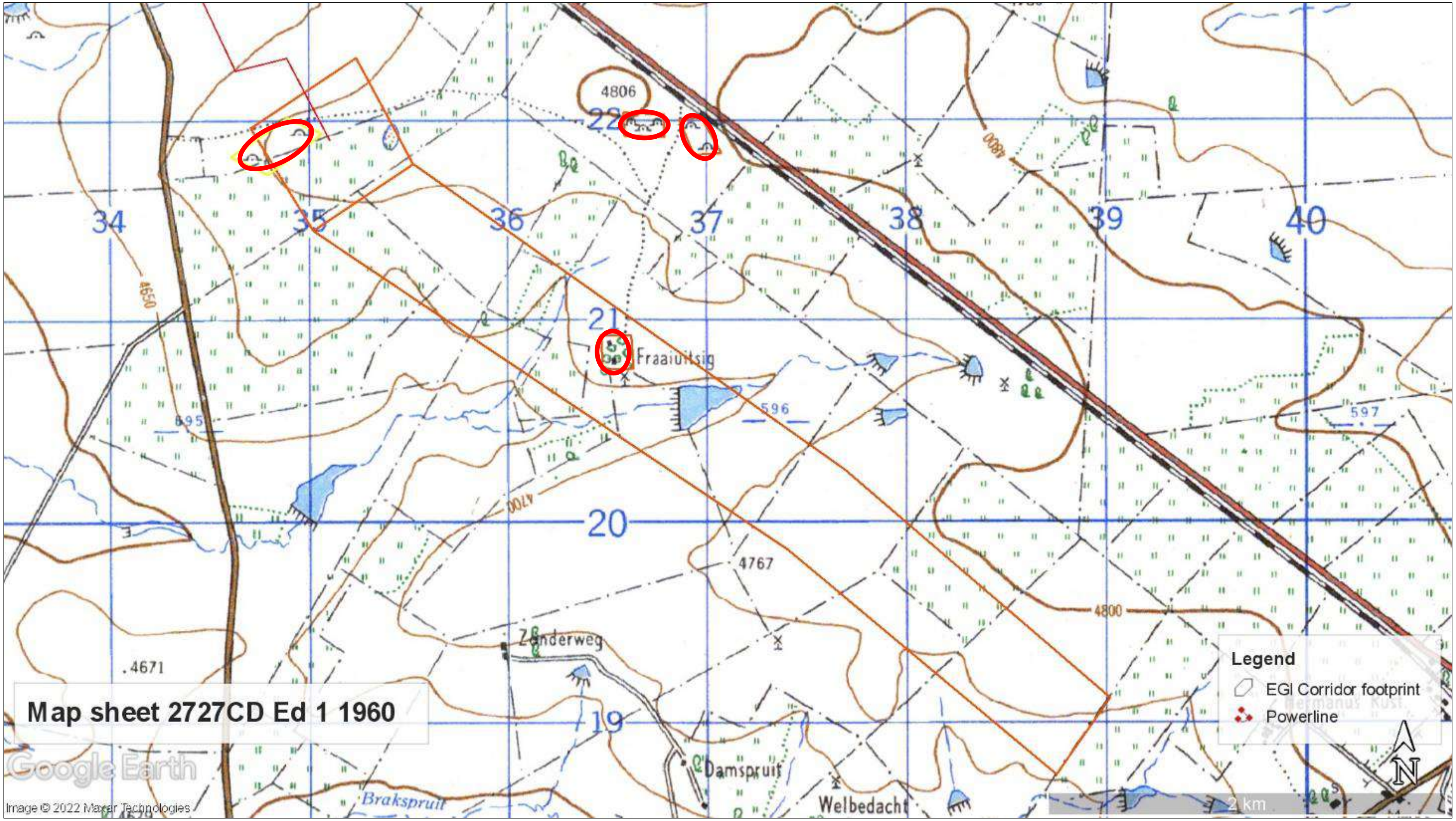


Figure 27: Enlarged view of topographic map 2727CD Ed 1 1960, depicting two heritage features within the MTS and LILO Corridor footprints (orange polygon). One depicts structures of a historical farmstead and the other depicts homesteads. There are also two homestead clusters located outside the LILO Corridor footprint (red polygons)

5.3 Previous HIA reports in the area

A search on the South African Heritage Resources Information System (SAHRIS) has identified several Heritage Impact Assessments conducted in and around the study area.

Fourie, W. 2021. HIA for *The Proposed Harmony Fss6 Reclamation Pipeline, Welkom, Free State Province.* During the survey, no heritage sites were identified.

Lavin, J. 2020. *Archaeological Specialist Study In terms of Section 38(8) of the NHRA for a Proposed development of the Vrede and Rondavel Solar Energy Facilities near Kroonstad, Free State Province*. Two Later Stone Age scatters and one isolated flake (RDW003) were identified within the area proposed for the Rondavel SEF. A series of four stone cairns were also identified, as possible graves.

Van der Walt, J. 2019. *Heritage Desktop Report Lengana Health SA Prospecting Application, Koppies, Free State Province.* The proposed prospecting activities were located on Felix 318, Goedgunst 315, Kronenbloem 51, Ventersbloem 163, Oceaan 64, Oceaan 99, Broodkop 304, Enkelsbosch 31, Hooge Bult 542, Geluk 237, Verdeel 278, Goudlaagte 238, Ongegund 507. The desktop study noted that structures of unknown age occur within the prospecting right area, no stone walled settlements were visible on aerial images consulted and no known graves occur in the study area, although informal graves could be expected in the study area.

Angel, J and J Kitto. 2018. *Kophia Diamonds (Pty) Ltd Catherine's Fancy 831, which forms part of the Blaauwbosch Mine, Boshof District, Free State Province Heritage Impact Assessment.* The HIA was necessitated by the discovery of skeletal material during mining activities on the farm Catherine's Fancy. Seven heritage resources were located, not including the accidentally discovered burial ground. These included three Middle Stone Age sites and four historical structures.

De Bruyn, C. 2018. *Basic Assessment Report for the Prospecting Right and Environmental Authorisation Application for Kroonstad South Situated in the Free State Province*. A cemetery with several marked and unmarked graves as well as two historical farmhouses were found within the project area.

De Jong, RC. 2011. *Specialist Study: Heritage Impact Assessment for the Installation of the Sirius Fibre Optic Cable between Johannesburg and Yzerfontein, Gauteng, Free State, Eastern and Western Cape Provinces.* The cable corridor included the section of the N1 roads between northern Johannesburg and Bloemfontein via Kroonstad, Ventersburg and Winburg. No significant heritage resources were identified along the N1 in the Kroonstad area.

5.4 Palaeontological sensitivity

Note that this section was compiled by the author and not by a palaeontological specialist. A basic palaeontological sensitivity was determined using the SAHRIS database South African Fossil Sensitivity Map (http://www.sahra.org.za/sahris/map/palaeo). This map indicates that the combined footprint for the Oslaagte Solar 3 PV project and LILO Corridor falls within an area of mainly Very High (red colour) fossil sensitivity (see **Figure 28** below), with a small section shown as moderate sensitivity (green). The different palaeontological sensitivities that are defined on the SAHRIS Palaeontological Sensitivity Map are outlined in the table below. Due to the underlying area being mainly of Very High sensitivity for fossils, a separate palaeontological assessment is being undertaken by a professional palaeontologist. The recommendations and mitigation measures provided in the assessment must be implemented where necessary.

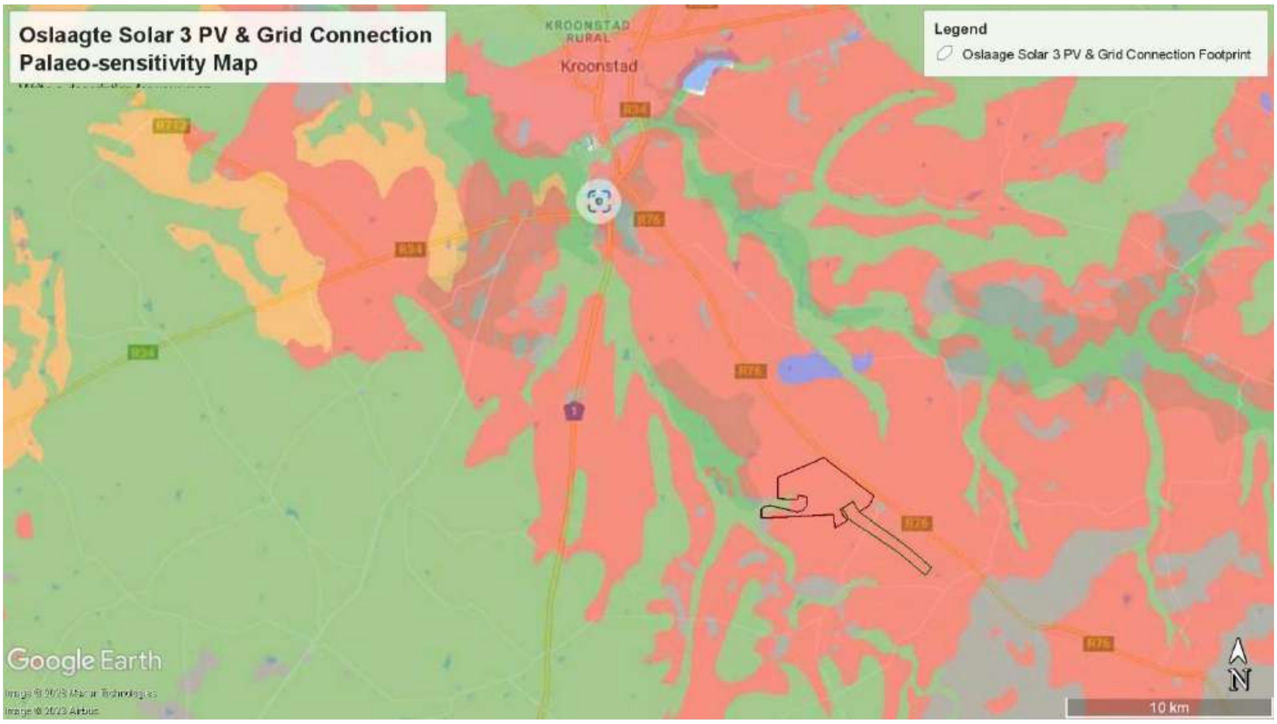


Figure 28: SAHRIS Palaeo sensitivity map overlain on the combined footprint for the Oslaagte Solar 3 PV project (red polygon) and LILO Corridor (green polygon). The underlying geology is shown as having mainly Very High fossil sensitivity (red).

Table 3: SAHRIS Fossil Map Palaeontological Sensitivity Ratings and Required Actions

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required.
ORANGE/ YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely to be requested.
GREEN	MODERATE	Desktop study is required.
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required.
GREY	INSIGNIFICANT /ZERO	No palaeontological studies are required.
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information becomes known, SAHRA will continue to populate the map.

5.5 Findings of the Historical Desktop Study

The general overview from the historical desktop study has shown that various archaeological and historical resources can be expected to occur in the project area. Furthermore, the examination of the earliest edition (1960) of the 1:50 000 topographical maps produced by overlying the maps with satellite Imagery (Google Earth) has shown that at least four heritage features could be present within the project footprint.

The Site Survey fieldwork provided confirmation of the heritage features depicted as occurring within and close to the PV project and LILO connection footprints.

6 SITE SURVEY/FIELDWORK RESULTS

The survey of the Oslaagte Solar 3 PV project and MTS/LILO corridor footprints took place over three days (21 December 2022, 7 January 2023 and 12 April 2023) by the author (heritage specialist) with an assistant and as part of a specialist team. A vehicle was used to access the project footprint areas and the survey was conducted by both vehicle and on foot (at selected areas). The survey covered as much of the project footprint area as was feasibly accessible, given the long grass and dense acacia thicket covering several areas, certain sections of wetlands and roads which were flooded due to rain, as well as certain sections which were not accessible due to locked gates or a combination of dense vegetation and animal burrows.

The author used a Global Positioning System (GPS) application to navigate access roads in the study area and for recording the tracklog of the survey and waypoints of the identified heritage resources. A Sony digital camera and Samsung mobile phone were used for photographic recording of identified heritage resources and general images of the project study area. The survey aimed to find and identify archaeological and other heritage resources such as burial grounds and graves (BGG), archaeological material or sites, historic built structures or remains and landscape features of cultural heritage significance.

The inspection of the Oslaagte Solar 3 PV footprint identified six heritage resources within or adjacent to the general PV footprint. Four are located within and two adjacent to the project footprint (Alternative 1). These include: a historical farmhouse with an outbuilding and a stone kraal (Os3-01), a railway culvert (Os3-04) and a disused road culvert (Os3-05), two areas with demolished structure remains (Os3-02 and Os3-06) and a possible grave (at Os3-02). One site could be the remains of a farm dam wall (Os3-03). The identified heritage resources are all avoided by the Alternative 2 layout.

The survey of the MTS/LILO Corridor footprint identified a total of six heritage resources within or adjacent to the footprint. Two of these sites are located just outside the boundary of the project footprint, the remaining four sites are located within the project footprint (Alternative 1 and Alternative 2). These included the remains of an historical farmstead (LILO-05), the remains of a stone wall (LILO-04, probably a kraal) and three informal graveyards or potential graves (LILO-01, LILO-02, LILO-06). One site is the remains of a homestead which may contain potential graves (LILO-03).

The description of the sites identified has been separated between the Oslaagte Solar 3 PV footprint area and the MTS/LILO Corridor area.

Identified Heritage Sites – Oslaagte Solar 3 PV Footprint

Site Name	Os3-01. Historical Farmhouse Structures
GPS Coordinates	27°49'30.62"S, 27°19'56.25"E (Os3-01.1); 27°49'35.50"S, 27°19'48.42"E (Os3-01.2)
Site Description	The site comprises a historical farmstead with a house (Os1-01.1) and one visible outbuilding. A historical stone kraal is situated near to the house. Approx. extent 24.6 ha (estimate from satellite imagery).
Approximate Age	More than 60 years old as it is depicted on the 1960 topographical map.
NHRA, No. 25	Section 34 of the Act
Field Grading and Ratings	
Site context and description	The site contains at least two historical buildings (farm house and outbuilding) situated within a grove of eucalyptus trees and is fenced. A partially collapsed stone kraal is situated outside the eucalyptus grove and fence. There are five structures depicted in this location on the 1960 topographic map 2727CD.
Site Density	Only two structures were visible within the fenced area. The kraal is situated outside the fenced area. However, more structures could be present. The site was extremely overgrown and time constraints did not allow a detailed investigation.
Uniqueness	Low
Heritage Significance	IIIB / GP.B - Medium, as at least two buildings and the kraal are still extant.
Mitigation	The site is situated immediately adjacent to the western-central boundary of the project footprint (Alternative 1 and Alternative 2). However, the site should be avoided and demarcated as a “no go” area to avoid any indirect impact.

Figure 29: View of historical farmhouse at Os3-01, showing the eucalyptus trees and dense vegetation.

Figure 30: View of associated brick outbuilding, with the roof missing

Figure 31: View of the partially collapsed stone kraal, overgrown with vegetation

Figure 32: View of the kraal showing animal ramp which may still be in use

Site Name	Os3-02_Structure remains
GPS Coordinates	27°49'12.29"S; 27°19'50.35"E
Site Description	Probable structure remains and a potential grave
Approximate Age	Unknown. Nothing is depicted in this location on the 1960 map or later editions.
NHRA, No. 25	Section 34 of the Act
Field Grading and Ratings	
Site context and description	The site comprises foundation remains of structures: a cluster of stones and rocks associated with a rectangular cement foundation and a circular cement foundation with adjacent stone cairn (potential grave). These foundation remains are located approx. 352m north of the historical farmhouse and buildings at Os3-01. The extent is roughly 875m^2.
Site Density	Two foundations with wall remains and one stone cairn
Uniqueness	Low
Heritage Significance	IIIC / GP.C – Low; except for potential grave
Mitigation	The circular foundation and adjacent stone cairn (potential grave) are located just inside the PV array area on the central-west section of the Solar PV footprint – Alternative 1. but avoided by the Alternative 2 layout. Due to the presence of a potential grave, the site should be avoided with a 20-30m buffer and any site clearance activities should be monitored by a heritage specialist/archaeologist.

Figure 33: View of cement foundation with remains of stone walls at Os3-02

Figure 34: View of circular cement foundation at Os3-02

Figure 35: View of the stone cairn (potential grave) situated adjacent to the cement circle

Site Name	Os3-03_Structure Remains?
GPS Coordinates	27°48'46.14"S; 27°20'18.75"E
Site Description	Excavation with a line of stones along one edge.
Approximate Age	Unknown. Nothing is depicted at this location on the 1960 map or later editions.
NHRA, No. 25	N/A
Field Grading and Ratings	
Site context and description	This is a large, shallow excavation into a sandstone outcropping, with a linear stone concentration along one edge. It could possibly be the remains of a farm dam wall.
Site Density	N/A
Uniqueness	Low
Heritage Significance	Not Conservation Worthy
Mitigation	No mitigation required

Figure 36: View of the excavation showing linear stone concentration along one edge, Os3-03

Figure 37: View along the linear stone concentration

Site Name	Os3-04_Historical Structure
GPS Coordinates	27°49'7.26"S; 27°21'36.92"E
Site Description	Historical Railway culvert
Approximate Age	Likely to be more than 60 years old as the railway is depicted on the 1960 topographical map.
NHRA, No. 25	Section 34 of the Act
Field Grading and Ratings	
Site context and description	The site is a concrete railway culvert, located within the railway reserve, just outside (± 15m) the eastern boundary of the PV array footprint (Alternative 1). It is avoided by the Alternative 2 layout.
Site Density	N/A
Uniqueness	Low
Heritage Significance	IIIC/ GP.C
Mitigation	The site is located within the fenced off railway reserve. No further mitigation required.

Figure 38: View of the concrete railway culvert at Os3-04

Site Name	Os3-05_Historical structure
GPS Coordinates	27°49'26.59"S; 27°20'48.08"E
Site Description	Concrete road bridge/ culvert over river
Approximate Age	More than 60 years old as the road (and river) is depicted on the 1960 topographical map.
NHRA, No. 25	Section 34 of the Act
Field Grading and Ratings	
Site context and description	The site comprises a concrete bridge/ culvert for a disused road crossing a river (road shown on 1960 map). It is located outside the PV array area of the footprint (Alternative 1 and Alternative 2) in the central section of the site area.
Site Density	N/A
Uniqueness	Low
Heritage Significance	IIIC / GP.C – Low
Mitigation	The site is avoided by both layout alternatives, but should be demarcated with a 30m buffer to prevent any indirect impact.

Figure 39: View of concrete road bridge/ culvert at Os3-05

Figure 40: View of the top of the disused road bridge/culvert

Site Name	Os3-06_Structure Remains
GPS Coordinates	27°49’7.79”S; 27°19’49.02”E
Site Description	Structure remains
Approximate Age	Nothing is depicted on the 1960 map in this location. A farm dam is depicted on the 1975, 1997 and 2007 maps.
NHRA, No. 25	N/A
Field Grading and Ratings	
Site context and description	The site comprises stone foundations with wall remains of a rectangular structure. It is located close to the site Os3-02 and a short distance away from Os3-01 (523m). The site falls within the Alternative 1 Layout and is avoided by the Alternative 2 layout.
Site Density	N/A
Uniqueness	Low
Heritage Significance	NCW
Mitigation	No mitigation required

Figure 41: View of the rectangular stone wall remains at Os3-06

Identified Heritage Sites –LILO Corridor Footprint

Site Name	LILO-01
GPS Coordinates	-27.834651°; 27.360782°
Site Description	Stone Cairn. The site comprises several stones forming a cluster adjacent to an acacia shrub, and could be a potential grave
Approximate Age	Nothing is depicted on the 1960 topographic map in this location. It is unlikely to be more than 60 years old.
NHRA, No. 25	Section 36
Field Grading and Ratings	
Site context	The site comprises several stones forming a pile adjacent to an acacia shrub and is a potential grave. The stone cairn is located within northern section of the LILO Corridor footprint.
Site Density	The site consists of a possible stone cairn overgrown by dense vegetation which obscured the visibility.
Uniqueness	Low
Heritage Significance	IIA / GP.A - High (if it is confirmed to be a grave)
Mitigation	To be avoided with a buffer of at least 30m. Due to the presence of a potential grave, the site should be avoided with a 20-30m buffer and any site clearance activities should be monitored by a heritage specialist/archaeologist.

Figure 42: General view of the stone cluster among dense vegetation, LILO-01

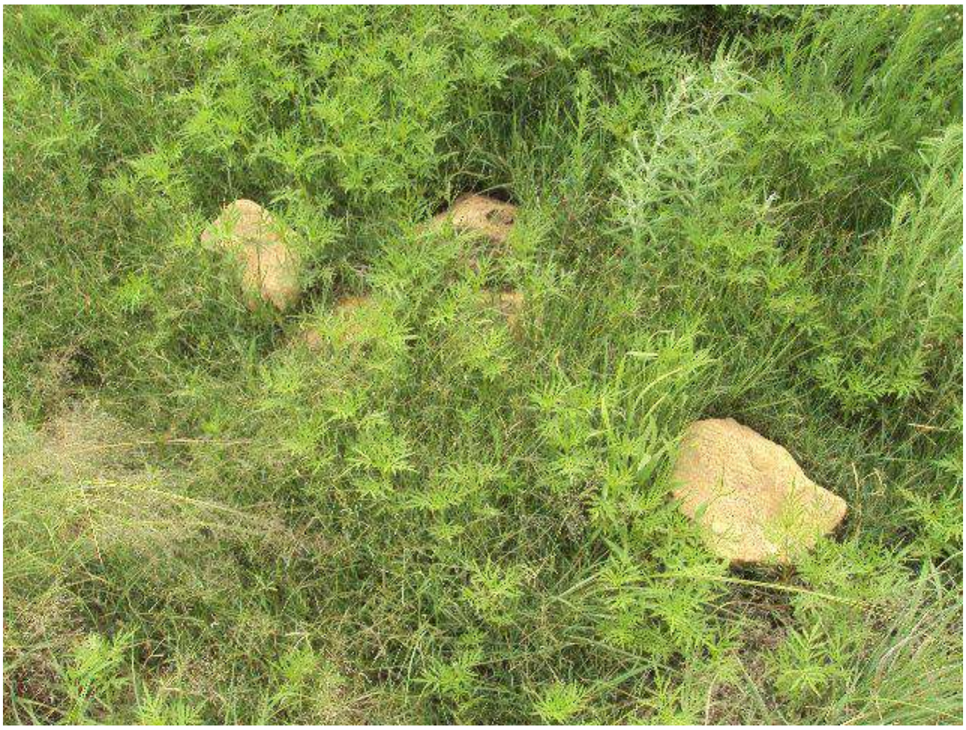


Figure 43: Closer view of the stone cluster forming a potential grave

Site Name	LILO-02
GPS Coordinates	-27.832688°; 27.357009°
Site Description	Stone cluster located adjacent to a fence boundary (potential grave).
Approximate Age	Estimated to be younger than 60 years as it is not depicted on the 1960 topographical map.
NHRA, No. 25	Section 36 of the Act
Field Grading and Ratings	
Site context	The site is a stone cluster located adjacent to a fence and is a potential grave. It is situated next in the northern section of the LILO Connection corridor footprint.
Site Density	Stone cluster forming potential grave
Uniqueness	Low
Heritage Significance	IIIA / GP. A - High (if confirmed to be a grave)
Mitigation	Due to the presence of a potential grave, the site should be avoided with a 20-30m buffer and any site clearance activities should be monitored by a heritage specialist/archaeologist.

Figure 44: View of stone cluster forming potential grave (LILO-02)

Figure 45: Closer view of stone cluster among dense vegetation

Site Name	LILO-03 Homestead with potential graves
GPS Coordinates	-27.846546°; 27.362618°
Site Description	Homestead with potential graves. Open area containing several stone concentrations.
Approximate Age	Nothing is depicted in this location on the 1960 map or later editions, so it could be older or younger than 60 years. The site was pointed out by the farmer's son who indicated that he thought it was quite old.
NHRA, No. 25	Section 34, Section 36 of the Act
Field Grading and Ratings	
Site context	The site comprises an area of open ground with vegetation that grows on disturbed ground. Part of the area is covered with many stones that could be the remains of an old kraal or could be possible graves. The site is located outside the LILO connection footprint area (approx. 800m west of the western boundary) but has been noted due to the possible presence of graves. The extent is estimated to be at least 50m by 100m.
Site Density	A large number of stones forming several concentrations.
Uniqueness	Low
Heritage Significance	IIIC / GP.C – Low (Structure Remains) IIIA / GP. A - High (potential graves)
Mitigation	As the site is located outside the footprint no mitigation is required; unless an alteration in the project design would result in an impact on the site.

Figure 46: General view of the possible homestead site, LILO-03

Figure 47: View of one of the stone concentrations

Site Name	LILO-04
GPS Coordinates	-27.839902°; 27.366812° (LILO-04A) and -27.839501°, 27.366272°(LILO-04B)
Site Description	Curved Stone wall (waypoints 04A and 04B).
Approximate Age	Although it is not depicted on the 1960 map it could be older than 60 years.
NHRA, No. 25	Section 34 or Section 35 of the Act (depending on age)
Field Grading and Ratings	
Site context	The site comprises the remains of an old, curved stone wall. It could be the remains of a historical kraal . The extent of the wall remains is approx.80m. The site is located within the upper portion of the southern section of the LILO Connection footprint area.
Site Density	Partial remains of an old stone wall.
Uniqueness	Low
Heritage Significance	IIIC / GP.C -Low
Mitigation	The site should be avoided with a buffer of 20-30m. If any impact is anticipated, a permit for demolition of the wall could be required from FS PHRA.

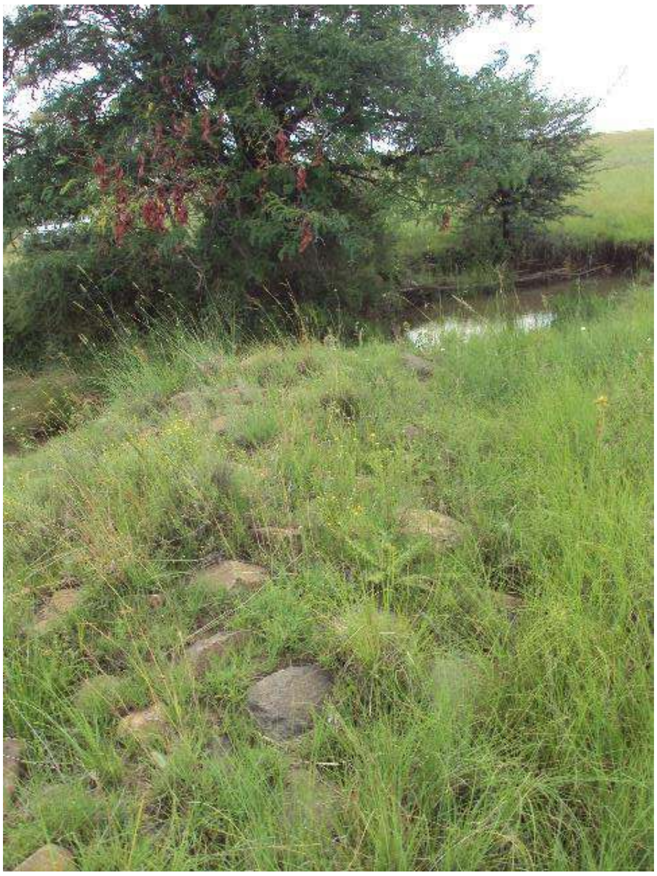


Figure 48:: View of southern end of the stone wall remains, LILO-04

Figure 49: View of the central section of the wall remains

Site Name	LILO-05
GPS Coordinates	-27.838937°, 27.370603° (05A); -27.839766°, 27.370857° (05B); -27.839896°, 27.371597° (05C)
Site Description	Historical farmstead (Waypoints 05A, 05B and 05C)
Approximate Age	Older than 60 years as this site is depicted on the 1960 map
NHRA, No. 25	Section 34 of the Act
Field Grading and Ratings	
Site context	The site is an historical farmstead. It comprises the remains of an extremely dilapidated farmhouse (LILO-05A), an outbuilding that was a barn/shed (LILO-05B) and an old kraal (LILO-05C) that has been repaired and seems to be in use still. The site extent is approx. 1.94ha. The site is located within the central portion of the southern section of the LILO Connection footprint area. It is possible that an associated graveyard may be present in the vicinity, but nothing was visible through the dense vegetation growing over the site.
Site Density	The remains of at least three historical farm buildings.
Uniqueness	Low
Heritage Significance	IIIC / GP. C - Low -Medium
Mitigation	It is recommended that the buildings should be avoided with a buffer of 30m. The project could have a direct impact on the farmstead and a permit for demolition or alteration of the buildings would be required from FS PHRA. The permit application would require that the structure remains be recorded photographically by an architectural historian.

Figure 50: View of the ruins of the farmhouse (LILO-05A)

Figure 51: View of the farmhouse construction materials; showing sandstone foundation, mud bricks and commercial bricks

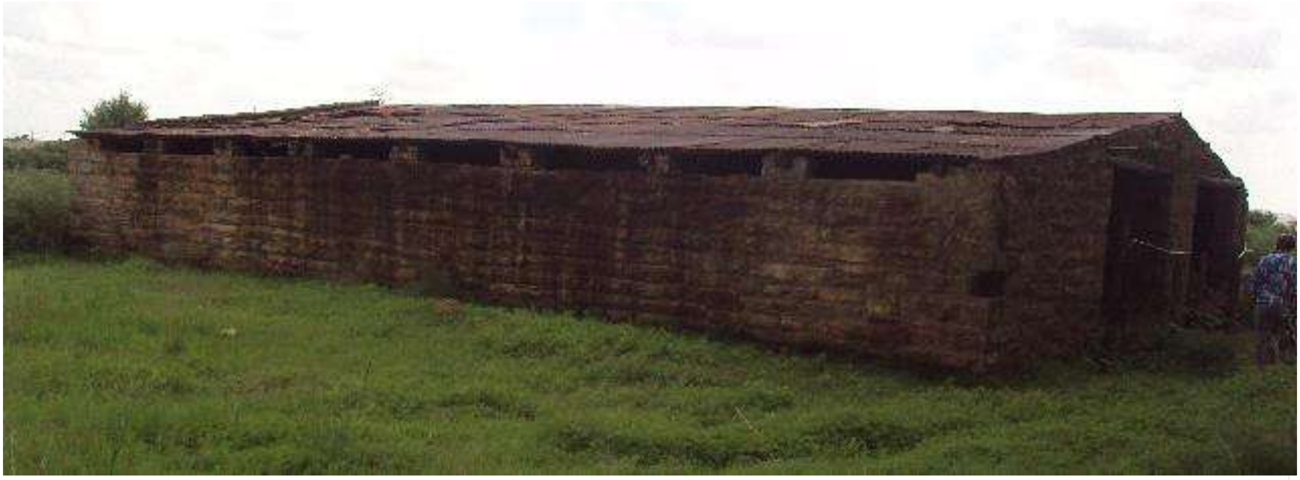


Figure 52: View of historical barn/shed building (LILO-05B)

Figure 53: View of entrance to historical barn/shed, showing sandstone construction material

Figure 54: View of historical kraal (LILO-5C) that is still in use

Figure 55: View of kraal wall, showing past repair work

Site Name	LILO-06A and 06B
GPS Coordinates	-27.845269°, 27.370236° (06A); -27.845320°, 27.370764° (06B)
Site Description	Two groups of informal stone graves located close to each other
Approximate Age	It is unknown if the graves are older than 60 years
NHRA, No. 25	Section 36 of the Act
Field Grading and Ratings	
Site context	The site comprises two groups of informal stone covered graves located close to each other. The graves were pointed out by a local farmworker. The total extent of the two groups together is approx. 60m x 20m. The number of graves is not clear, there could be 5-10 graves in each group. The site is located outside of the LILO connection footprint, approx. 240m away from the western boundary.
Site Density	Two groups each containing an unknown number of graves, possibly 5-10 in each area.
Uniqueness	Low
Heritage Significance	IIIA/ GP.A - High
Mitigation	It is recommended that the graves should be avoided and demarcated with a buffer of at least 30m. No specific mitigation is required unless an alteration in the project design would result in an impact on the site.

Figure 56: View of informal stone graves at LILO-06A

Figure 57: View of informal stone graves at LILO-06B

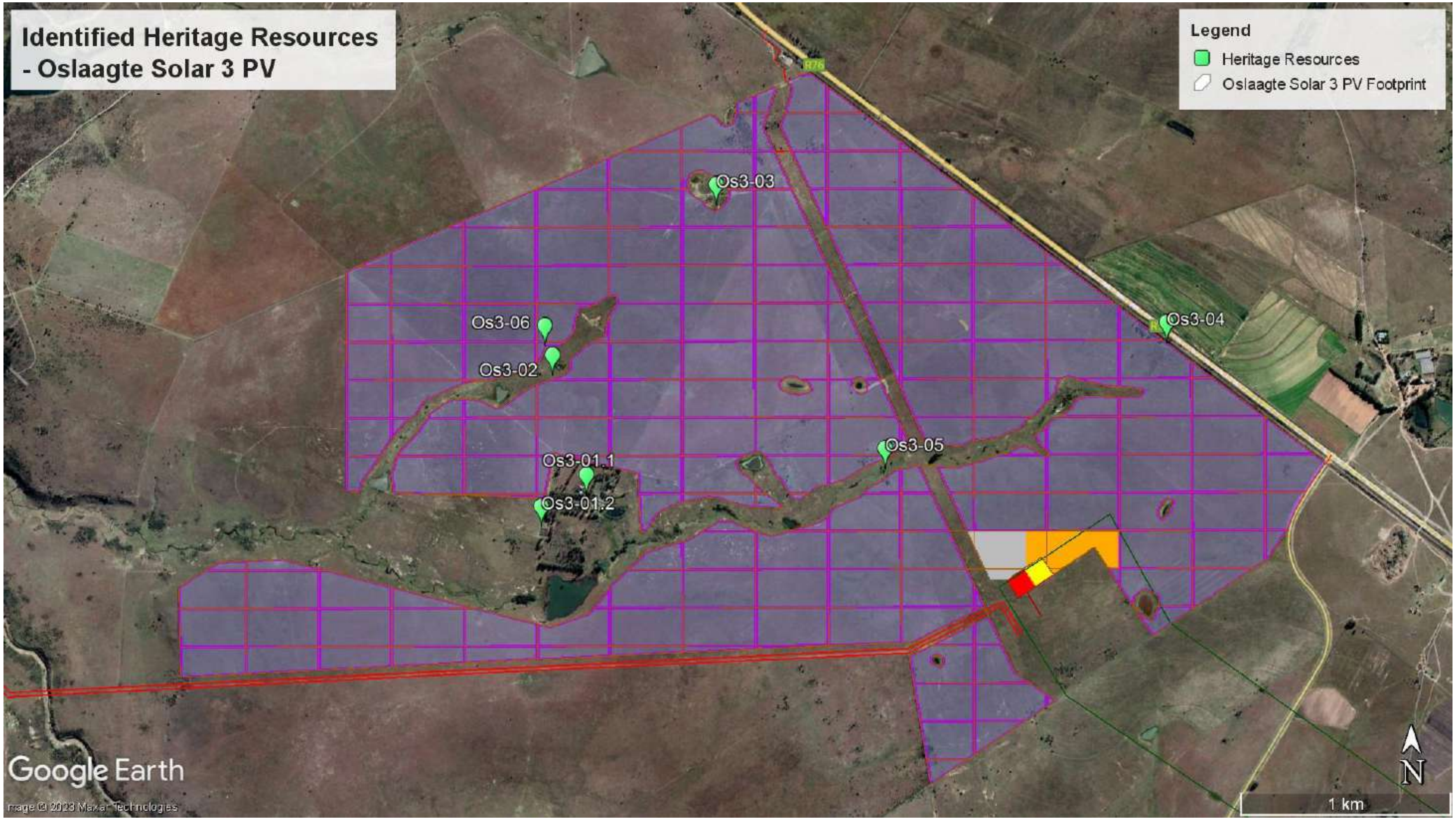


Figure 58: Heritage resources identified during the survey (green icons), in relation to the Oslaagte Solar 3 PV Alternative 1 project layout (Google Earth satellite view)

Figure 59: Heritage resources identified during the survey (green icons), in relation to the Oslaagte Solar 3 PV Alternative 2 project layout (Google Earth satellite view)

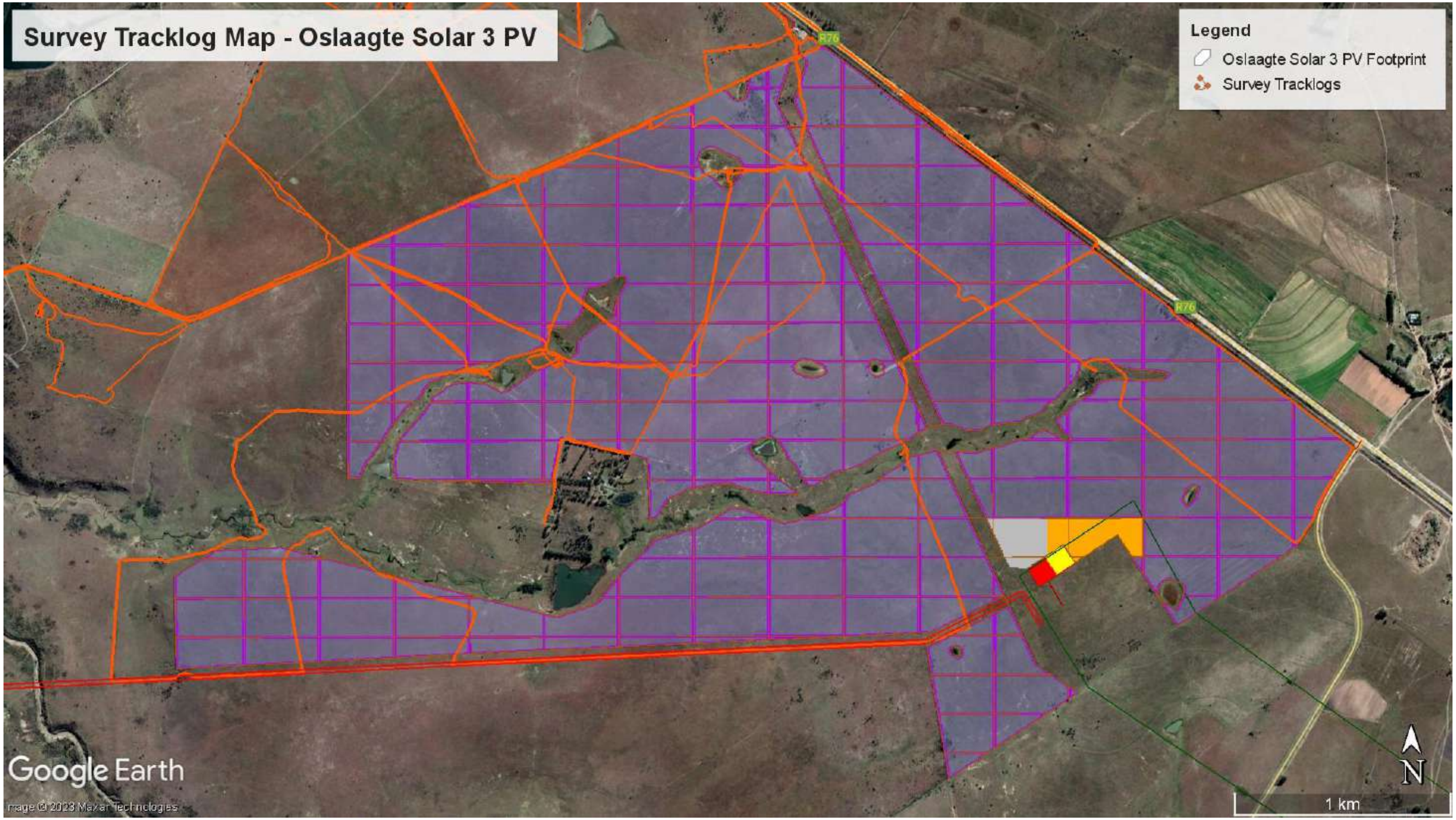


Figure 60: Site Survey Tracklog (orange lines) overlaid on the Oslaagte Solar 3 PV project footprint (Alternative 1)

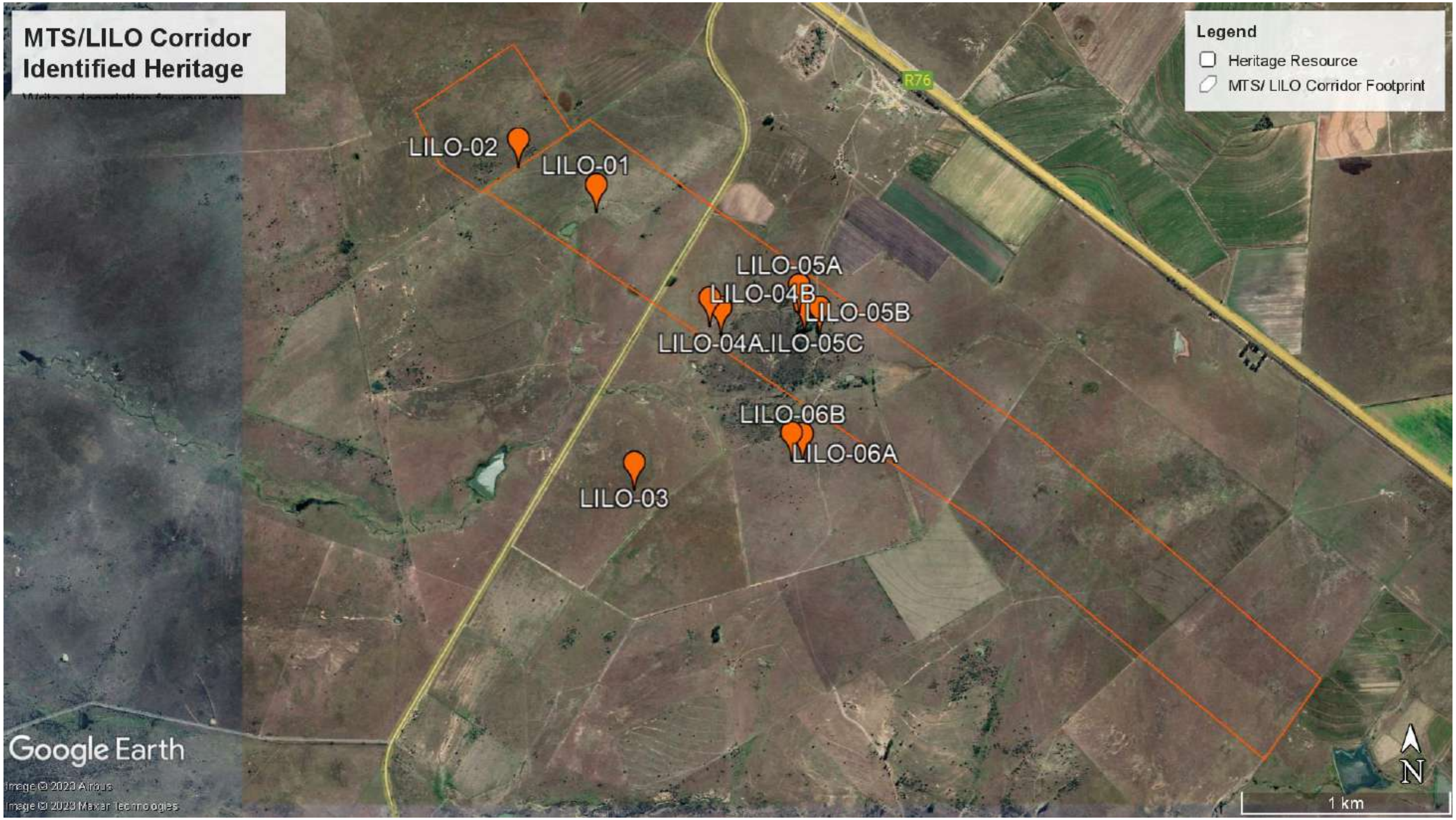


Figure 61: Heritage resources identified during the site survey (orange icons), in relation to the MTS/LILO Corridor footprint (Google Earth satellite view)

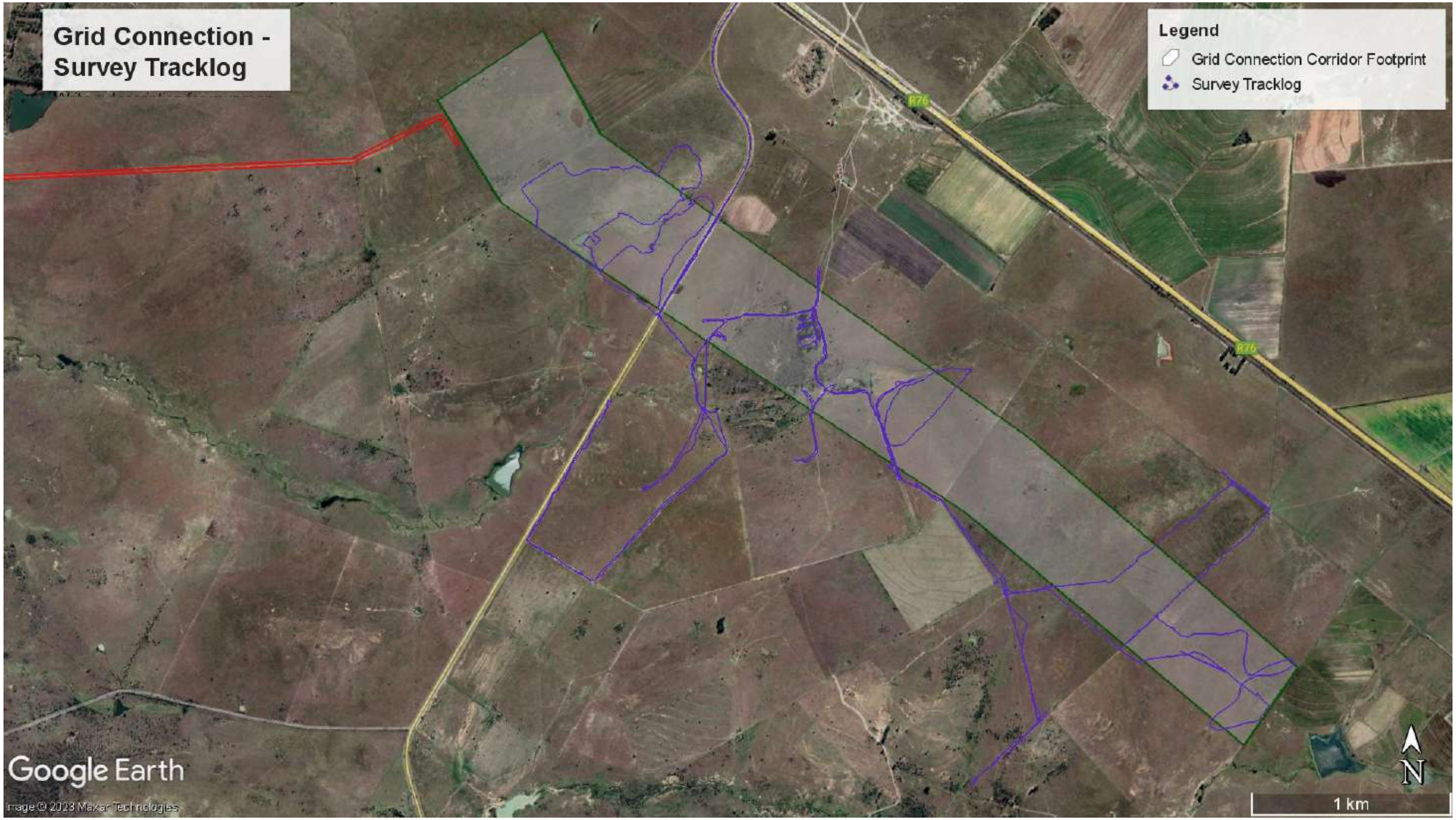


Figure 62: Site Survey Tracklog (purple lines) overlaid on the LILO Corridor footprint

7 SIGNIFICANCE ASSESSMENT

7.1 Methodology for Assessing Heritage Site Significance

The applicable maps, tables and figures are included, as stipulated in NHRA and NEMA. The HIA methodology process consists of three steps:

Literature Review

The desktop literature review provided information on the Heritage Background of the general region and project area. This included investigating published sources as well as past HIA studies conducted for the project area and surrounding region. An examination of historical 1:50 000 topographical maps and/or archival maps (if available) was also undertaken. The relevant early editions of the 2727CD topographical map sheets were obtained from the Department of Rural Development & Land Reform, Cape Town.

A number of internet sites were also accessed for information including ,amongst others, the website of SA History Online (https://www.sahistory.org.za), and the concentration camp database website of the University of Cape Town (British Concentration Camps of the South African War 1900-1902 (uct.ac.za))

Literature resources accessed are listed in Table 4.

Table 4: Literature sources accessed

Source	Information
Background Information Document - Nemai	Project location and description details
Published sources and Past HIAs	Historical and archaeological background on Kroonstad and surrounding region
Directorate: National Geo-spatial Information of the Department of Rural Development & Land Reform, Cape Town	Historical topographic maps, 1:50 000 2727CD Ed 1 1960

Field Survey

A physical Site Inspection or Field Survey was conducted, predominantly by vehicle and on foot through the project area by an experienced heritage specialist and an assistant. This focussed on identifying and documenting heritage resources situated within and immediately adjacent to the proposed project area footprint, such as graves, historical structures or remains and archaeological sites or material.

HIA Report

The final step involved the recording and documentation of the identified heritage resources, the assessment of such resources in terms of heritage significance and impact assessment criteria, producing a heritage sensitivity map and compiling the heritage impact assessment report with constructive recommendations for mitigation, if required.

Impacts on these sites by the development will be evaluated as follows:

Site Significance

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2021) is implemented in this report.

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (**Table 5** and **Table 6**).

Table 5: Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table 6: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e., in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be	Not Conservation worthy –

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	retained as part of the National Estate.	lifted by the PHRA for structures in this category if they are older than 60 years.	no research potential or other cultural significance

Table 7: Site significance classification standards as prescribed by SAHRA.

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	Very High - of National Significance	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	Very High – of Provincial Significance	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)		High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)		Medium Significance	Recording before destruction
Generally Protected C (GP.C)		Low Significance	Destruction

8 Identification of Impacts

8.1 Impacts and Mitigation Framework

All impacts are analysed in the section to follow regarding their nature, extent, magnitude, duration, probability and significance.

ISO 14001-2004 defines impacts as “any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization’s environmental aspects”.

When considering an assessment of the impacts and their mitigation, the following definitions as per Table 8 apply.

Table 8: Impact and Mitigation Quantification Framework

Nature	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 socio-economic functions and processes are not affected or minimally affected. **Medium** – affected environment is notably altered; natural and socio-economic functions and processes continue albeit in a modified way. **High** – natural or socio-economic 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.
Mitigation	Information on the impacts together with literature from socio-economic science journals, case studies and field work will be used to provide mitigation recommendations to ensure that any negative impacts are decreased and positive benefits are enhanced.
Monitoring	Monitoring usually involves developing and implementing a monitoring programme to identify deviations from the proposed action and to manage any negative impacts. The recommended mitigation measures will also include monitoring measures.

Table 9: Impact Methodology Table

Nature				
Negative		Neutral		Positive
-1		0		+1
Extent				
Local	Regional	National	International	
1	2	3	4	
Magnitude				
Low		Medium		High
1		2		3
Duration				
Short Term (0-5yrs)	Medium Term (5-11yrs)	Long Term	Permanent	
1	2	3	4	
Probability				
Rare/Remote	Unlikely	Moderate	Likely	Almost Certain
1	2	3	4	5
Significance				
No Impact/None	No Impact After Mitigation/Low	Residual Impact After Mitigation/Medium	Impact Cannot be Mitigated/High	
0	1	2	3	

8.2 Identification of Activities and Aspects

An "Activity" is defined as a distinct process or risks undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation (International Organization for Standardization, 2011).

An aspect is defined as elements of an organisation's activities or products or services that can interact with the environment.

In order to capture the impacts associated with the proposed infrastructure, an activity – aspect – impact table was created refer to 10 below.

Table 10: Activity, Aspects and Impacts of the Project

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
Site clearance/ construction camp	Heritage		Damage to existing historical structures or unidentified graves
Construction	Heritage	Positive - if historical structures are reused	Damage to existing historical structures or unidentified graves
Operation	Heritage	Positive – if historical structures are reused	Damage to existing historical structures

8.3 Impact and Mitigation Assessment

The impact significance of the project on graves and cemeteries is Medium (before mitigation) and Low (after mitigation) as three potential graves (Os3-02, LILO-01, LILO-02) were identified within the combined Oslaagte Solar 3 PV (Alternative 1 and Alternative 2) and MTS/LILO Corridor footprints. One definite gravesite (LILO-06) is situated outside the MTS/LILO corridor footprint. Implementation of the mitigation measures required (set out in Table 10, below) will retain the impact as low.

The impact significance of the proposed project on protected historical structures is Medium (before mitigation) as three extant historical structure sites (Os3-01, Os3-04, Os3-05), were identified within or adjacent to the Oslaagte Solar 3 PV footprint (Alternative 1). Two sites containing historical structure remains (Os3-02 and Os3-06), were identified also situated within the Solar PV footprint (Alternative 1) and two sites containing historical structure remains (LILO-05 and LILO-04) were identified within the MTS/LILO Corridor footprint. The heritage resource sites identified within the PV footprint area are all avoided by the Alternative 2 layout. There is no difference in impact between the Alternative 1 and Alternative 2 layouts for the LILO Corridor.

8.4 Impacts During Planning, Construction and Operation Phases

As a result of the analysis above,**Error! Reference source not found.** the following impact/mitigation tables have been generated.

Table 11: Heritage Resources – Historical Structures Mitigation Table

Environmental Feature	Heritage resources – Historical structures					
Project life-cycle	Planning, Construction and Operation					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Possible damage to or destruction of extant historical structures (Site Os3-01, Os3-05)	• A buffer of at least 30m must be placed around these sites (Site Os3-01, Os3-05) to ensure that during construction, no indirect impact occurs. • The materials demarcating the 30m buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the PV site so that work crews are aware of the sites. • If any impact is anticipated, then a permit will be required for the alteration or destruction of these structures (from FS PHRA) • If a permit is required, then a photographic record of the structures should be undertaken by an architectural historian					
Possible damage to or destruction of remains of historical structures (Os3-02, Os3-06; LILO-04, LILO-05)	• A buffer of at least 30m must be placed around these sites to ensure that during construction, no historical-archaeological material is damaged • If any impact on these sites is anticipated, a permit will be required for the destruction/clearance of the area (from FS PHRA or SAHRA)					
Alternative 1	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Permanent	Moderate	2

After Mitigation	Positive	Local	Low	Long- term	Unlikely	1
Significance of Impact and Preferred Alternatives	Site Os3-01 has medium significance as the structures are extant and can be recorded. Since the site is situated immediately adjacent to the Alternative 1 footprint layout, it is recommended that a buffer of at least 30m is implemented to avoid any indirect impact. Both site Os3-01 and Os3-05 are older than 60 years and protected by s34 of the NHRA, as well as LILO 04 and LILO 05.					
Alternative 2	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Permanent	Unlikely	2
After Mitigation	Positive	Local	Low	Long- term	Remote	1
Significance of Impact and Preferred Alternatives	Site Os3-01 has medium significance as the structures are extant and can be recorded. Even though the site is avoided by the Alternative 2 layout, the 30m buffer should still be demarcated to avoid any indirect impact. Both site Os3-01 and Os3-05 are older than 60 years and protected by s34 of the NHRA, as well as LILO 04 and LILO 05.					

Table 12: Heritage Resources – Historical Graves Mitigation Table

Environmental Feature	Heritage resources – Graves and burial grounds					
Project life cycle	Planning, Construction and Operation					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Possible damage to or destruction of identified historical graves (LILO-06)	• A buffer of at least 30m must be placed around the graveyards at LILO-06 to protect them from any indirect impact • The materials demarcating the 30m buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the PV site so that work crews are aware of the sites. • If, for any reason, the graves cannot be avoided, then a Phase 2 mitigation process can be considered. During this process, the family and relevant communities will have to be engaged with to obtain their permission and discuss to where the remains should be moved. In addition, application will have to be made to SAHRA for the necessary permits. • Sub-sections (4) and (5) of section 36 of the NHRA regarding the removal of graves must be adhered to. The exhumation and removal of graves is strongly discouraged as graves are highly significant to many people and there are many traditional, cultural and personal sensitivities concerning the removal of graves.					
Potential or unidentified graves (Os3-02, LILO-01, LILO-02)	• A buffer of at least 30m must be placed around the sites to ensure that during construction, the sites are not damaged • Monitoring of site clearance activities in the vicinity of these sites must be undertaken by a heritage specialist					
Alternative 1	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	High	Permanent	Unlikely	2
After Mitigation	Negative	Local	Low	Long- term	Unlikely	1
Significance of Impact and	The graveyard site (LILO-06) is located outside the proposed LILO corridor footprint of the project (Alternative 1). Two of the potential grave sites are located inside the LILO					

Preferred Alternatives	corridor (Alternative 1) and one is located inside the Alternative 1 layout for the PV footprint. Therefore, monitoring of site clearance and construction activities in the vicinity of all three sites should be undertaken.					
Alternative 2	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	High	Permanent	Unlikely	2
After Mitigation	Negative	Local	Low	Long- term	Unlikely	1
Significance of Impact and Preferred Alternatives	The graveyard site (LILO-06) is located outside the proposed LILO corridor footprint of the project (Alternative 2). Two of the three potential grave sites are located inside the LILO corridor (Alternative 2) and the other one is avoided by the Alternative 2 layout for the PV project. Therefore, monitoring of site clearance and construction activities in the vicinity of LILO-01 and LILO-02 should be undertaken.					

8.5 Cumulative impacts

The project area and surrounding region has been affected by impacts of activities occurring in the past, current activities and proposed future developments. These will be discussed below.

Past impacts: The past HIA reports recovered from the SAHRIS database indicated that the Oslaagte Solar 3 PV and LILO project footprint and surrounding region has been affected by several development and other activities that would have disturbed the heritage resources which occur in the area. These include other solar PV projects, prospecting and mining projects, pipeline and fibre optic cable construction and the construction of the N1 national road and R76 regional road as well as the railway line, in addition to historical farming activities around Kroonstad and the development of Kroonstad town.

Current impacts: the immediate area of the Oslaagte Solar 3 PV footprint is affected by farming activities (cattle and game) and the R76 regional road is currently being upgraded with roadworks in progress along the eastern boundary of the project area.

The baseline impacts are considered to be low to moderate for Heritage resources, and additional project impacts (if no mitigation measures are implemented) will increase the significance of the existing baseline impacts, where the cumulative unmitigated impact will probably be of a moderate to high significance. The impact is going to happen and will be long-term in nature, therefore the impact risk class will be Moderate to High. However, with the implementation of the recommended management and mitigation measures this risk class can be minimized to a Low rating.

9 Analysis of Alternatives

9.1 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 a project.

The sub-sections to follow discuss the project alternatives considered during the EIA process.

9.2 Site Alternatives

No site alternatives are proposed for this Project. Favourable location factors for the PV Site include suitable solar irradiation levels, short distance to grid connection point, flat topography, suitable site access and availability of land.

9.3 Layout / Design Alternatives

In terms of the impact on the identified heritage resources, the original layout for the Oslaagte Solar 3 PV footprint (Alternative 1) has been revised to exclude certain environmentally sensitive areas (Alternative 2). The Alternative 2 layout avoids the identified heritage resources that would be impacted by the Alternative 1 layout. Therefore, from a heritage perspective, Alternative 2 is the preferred layout. However, some of these heritage resources still could be subject to indirect impact, specifically during site clearance or construction activities, therefore the mitigation measures set out above and below will still apply.

9.4 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 Project footprint 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.

10 STATEMENT OF IMPACT SIGNIFICANCE

The project area that will be impacted by the proposed Oslaagte Solar 3 PV project and MTS/LILO Corridor contains some areas that are currently disturbed by cattle and game farming activities and other animal activity (e.g., burrows and termite mounds).

The survey of the Oslaagte Solar 3 PV footprint identified six heritage resources within or adjacent to the general project footprint. Four are located within and two adjacent to the boundary of the project footprint (Alternative 1). These include: a historical farmhouse with an outbuilding and a stone kraal (Os3-01), a railway culvert (Os3-04) and a disused road culvert (Os3-05), two areas with demolished structure remains (Os3-02 and Os3-06) and a possible grave (at Os3-02). One site could be the remains of a farm dam wall (Os3-03). All of these sites are avoided by the Alternative 2 layout.

The survey of the MTS/LILO Corridor footprint identified a total of six heritage resources within or adjacent to the footprint. Two of these sites are located just outside the boundary of the project footprint (LILO-03 and LILO-06), the remaining four sites are located within the project footprint (Alternative 1 and Alternative 2). The identified heritage resources include the remains of an historical farmstead (LILO-05), the remains of a stone wall (LILO-04, probably a kraal) and three sites identified as an informal graveyard (LILO-06) or potential single graves (LILO-01, LILO-02). One site is the remains of a homestead which may contain potential graves (LILO-03).

The impact significance of the project on graves and cemeteries is Medium as three potential graves were identified within the combined footprint for the Oslaagte Solar 3 PV project and MTS/LILO Corridor (Os3-02, LILO-01, LILO-02), while one informal grave site was identified (LILO-06) situated outside the LILO Corridor footprint. Only the LILO-06 grave site is located outside the Alternative 1 layout while two sites (Os3-02 and LILO-06) are avoided by the Alternative 2 layout.

The impact significance of the proposed project on protected historical structures is medium as three sites comprising historical structures and four sites containing the remains of historical structures were identified within or adjacent to the combined footprint. Most of these structures or structure remains are over 60 years of age and therefore protected by s.34 of the NHRA. Even though most of these sites are avoided by the Alternative 2 layout, there is a possibility of indirect impact during construction activities.

It should be noted that the original layout for the Oslaagte Solar 3 PV footprint (Alternative 1) has been revised to exclude certain environmentally and heritage sensitive areas (Alternative 2). The Alternative 2 layout avoids the identified heritage resources that would be impacted by the Alternative 1 layout. Therefore, from a heritage perspective, Alternative 2 is the preferred layout. However, some of these heritage resources still could be subject to indirect impact, specifically during site clearance or construction activities, therefore the mitigation measures set out above and below will still apply.

11 Heritage Management Guidelines

11.1 General Management Guidelines

The following General Heritage Management Guidelines are recommended:

1. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. These sections must include basic information on:
    a. Heritage;
    b. Graves;
    c. Archaeological finds; and
    d. Historical Structures.

    This module must be tailor made to include all possible finds that could be expected in that area of construction. Possible finds include:
    a. Unidentified graves or burials;
    b. Historical-archaeological material, including middens;
    c. Historical structure remains;
    d. Palaeontological deposits such as bones and teeth or plant fossils.

2. If a possible find is discovered during construction, all activities must be halted around the discovery and a qualified archaeologist contacted.
3. The archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.
4. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.
5. After mitigation, an application must be lodged with SAHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.
6. If during the initial survey sites of cultural significance are discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/palaeontological monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.
7. If human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation made of the finds.
8. If the remains or grave/s are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.

12 RECOMMENDATIONS AND CONCLUSION

The project area that will be impacted by the proposed Oslaagte Solar 3 PV project and MTS/LILO Corridor contains some areas that are currently disturbed by cattle and game farming activities and other animal activity (e.g., burrows and termite mounds).

The survey of the combined footprint for the Oslaagte Solar 3 PV project and the MTS/LILO Corridor identified a total of twelve heritage resources within or adjacent to the general footprint. These have been separated between the Oslaagte Solar 3 PV project and the MTS/LILO Corridor footprints.

Six heritage resources were identified within or adjacent to the general Oslaagte Solar 3 PV footprint. Four are located within and two outside or adjacent to the project footprint (Alternative 1). These include: a historical farmhouse with an outbuilding and a stone kraal (Os3-01), a railway culvert (Os3-04) and a disused road culvert (Os3-05), two areas with demolished structure remains (Os3-02 and Os3-06) and a possible grave (at Os3-02). One site could be the remains of a farm dam wall (Os3-03).

Six heritage resources were identified within or adjacent to the MTS/LILO Corridor footprint. Two of these sites are located outside the project footprint for both Alternative 1 and Alternative 2: a group of graves (LILO-06) and the remains of a homestead which may contain potential graves (LILO-03). The remaining four sites are located within the project footprint (Alternative 1 and Alternative 2). These included the remains of an historical farmstead (LILO-05), the remains of a stone wall (LILO-04, probably a kraal) and two potential graves (LILO-01, LILO-02,).

The recommendations below are provided to mitigate the potential impact of the proposed PV project on the identified heritage resources:

Historical Structures

- The sites with extant historical structures (Site Os3-01, Os3-04, Os3-05) must be avoided and a buffer of at least 30m must be implemented;
- The materials demarcating the 30m buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the PV site so that work crews are aware of the sites;
- If any impact is anticipated on these sites, a permit will be required for the alteration or destruction of any of these structures (from FS PHRA);
- If a permit is required, as above, then a photographic record of the structures should be undertaken by an architectural historian;
- The sites with remains of Historical structures (Os3-02, Os3-06, LILO-04, LILO-05) are also protected by section 34 of the NHRA and will require a permit from FSPHRA before any historical-archaeological materials or remains can be destroyed;

Informal Graveyard / Potential Graves

- A buffer of at least 30m must be placed around the informal graveyard at LILO-06 to ensure that during construction, the graves are not damaged by any indirect impacts

- The materials demarcating the 30m buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the PV site so that work crews are aware of the sites.
- If, for any reason, the identified graveyard (or potential graves) cannot be avoided, then a Phase 2 mitigation process can be considered. During this process, the family and relevant communities will have to be engaged with to obtain their permission and discuss to where the remains are to be moved. In addition, application will have to be made to SAHRA for the necessary permits.
- Sub-sections (4) and (5) of section 36 of the NHRA regarding the removal of graves must be adhered to. The exhumation and removal of graves is strongly discouraged as graves are highly significant to many people and there are many traditional, cultural and personal sensitivities concerning the removal of graves.

Palaeontology

- A separate palaeontological assessment is being undertaken as the project area falls into an area of Very High fossil sensitivity. The assessment will indicate if significant/sensitive fossils would be impacted by the proposed project and provide mitigation measures.

No fatal flaws were identified during this study, therefore, it is the considered opinion of the heritage specialist that the construction of the proposed Oslaagte Solar 3 PV project and MTS/LILO Corridor within the project footprints can proceed. There are no objections from a heritage perspective provided the recommendations and mitigation measures contained in this report and in the palaeontological assessment are implemented where necessary. It should be noted that the original layout for the Oslaagte Solar 3 PV footprint (Alternative 1) has been revised to exclude certain environmentally and heritage sensitive areas (Alternative 2). The Alternative 2 layout avoids the identified heritage resources that would be impacted by the Alternative 1 layout. Therefore, from a heritage perspective, Alternative 2 is the preferred layout. However, some of these heritage resources still could be subject to indirect impact, specifically during site clearance or construction activities, therefore the mitigation measures set out above and below will still apply.

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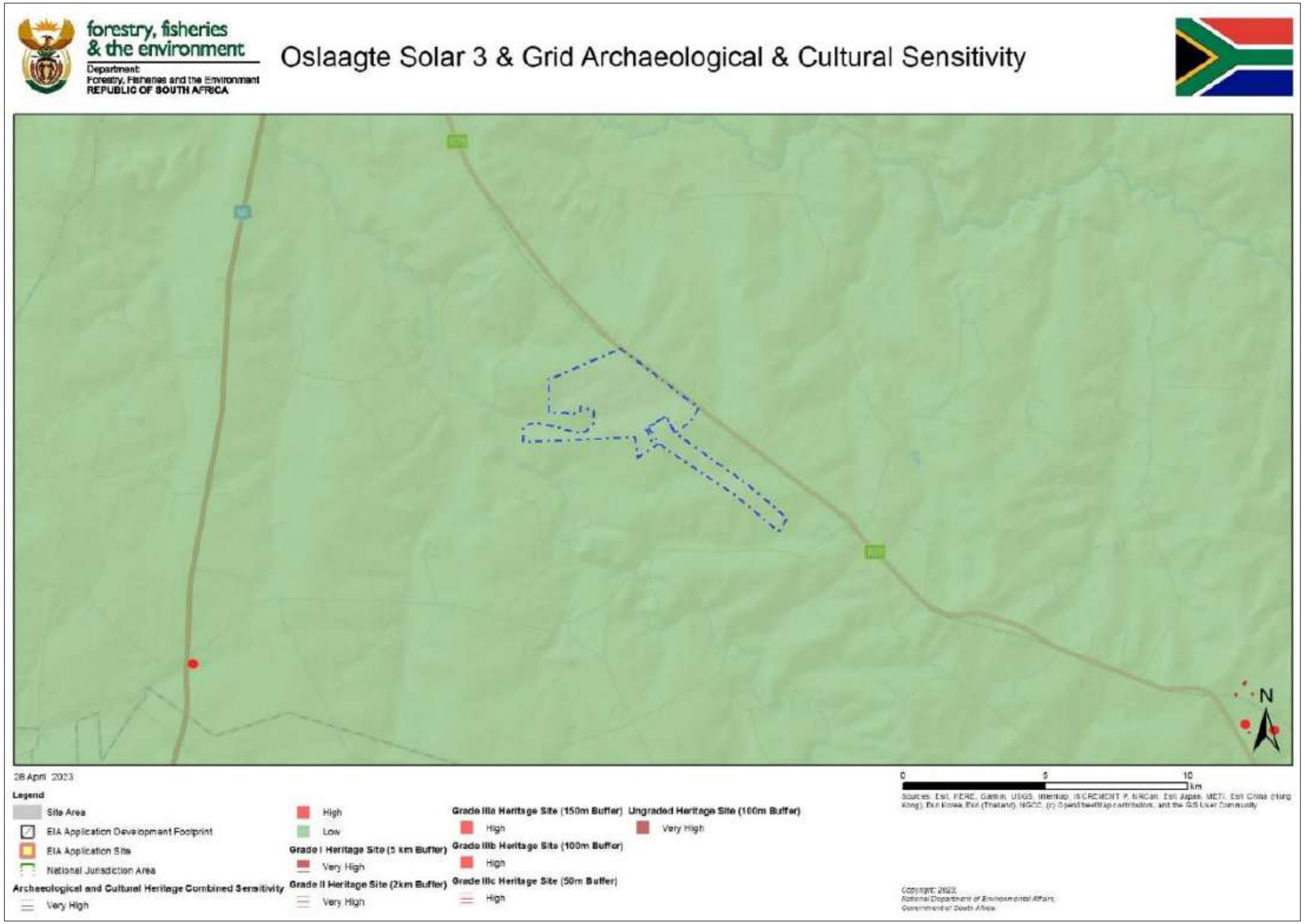
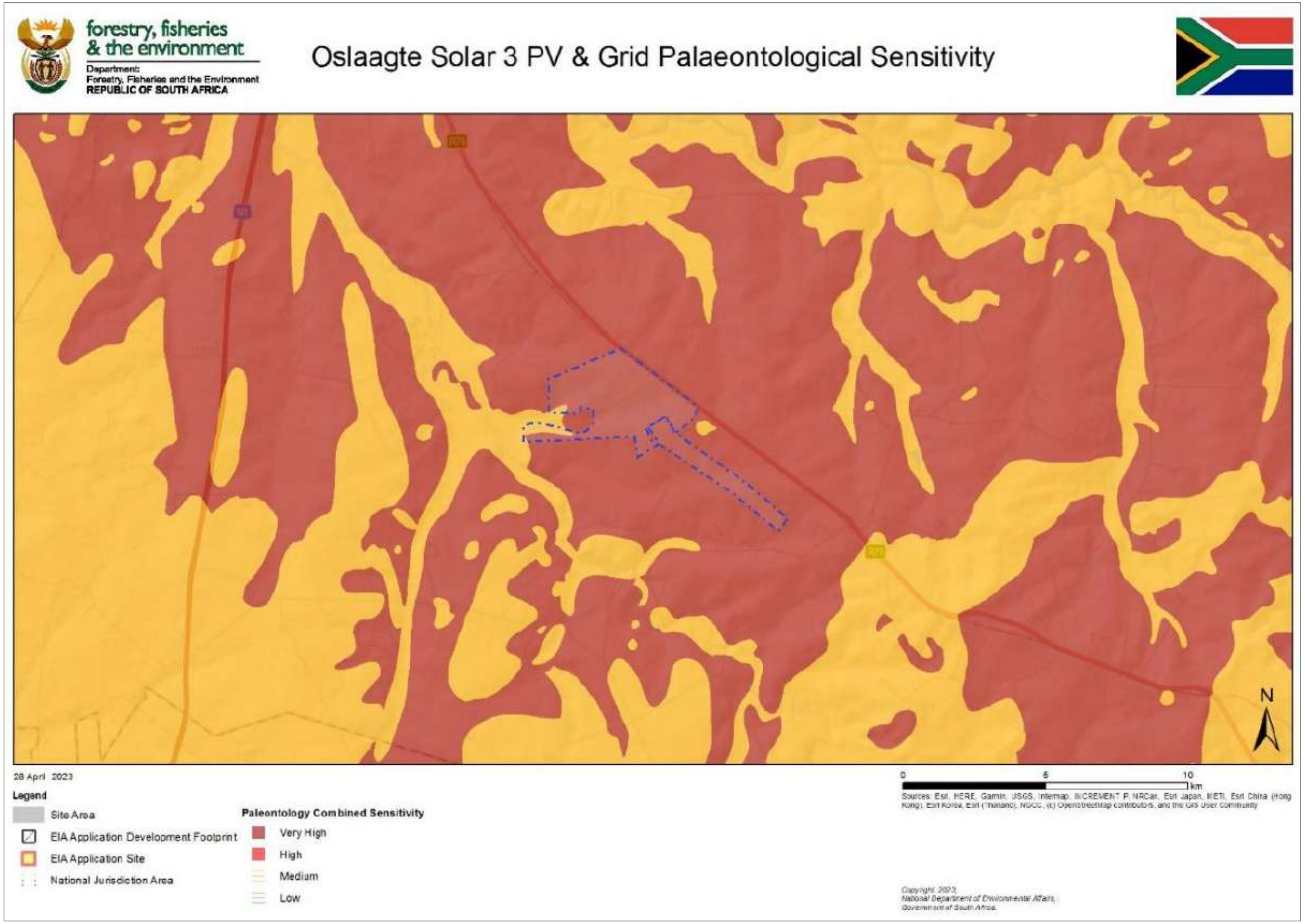
APPENDIX 1: HERITAGE SENSITIVITY MAP/S

1. Cultural Heritage Sensitivity map from DFFE screening tool

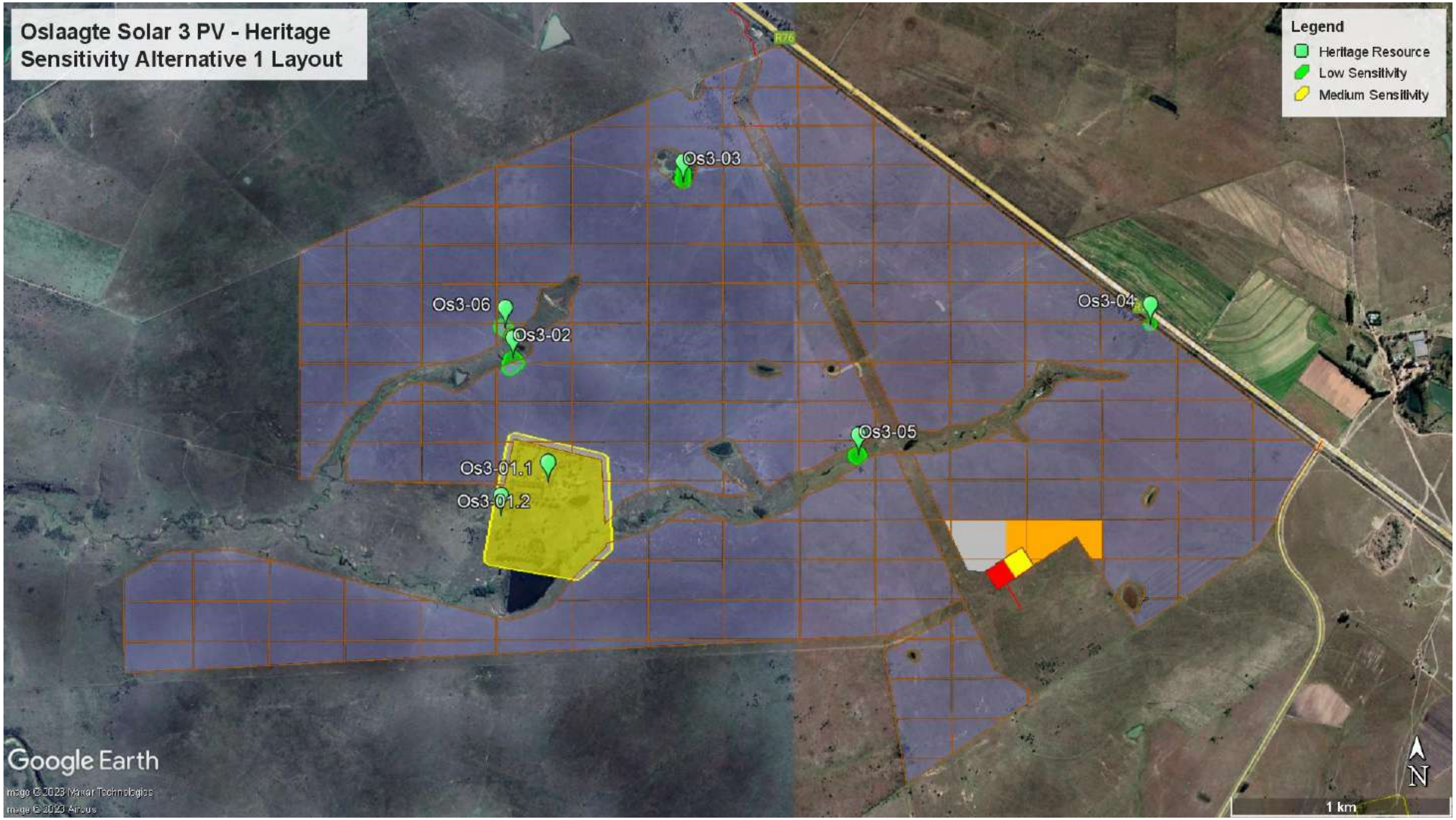


2. Palaeontological Sensitivity map from DFFE screening tool

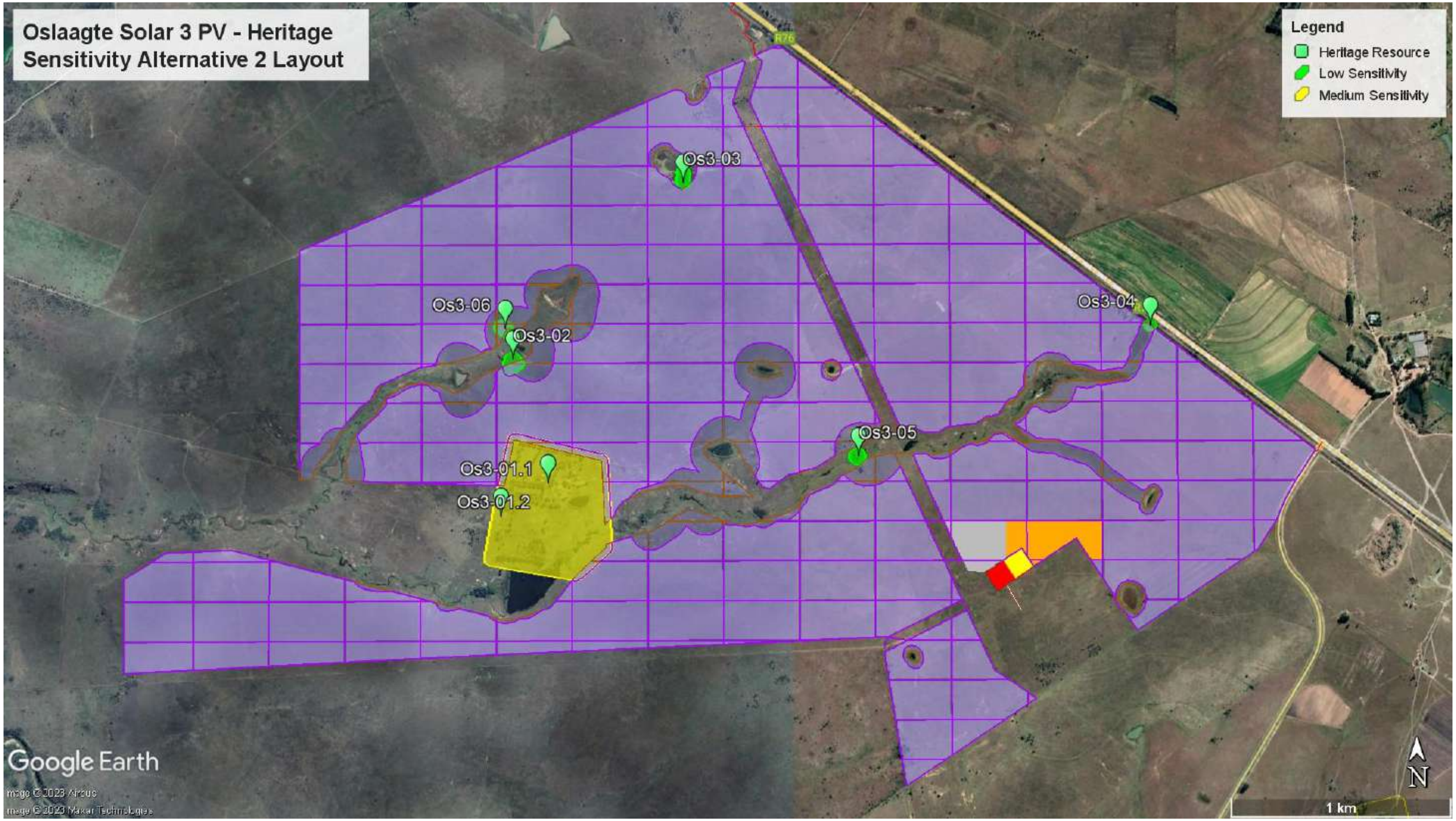


3. HERITAGE SENSITIVITY MAPS BASED ON THE SITE INSPECTION / FIELD SURVEY AND TOPOGRAPHICAL MAP SHEET

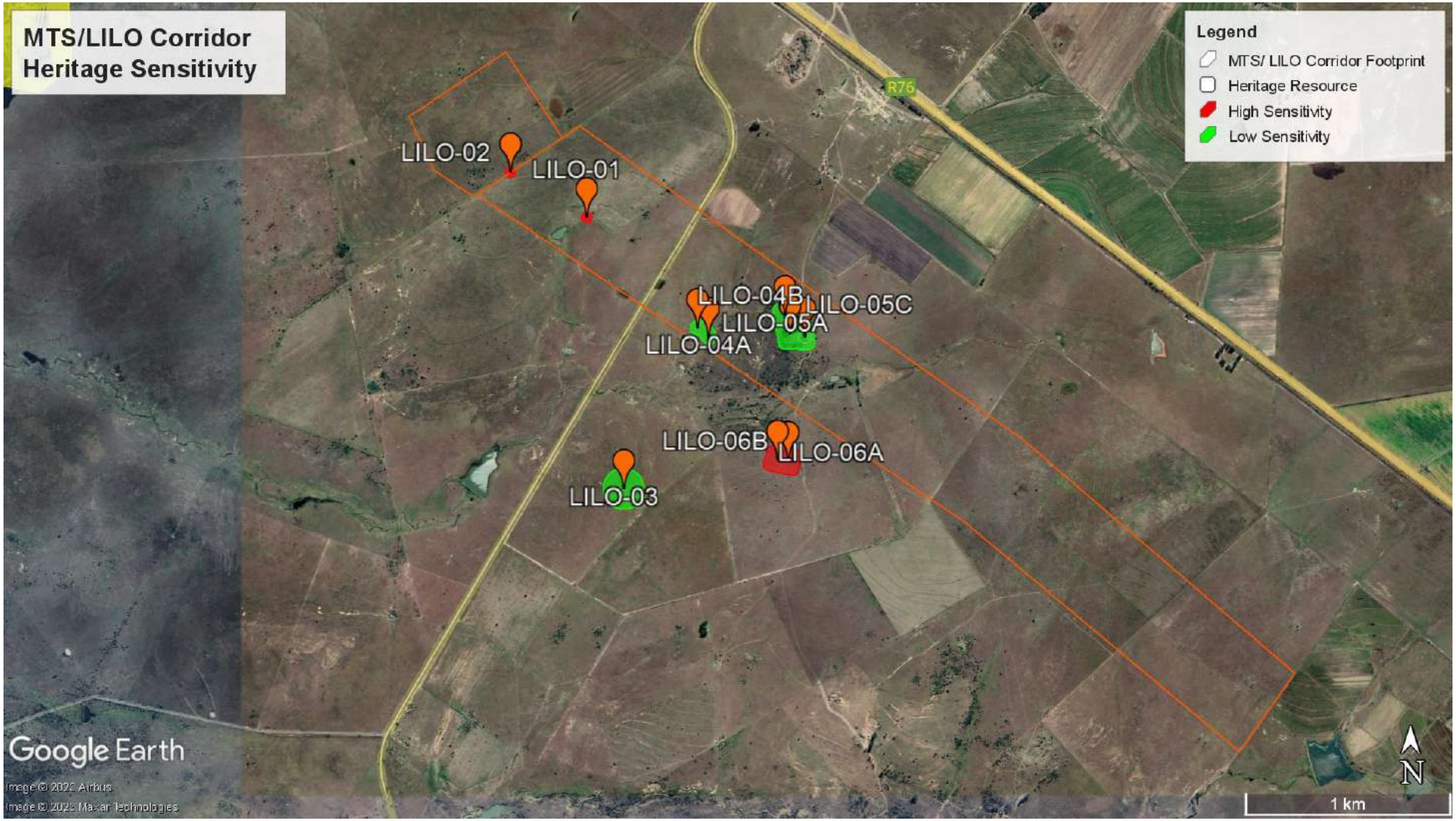
3A. Heritage Sensitivity for Oslaagte Solar 3 PV footprint – Alternative 1



3B. Heritage Sensitivity of Combined footprint for Oslaagte Solar 3 PV footprint – Alternative 2



3C. Heritage Sensitivity for MTS/LILO footprint



APPENDIX 2: CURRICULUM VITAE OF HERITAGE SPECIALIST

1 Personal Particulars

Profession:	Heritage Specialist
Date of Birth:	11 September 1966
Name of Firm:	Nitai Consulting
Name of Staff:	Jennifer Kitto
Nationality:	RSA
Membership of Professional Societies	Association of Southern African Professional Archaeologists (444); International Association for Impact Assessment South Africa (7151)

2 Education:

BA Hons Social Anthropology, WITS, South Africa, 1994

BA. Archaeology and Social Anthropology, WITS, South Africa, 1993

Higher National Diploma, Practical Archaeology, Dorset Institute for Higher Education (now Bournemouth University), UK, 1989

3 Employment Record:

2022 – Present Heritage Specialist, Nitai Consulting

Conduct Heritage Impact Assessments;

2012 – 2021 Heritage Specialist, PGS Heritage (Pty) Ltd

Conduct Heritage Impact Assessments

Compile Desktop Historical Research

Compile Heritage Audit and Management Plans

Compile and submit permit applications to National and Provincial Heritage Authorities for Section 34 building alterations and demolitions (under National Heritage Resources Act, 25 of 1999)

Compile and submit permit applications to Provincial and Municipal Health Authorities for Section 36 relocations of graves and burial grounds (under National Heritage Resources Act, 25 of 1999 and National Health Act, No 61 of 2003)

2008 – 2011 *Cultural Heritage Officer (National), Burial Grounds and Graves Unit: South African Heritage Resources Agency (SAHRA)*

Review and assessing permit applications for relocation of historical graves and burial grounds

1998 – 2008 *Cultural Heritage Officer (Provincial), Provincial Office – Gauteng: SAHRA*

Review and comment on heritage and archaeological impact reports

Research for the nomination and grading process for related to the declaration of specific heritage resources as National Heritage Sites

Monitoring of certain archaeological and built environment National Heritage Sites (e.g. The Cradle of Humankind World Heritage Site)

4 Selected Consultancies

4.1 GDID East Corridor, OHS Implementation, Tambo Memorial Regional Hospital (as sub-contractor to PGS Heritage (Pty) Ltd

2022 Independent Heritage Specialist. Compile Historical Archival Report of Tambo Hospital Boksburg, Gauteng for PGS Heritage (Pty) Ltd, Finalise HIA Report and submit HIA report to Gauteng Provincial Heritage Resources Authority

4.2 GDID East Corridor, OHS Implementation, Tembisa Regional Hospital (as sub-contractor to PGS Heritage (Pty) Ltd

2022 Independent Heritage Specialist. Compile Historical Archival Report of Tembisa Hospital, Ekurhuleni, Gauteng for PGS Heritage (Pty) Ltd, Finalise HIA Report and submit HIA report to Gauteng Provincial Heritage Resources Authority.

4.3 Kroonstad Cluster Solar PV Facilities

2022/2023 Heritage Specialist, Development of three Solar PV facilities west of Kroonstad, Free State Province, South Africa, Undertake Heritage Impact Assessment of all heritage resources associated with the three solar PV facilities

4.4 Rustenburg Solar PV Facilities

2022/2023 Heritage Specialist, Development of three Solar PV facilities near Raisimone, Rustenburg, North West Province, South Africa, Undertake Heritage Impact Assessment of all heritage resources associated with the three solar PV facilities

4.5 Seelo Solar PV Cluster

2022/2023 Heritage Specialist, Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Undertake Heritage Impact Assessment all heritage resources associated with the three solar PV facilities

4.6 Decommissioning of Komati Power Station

2023, Heritage Specialist, Proposed Decommissioning of the Komati Power Station, Middelburg, Mpumalanga, Undertake Heritage Impact Assessment of all heritage structures within the power station

4.7 Carbon Capture Utilisation & Storage Pilot Project

2023 Heritage Specialist, Proposed pilot project for the capture and storage of CO_2, in Mpumalanga, comprising a 3D seismic survey and test drilling for the purpose of geological characterisation of the project area. Undertake Heritage Impact Assessment all heritage resources associated with the CCUS Pilot Project.

5 Languages:

English - excellent speaking, reading, and writing

Afrikaans –fair speaking, reading and writing

APPENDIX E6: Paleontological Impact Assessment

BANZAI ENVIRONMENTAL

PALAEONTOLOGICAL IMPACT ASSESSMENT

PROPOSED 480 MW OSLAAGTE SOLAR 3 PHOTOVOLTAIC RENEWABLE ENERGY FACILITY

NEAR KROONSTAD, FREE STATE PROVINCE

2023

COMPILED for: Nemai Consulting CC

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and

- I realize that a false declaration is an offense in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

PALAEONTOLOGICAL CONSULTANT: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: info@banzai-group.com

SIGNATURE:

The Palaeontological impact assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii and Section 2 of Report – Contact details and company and Appendix 1	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 2 – refer to **Appendix 1**	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 4 – Objective	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 5 – Geological and Palaeontological history	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 10	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 1;9 & 11	-

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 7 Approach and Methodology	-
(f) details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 1; & 11	-
(g) An identification of any areas to be avoided, including buffers	Section 1 & 11	-
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5 – Geological and Palaeontological history	-
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7.1 – Assumptions and Limitation	-
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 1 and 11	-
(k) Any mitigation measures for inclusion in the EMPr	Section 12	-
(l) Any conditions for inclusion in the environmental authorisation	Section 12	-
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 12	-

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 & 11	-
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		-
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 1 and 11	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A	Not applicable. A public consultation process was handled as part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) process.
(p) A summary and copies of any comments that were received during any consultation process	N/A	Not applicable. To date, no comments regarding heritage

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
		resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.	N/A	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 3 compliance with SAHRA guidelines	

EXECUTIVE SUMMARY

Banzai Environmental was appointed by Nemai Consulting CC to conduct the Palaeontological Impact Assessment (PIA) to assess the proposed 480 MW Oslaagte Solar 3 Photovoltaic (PV) Project south east of Kroonstad, Free State Province. This project forms part of the Kroonstad South PV Cluster. In accordance with the National Environmental Management Act No 107 of 1998 (NEMA) and to comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PIA is necessary to confirm if fossil material could potentially be present in the planned development area, to evaluate the potential impact of the proposed development on the Palaeontological Heritage and to mitigate possible damage to fossil resources.

The proposed Oslaagte Solar 3 PV Facility is largely underlain by the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) with a very small portion of Jurassic dolerite and Quaternary alluvium in the west of the development. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) and the DFFE (Department of Forestry, Fisheries and the Environment) Screening Tool the Palaeontological Sensitivity of the Adelaide Subgroup is Very High (Almond and Pether, 2009; Almond *et al*., 2013). Updated Geology (Council of Geosciences) indicates that the proposed development is underlain by the Balfour Formation of the Adelaide Subgroup. Two Layout alternatives have been considered for this project. The first alternative is the original layout of the proposed development while the second alternative was determined after input of the different specialist studies. As the geology of the alternatives are the same there is no preference between the alternatives from a Palaeontological point of view.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on the weekend of 13 May 2023. No fossiliferous outcrop was detected in the proposed development. This could be attributed to the lack of outcrops as well as the lush grassy vegetation in the area. Based on the site investigation as well as desktop research it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. A medium Palaeontological Significance has been allocated for the construction phase of the PV development pre-mitigation and a low significance post mitigation. The construction phase will be the only development phase impacting Palaeontological Heritage and no significant impacts are expected to impact the Operational and Decommissioning phases. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The Cumulative impacts of the development near Kroonstad is considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently

recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

Impact Summary

Environmental parameter	**Issues**	**Rating prior to mitigation**	**Average**	**Rating post mitigation**	**Average**
Planning Phase Alternative 1 Oslaagte Solar 3PV Facility	No Impact	0	No Impact	0	No Impact
Construction Stage Alternative 1 Oslaagte Solar 3PV Facility Loss of fossil heritage	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	45	Negative Medium impact	16	Negative Low impact
Operational Phase Alternative 1 Oslaagte Solar 3PV Facility	No Impact	0	No Impact	0	No Impact
Decommissioning Phase Alternative 1 Oslaagte Solar 3 PV Facility	No Impact	0	No Impact	0	No Impact
Planning Phase Alternative 2 Oslaagte Solar 3PV Facility	No Impact	0	No Impact	0	No Impact

Construction Stage Alternative 2 Oslaagte Solar 3 PV Facility Loss of fossil heritage	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	45	Negative Medium impact	16	Negative Low impact
Operational Phase Alternative 2 Oslaagte Solar 3 PV Facility	No Impact	0	No Impact	0	No Impact
Decommissioning Phase Alternative 2 Oslaagte Solar 3 PV Facility	No Impact	0	No Impact	0	No Impact

It is therefore considered that the proposed Oslaagte Solar 3 PV Facility is deemed appropriate and will not lead to detrimental impacts on the palaeontological reserves of the area. Thus, the construction of the development may be authorised in its whole extent.

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1 INTRODUCTION

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. Oslaagte Solar 3 (Pty) Ltd (the "Applicant") has proposed the development of up to 480 MW Oslaagte Solar 3 Photovoltaic (PV) Project near Kroonstad, in the Free State Province (the "Project"). The electricity generated by the Project will be transmitted through a 132kV power line from the new facility substation to a new 400/132 kV Main Transmission Substation (MTS) and then onto the National Grid via 400 kV LILO powerlines.

The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within SA.

Nemai Consulting CC (Nemai) was appointed by Oslaagte Solar 3 (Pty) Ltd (the "Applicant") to conduct the Environmental Impact Assessment (EIA) for the proposed 480 MW Solar Photovoltaic (PV) Project south east of Kroonstad, in the Free State Province (the "Project") (Figure 1-2).

1.1 Technical details

The Project consists of the following systems, sub-systems or components (amongst others):

- PV modules and mounting structures which will consist of either Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems.
- Inverters and transformers.
- Battery Energy Storage System (BESS) area up to 5ha.
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance.
- Facility grid connection infrastructure, including:
  - 33kV cabling between the project components and the facility substation
  - A 132kV facility substation
  - 33kV or 132kV cabling or powerline between the facility substation and the proposed Main Transmission Substation.
- Temporary construction laydown area up to 10 ha.
- Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
- Internal roads will be up to 6 m wide, to allow access to the Solar PV modules for operations and maintenance activities. Main access road is up to 8 m wide. The site is accessible via the R76.

- 400/132kV MTS (up to 600m x 600m). The MTS includes a switching station.
- 400kV LILO powerlines between the new proposed MTS and the existing Eskom 400kV powerlines.

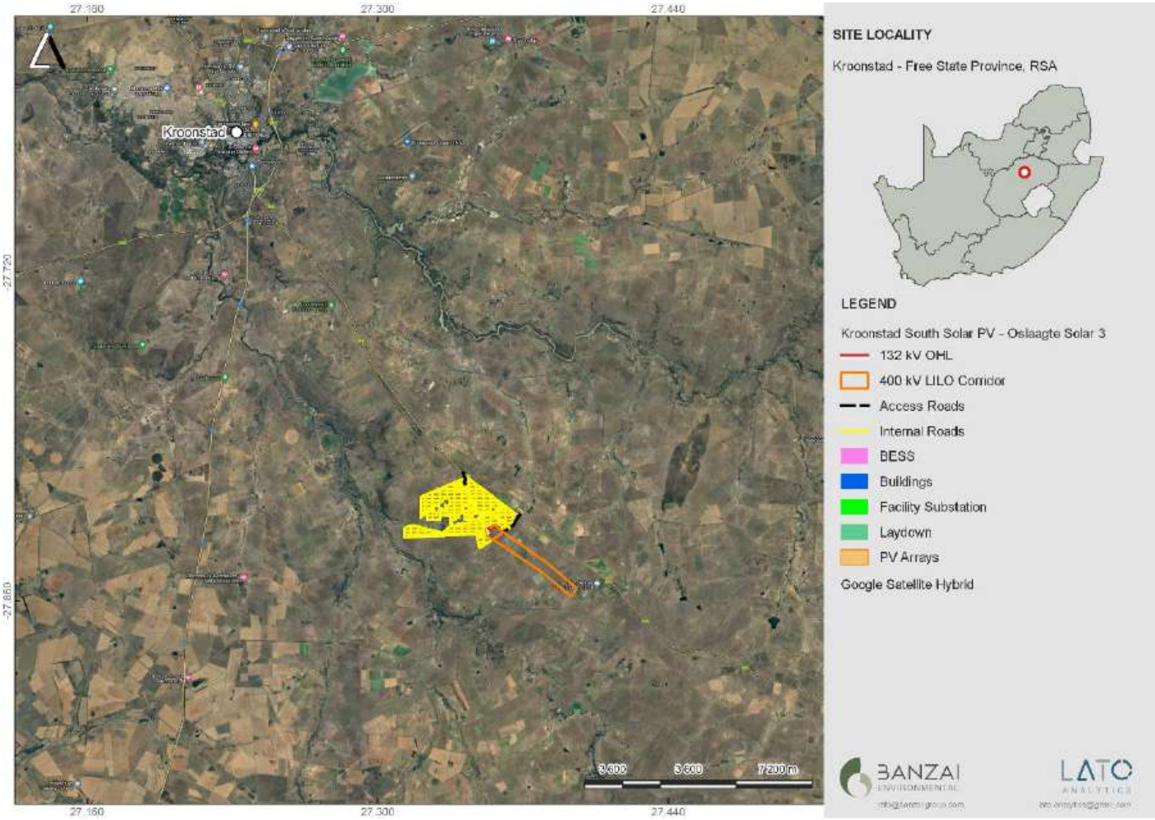


***Figure 1:** Regional locality of the proposed Oslaagte Solar 3 PV Project near Kroonstad, in the Free State Province.*

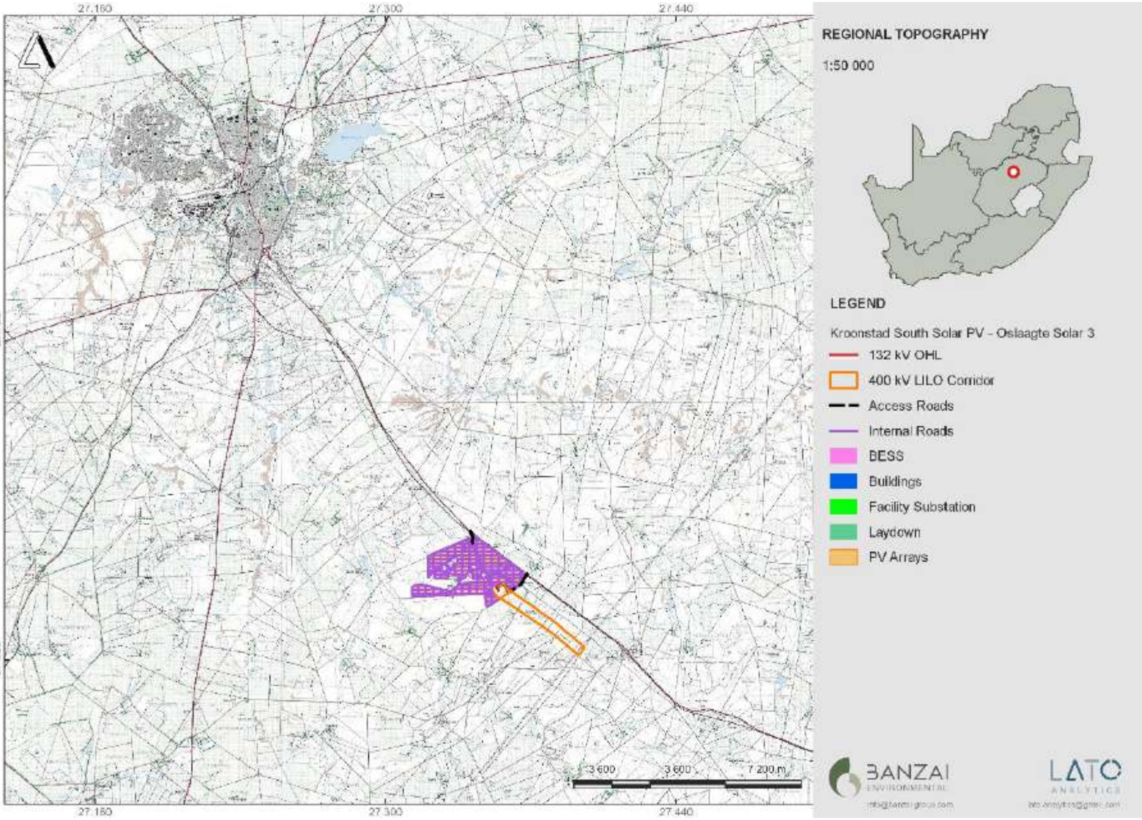


Figure 2*: Locality map of the the proposed Oslaagte Solar 3 PV Project near Kroonstad, in the Free State.*

Table 2: Technical Details of the PV plant

No.	Component	Alternative 1 - Description / Dimensions	Alternative 2 - Description / Dimensions
1.	Height of PV panels	Up to 5.5 m	Up to 5.5 m
2.	Facility generation capacity (MW)	240 MW	Up to 480 MW
3.	Area of PV Array	Up to 817 ha	Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems. Area: Up to 760 ha
4.	Area occupied by substations	Facility Substation: Up to 1 ha Main Transmission Substation: Up to 36 ha	Facility Substation: Up to 2 ha Main Transmission Substation: Up to 36 ha
5.	Capacity of on-site substation	Facility Substation: Up to 132 kV Main Transmission Substation: Up to 400 kV	Facility Substation: Up to 132 kV Main Transmission Substation: Up to 400 kV
6.	BESS	Area up to ± 5ha	Area: up to ± 5 ha
7.	Area occupied by both permanent and construction laydown areas	Temporary: Up to 7ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)	Temporary construction laydown area up to 10 ha. Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
8.	Area occupied by buildings	Up to 1.5 ha	Up to 1.5 ha
9.	Length of internal roads	Up to 33 km	Up to 33 km
10.	Width of internal roads	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.
11.	Height of fencing	Up to 3.5m	Up to 3.5m
12.	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing	Type will vary around the site, welded mesh, palisade and electric fencing

1.2 Alternatives

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 a 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 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".

1.2.1 Site alternatives

No site alternatives are proposed for this Project. Favourable location factors for the PV Site include suitable solar irradiation levels, short distance to grid connection point, flat topography, suitable site access and availability of land.

1.2.2 Layout / Design Alternatives

It is anticipated that the space available at the PV Site 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. For this reason, two Layout alternatives have been considered for this project. The first alternative was the original layout of the proposed development while the second alternative was determined after input of the different specialist studies.

1.2.3 Technology Alternatives

Solar PV technology consists of either monofacial or bifacial solar panels used on either a fixed mounting system or tracking mounting system. The following is noted in this regard:

- Single axis tracker system – this is preferred as it optimises the yield output and is the standard for utility scale solar PV installation. Some additional 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. The selected tracker type is the single axis E-W tracker system which specifically has its collector move from east to west tracking the suns movement throughout the day.

- Fixed mounted system – This is not preferred in utility scale solar PV plants as it is not able to generate as much energy as a solar PV system using a tracker system. This option will not be considered further.

A bifacial solar panel receives irradiation on both sides of the panel, which increases the yield. This is preferred over monofacial solar panels that only receive power on one of its sides

1.2.4 BESS Technology

The BESS can be broken into solid state and flow battery systems. The EIA Report will evaluate the advantages and disadvantages associated with the types of BESS.

1.2.5 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 Project footprint 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).

1.2.5 Terms of Reference

A site sensitivity verification report is required to be undertaken to comply with "Part A - General Protocol for the Site Sensitivity Verification and Minimum Report Content Requirements where a Specialist Assessment is required but no specific Environmental Theme Protocol has been prescribed" (GG 43110 / GNR 320, 20 March 2020).

A site-specific field survey of the development footprint for the project was conducted in May 2023 to verify the site sensitivity assigned to the Kroonstad Cluster and to validate the sensitivity and land use as prescribed by the DFFE Screening Tool (see Appendix 2). The Screening Tool indicates that the proposed development has a Very High Palaeontological Sensitivity. This provisional assessment is contested here due to the fact that no fossils were recovered in the palaeontological site investigation. It is concluded that the study area generally has a low palaeontological sensitivity. If Palaeontological Heritage is uncovered during surface clearing and excavations, the Chance find Protocol attached should be implemented immediately. These recommendations should be incorporated into the EMPr and fully implemented during the construction phase of the development. The construction of the development may thus be permitted in its whole extent, and no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

This study has been conducted by Mrs Elize Butler. She has conducted approximately 400 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than twenty-eight years. She has experience in locating, collecting, and curating fossils. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

3. LEGISLATION

National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens"**.

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) Act 107 of 1998
- National Heritage Resources Act (NHRA) Act 25 of 1999
- Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified.

The next section in each Act is directly applicable to the identification, assessment, and evaluation of cultural heritage resources.

GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998

- Basic Assessment Report (BAR) – Regulations 19 and 23
- Environmental Impacts Assessment (EIA) – Regulation 23
- Environmental Scoping Report (ESR) – Regulation 21
- Environmental Management Programme (EMPr) – Regulations 19 and 23

National Heritage Resources Act (NHRA) Act 25 of 1999

- Protection of Heritage Resources – Sections 34 to 36
- Heritage Resources Management – Section 38

The NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) "…*identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*".

In agreement with legislative requirements, EIA rating standards as well as SAHRA policies the following comprehensive and legally compatible PIA report have been compiled.

Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to Section 38 (1), an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, 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 m^2 in extent; or
  - involving three or more existing erven or subdivisions thereof; or
  - involving three or more erven or divisions thereof which have been consolidated within the past five years; or
  - the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- the re-zoning of a site exceeding 10 000 m^2 in extent.
- or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

4. OBJECTIVE

The objective of a Palaeontological Impact Assessment (PIA) is to determine the impact of the development on potential palaeontological material at the site.

According to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports" the aims of the PIA are: 1) to identify the palaeontological status of the exposed as well as rock formations just below the surface in the development footprint 2) to estimate the palaeontological importance of the formations 3) to determine the impact on fossil heritage; and 4) to recommend how the developer ought to protect or mitigate damage to fossil heritage.

The terms of reference of a PIA are as follows:

General Requirements:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
- Adherence to all applicable best practice recommendations, appropriate legislation and authority requirements;
- Submit a comprehensive overview of all appropriate legislation, guidelines;
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study,
- Description and location of the proposed development and provide geological and topographical maps
- Provide palaeontological and geological history of the affected area.
- Identification of sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
- Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
    a. Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
    b. Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity.
    c. Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.

- Fair assessment of alternatives (infrastructure alternatives have been provided):
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Implications of specialist findings for the proposed development (such as permits, licenses etc).

5. GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The geology of the proposed Oslaagte Solar 3 PV Project near Kroonstad in the Free State is depicted on the 1: 250 000 Kroonstad 2726 (2000) Geological Map (Council for Geosciences, Pretoria) (Figure 3, Table 2). Two layout alternatives have been considered for this project. The first alternative is the original layout of the proposed development while the second alternative was determined after input of the different specialist studies. The proposed development is underlain by Quaternary alluvium (yellow, single bird figure) and Jurassic Dolerite (Jd, red) in the west, while the largest portion of the development is underlain by the Adelaide Subgroup (Pa, green) of the Beaufort Group (Karoo Supergroup). According to the PalaeoMap (Figure 4) of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of Quaternary alluvium is moderate (green), that of the dolerite is Zero (grey) as it is igneous in origin and thus unfossiliferous, while the Adelaide Subgroup has a Very High (red) Palaeontological Sensitivity (Almond and Pether, 2009; Almond *et al*., 2013). The Environmental Screening Tool is depicted in Figure 5-6 and indicates that the development has a very High Palaeontological Sensitivity. Updated Geology (Council of Geosciences) indicates that the proposed development is entirely underlain by the Balfour Formation of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) (Figure 7, Groenewald *et al.,* 2014).

The Cenozoic superficial deposits (updated geology, Figure 7) are the youngest geological deposits formed during the most recent geological period (approximately 2.6 million years ago to present). Most of the superficial deposits are unconsolidated sediments and consist of clay, gravel, sand, silt, that form relatively thin, discontinuous patches of sediments. These sediments comprise of channel, floodplain, and stream deposits.

The Cenozoic deposits are very important because palaeoclimatic changes are reflected in the different geological formations (Hunter *et al*., 2006). During the climate fluctuations in the Cenozoic Era most geomorphologic features in southern Africa where formed (Maud, 2012). Barnosky (2005) indicated that various warming and cooling events occurred in the Cenozoic but states that climatic changes during the Quaternary Period, specifically the last 1.8 Ma, were the most drastic climate changes relative to all climate variations in the past. Climate variations that occurred in the Quaternary Period were both drier and wetter than the present and resulted in changes in river flow patterns, sedimentation processes and vegetation variation (Tooth *et al*., 2004).

Cenozoic fossil assemblages are generally rare and low in diversity and occur over a wide-ranging geographic area. These fossil assemblages may in some cases occur in extensive alluvial and colluvial deposits. In the past palaeontologists did not focus on Caenozoic superficial deposits although they sometimes comprise of significant fossil deposits. These fossil assemblages resemble modern animals and may comprise of mammalian teeth, bones and horn corns, reptile skeletons and fragments of ostrich eggs. Microfossils, non-marine mollusc shells are also known from Quaternary deposits. Plant material such as foliage, wood, pollens, and peats are recovered as well as trace fossils like vertebrate tracks, burrows, termitaria (termite heaps/ mounds) and rhizoliths (root casts).

Partially calcretised older alluvium deposits often overlies dolerite. Gravelly colluvial and eluvial deposits are dominated by hornfels, sandstone, and dolerite rubble that mantles most hillslopes and plateaus. The topographically relief of the Beaufort Group in the development footprint is low as can be seen in the Site Visit Section (Section 8).

The Karoo igneous province is one of the worlds classic continental basalt (CFB) provinces. This province consists of intrusive and extrusive rocks that occur over a large area (Duncan et al, 2006). Generally, the flood basalts do not contribute to prominent volcanic structures, but instead are formed by successive eruptions from a set of fissures that form sub-horizontal lava flows (sills and dykes) varying in thickness. This lava caps the landscape on which they erupted. As the Karoo is an old flood basalt province it is today preserved as erosional fragments of a more extensive lava cap that covered much of southern Africa in the geological past. It is estimated that the Karoo lava outcrop currently covered at least 140 000 km^{2} while it was larger in the past [~2 000 000 km^{2} (Cox 1970, 1972)].

The Karoo Igneous Province contains a large volume of flood basalts as well as silicic volcanic rocks. These units are comprised of rhyodacite and rhyolitic magma and crops out along the Lebombo monocline. Individual units span up to 60 km and sometimes show massive pyroclastic structures and are thus classified as rheoignimbrites. The basal lavas lie conformable on the Clarens Formation but in specific localities sandstone erosion occurred before the volcanic eruptions took place. Lock *et al* (1974) found evidence in the Eastern Cape that in the early stages of volcanism magma interacted with ground water to produce volcaniclastic deposits as well as phreatic and phreatomagmatic diatremes. Eales *et al* (1984) also found evidence of aqueous environments during early volcanism by the existence of pillow lavas and associated hyaloclastite breccias and thin lenses of fluviatile sandstones interbedded with the lowermost magmas.

The Adelaide Subgroup (Beaufort Group). Comprise of Karoo sandstones, mudstones, and shales, that was deposited under fluvial environments. The Beaufort Group is the third of the main subdivisions of the Karoo Supergroup. The Beaufort group overlays the Ecca Group and consists essentially of sandstones and shales, deposited in the Karoo Basin from the Middle Permian to the early part of the Middle Triassic periods and was deposited on land through alluvial processes. The

Beaufort Group covers a total land surface area of approximately 200 000 km^2 in South Africa and is the first fully continental sequence in the Karoo Supergroup and is divided into the Adelaide subgroup and the overlying Tarkastad subgroup (Figure 8). The Adelaide subgroup rocks are deposited under a humid climate that allowed for the establishment of wet floodplains with high water tables and are interpreted to be fluvio-lacustrine sediments. The Adelaide Subgroup is approximately 5 000m thick in the southeast, but this decreases to about 800m in the centre of the basin which decreases to about 100 to 200m in the north.

The Adelaide Subgroup contains alternating greyish-red, bluish-grey, or greenish grey mudrocks in the southern and central parts of the Karoo Basin with very fine to medium-grained, grey lithofeldspathic sandstones. Thicker sandstones of the Adelaide are usually multi-storey and usually have cut-and-fill features. The sandstones are characterized internally by horizontal lamination together with parting lineation and less frequent trough crossbedding as well as current ripple lamination. The bases of the sandstone units are extensive beds, while ripple lamination is usually confined to thin sandstones towards the top of the thicker units. The mudrocks of the Adelaide Subgroup usually have massive and blocky weathering. Sometimes desiccation cracks and impressions of raindrops are present. In the mudstones of the Beaufort Group calcareous nodules and concretions occur throughout.

The flood plains of the Beaufort Group (Karoo Supergroup) are internationally renowned for the early diversification of land vertebrates and provide the worlds' most complete transition from early "reptiles" to mammals. The Beaufort Group is subdivided into a series of biostratigraphic units based on its faunal content (Kitching1977, 1978; Keyser *et al*, 1977, Rubidge 1995, Smith *et al,* 2020; Viglietti 2020) (Figure 8). The development is underlain by the Balfour Formation (Figure 7) which is divided in the *Daptocephalus* (DAZ) which in turn is divided in the upper (younger) *Lystrosaurus maccaigi - Moschorhinus* and lower (older) *Dicynodon-Theriognathus Subzones* (Figure 8-13; Viglietti, 2020).

The dicynodont, *Daptocephalus leoniceps* is the main biozone defining fossil of the D*aptocephalus* Assemblage Zone (Figure 8). The *Daptocephalus* Assemblage Zone (DaAZ) is characterised by the co-occurrence of the dicynodontoid *Daptocephalus leoniceps*, the therocephalian *Theriognathus* microps, and the cynodont *Procynosuchus delaharpeae*. The DaAZ comprise of two subzones representing the two distinct faunal assemblages in this assemblage zone. The Dicynodon - Theriognathus Subzone (Figure 9) (in co-occurrence with *Daptocephalus*) is present in the lower *Daptocephalus* Assemblage Zone while the *Lystrosaurus maccaigi* – Moschorhinus kitchingi Subzone (Figure 10) is present in the upper DaAZ. The defining taxa of the latter subzone is *L. maccaigi, Daptocephalus* and *Moschorhinus*. This Zone is characterized by the co-occurrence of the two therapsids namely *Dicynodon* and *Theriognathus (Figure 9)*. The *Daptocephalus* Assemblage Zone of the Beaufort Group shows the greatest vertebrate diversity and includes numerous well-preserved genera and species of dicynodonts, biarmosuchians, gorgonopsian, therocephalian and cynodont therapsid Synapsida. Captorhinid Reptilia are also present while eosuchian Reptilia, Amphibia and Pisces are rarer in occurrence. Trace fossils of vertebrates and invertebrates as well as *Glossopteris* flora plants have also been described.

The *Daptocephalus Assemblage Zone* (AZ) expands into the lower Palingkloof of the Upper Balfour Formation. The lower Palingkloof Member is of special importance as it precedes the Permo-Triassic Extinction Event which destroyed the vertebrate fauna and extinguished the diverse glossopterid plants. The lower *Lystrosaurus* declivis AZ forms part of the Katberg Formation. Fauna and flora from this assemblage zone is rare as few genera survived the Permo-Triassic Extinction Event. The *Lystrosaurus* declivis AZ is characterized by the dicynodont, *Lystrosaurus* (Figure 13) and captorhinid reptile, *Procolophon,* biarmosuchian and gorgonopsian Therapsida that did not survive into the *Lystrosaurus* Assemblage Zone although the therocephalian and cynodont Therapsida are present in moderate quantities. Captorhinid Reptilia is reduced, but this interval is characterised by a unique diversity of oversize amphibians while fossil fish, millipedes and diverse trace fossils have also been recorded.

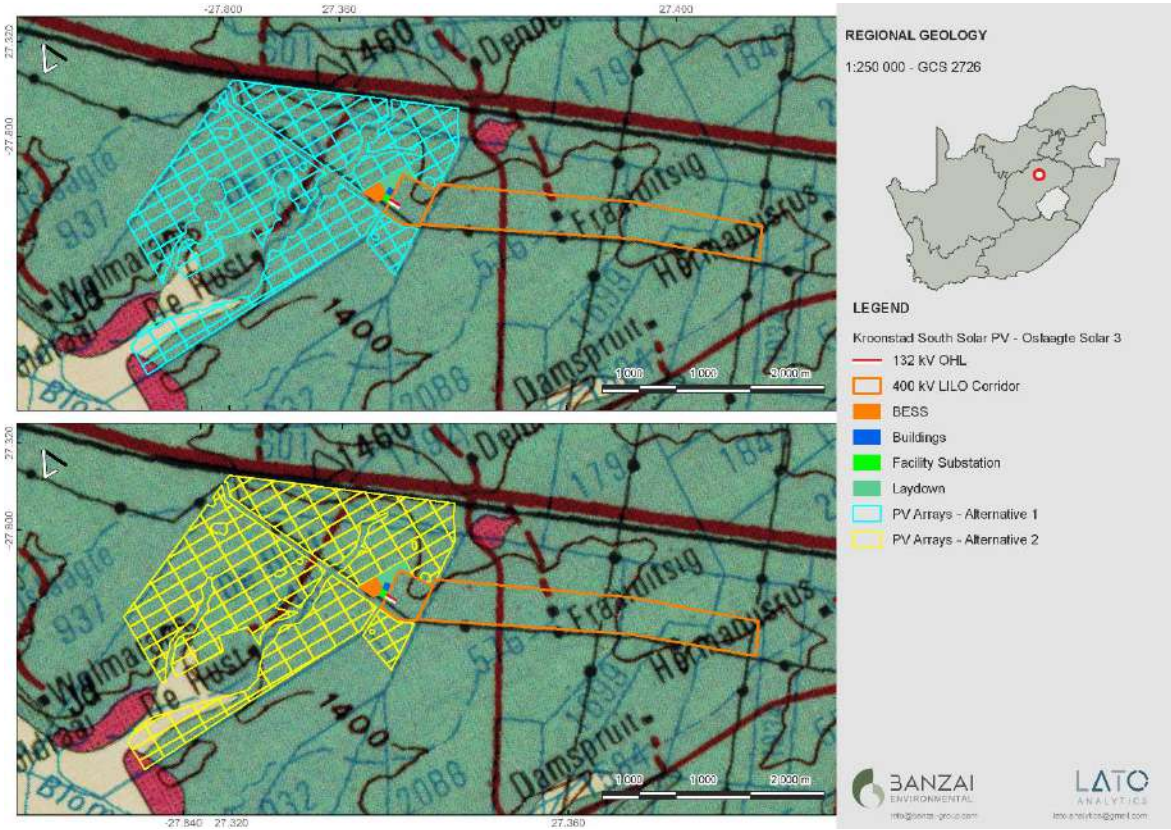
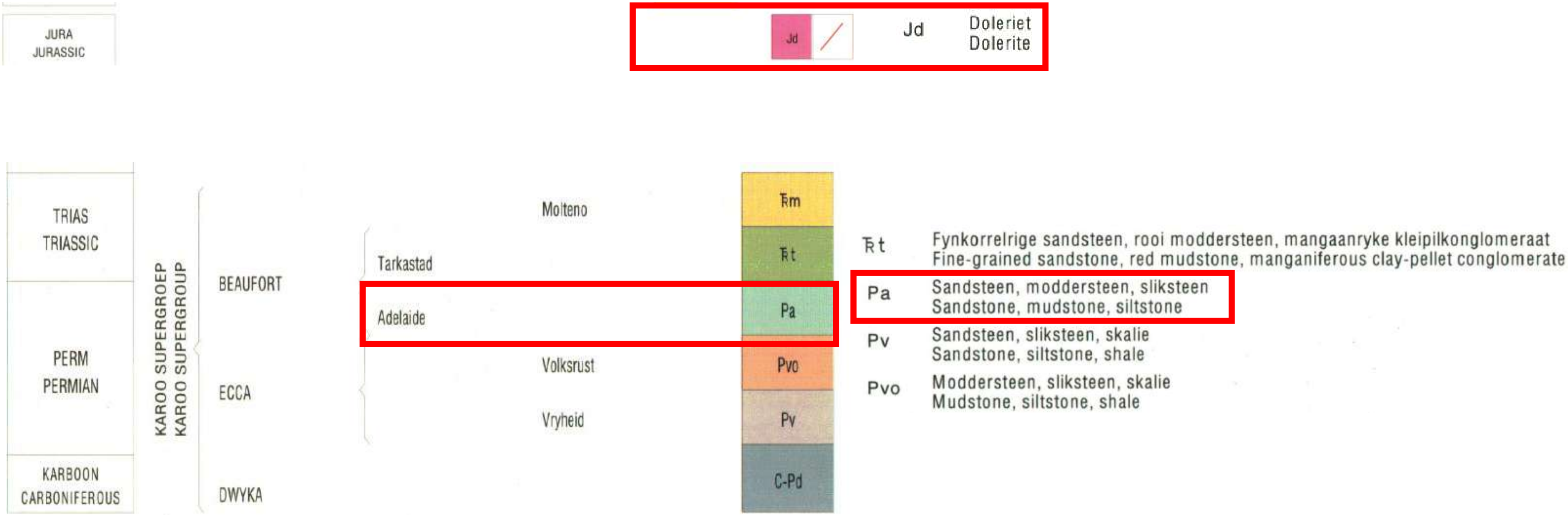


***Figure 3**: Extract of the 1:250 000 Kroonstad 2726 (2000) Geological Map (Council for Geosciences, Pretoria) indicating the Oslaagte Solar 3 PV and Power Line Project near Kroonstad in the Free State. The proposed development is underlain by Quaternary Superficial sediments (yellow, single bird figure) and Dolerite (Jd, red) in the west while the largest portion is underlain by and Adelaide Subgroup (Pa, green) of the Beaufort Group (Karoo Supergroup).*

Table 3: Legend to the Kroonstad 2726 (2000) Geological Map (Council for Geosciences, Pretoria). Relevant sediments are indicated in a red square.



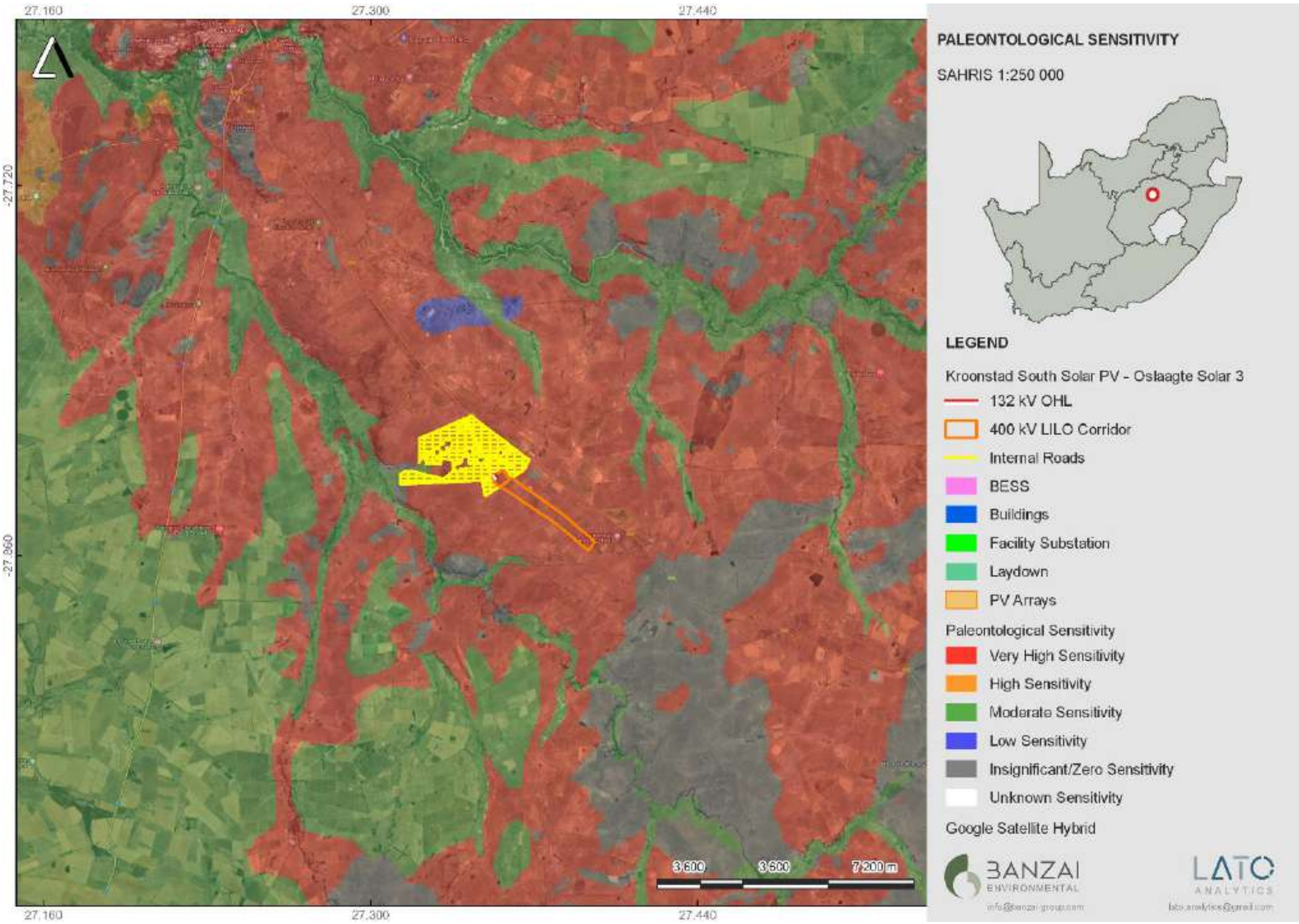


***Figure 4**: Extract of the 1 in 250 000 SAHRIS PalaeoMap (Council of Geosciences) indicating the proposed Oslaagte Solar 3 PV and power line near Kroonstad in the Free State.*

Table 4: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website		
Colour	**Sensitivity**	**Required Action**
RED	**VERY HIGH**	**Field assessment and protocol for finds is required**
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	**MODERATE**	**Desktop study is required**

BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	**INSIGNIFICANT/ZERO**	**No palaeontological studies are required**
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

According to the SAHRIS Palaeosensitivity map (Figure 4) the proposed development is underlain by sediments with a Very High (red) and Zero (grey) Palaeontological Significance.

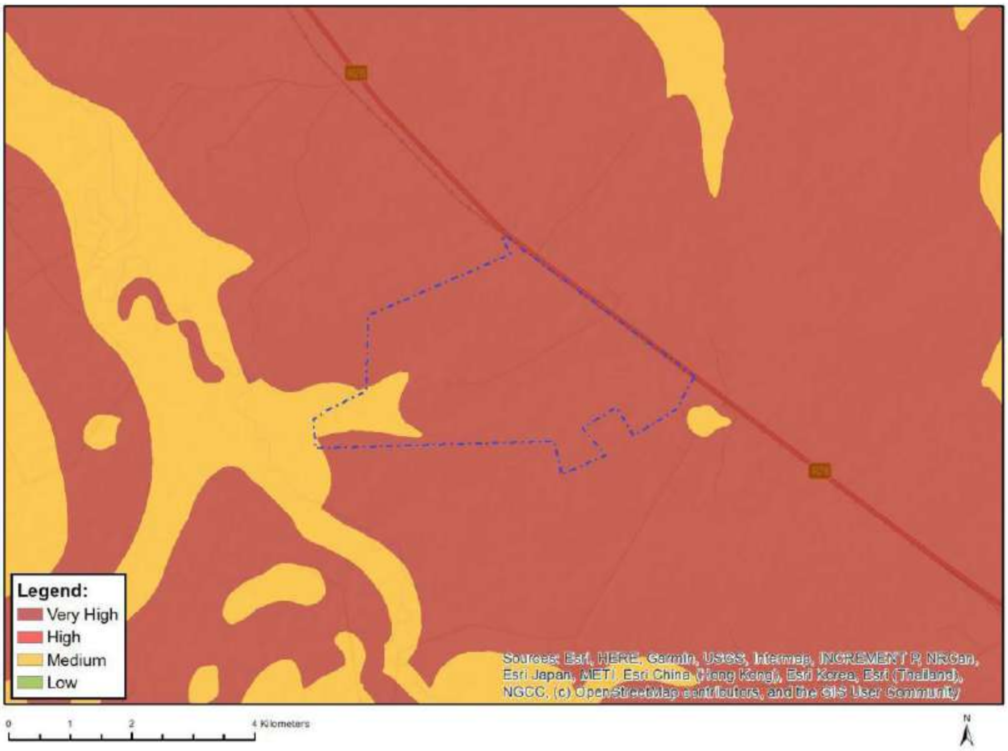


***Figure 5**: Palaeontological Sensitivity of the* Oslaagte Solar PV 3 facility *by the National Environmental Web-bases Screening Tool indicates a Very High Palaeontological Sensitivity.*

***Figure 6**: Palaeontological Sensitivity of the* Oslaagte Solar PV 3 *grid connection by the National Environmental Web-bases Screening Tool indicates a Very High Palaeontological Sensitivity.*

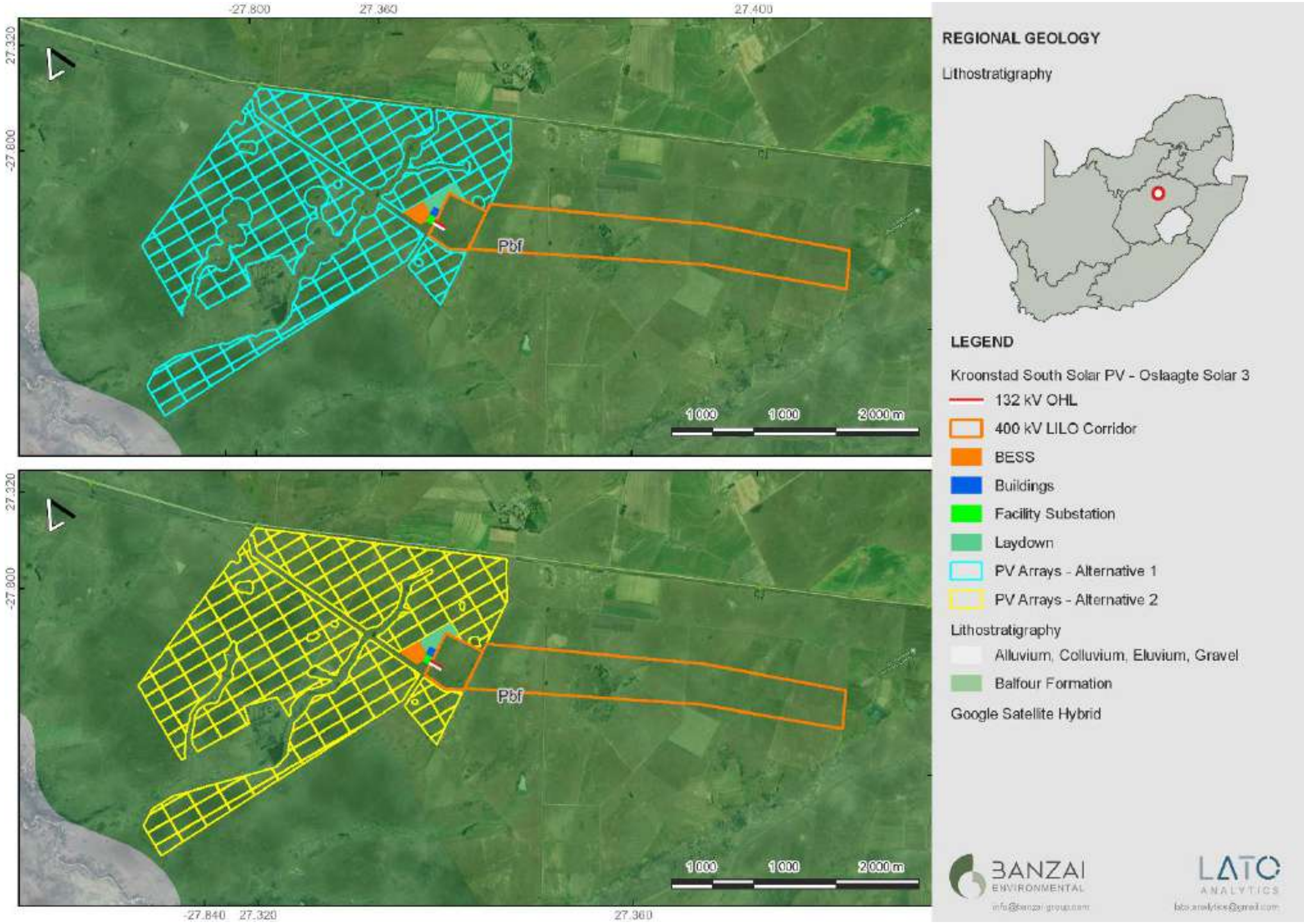


Figure 7: *Updated Geology (Council of Geosciences, Pretoria) of the study area indicates that the development is entirely underlain by the Balfour Formation of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup).*

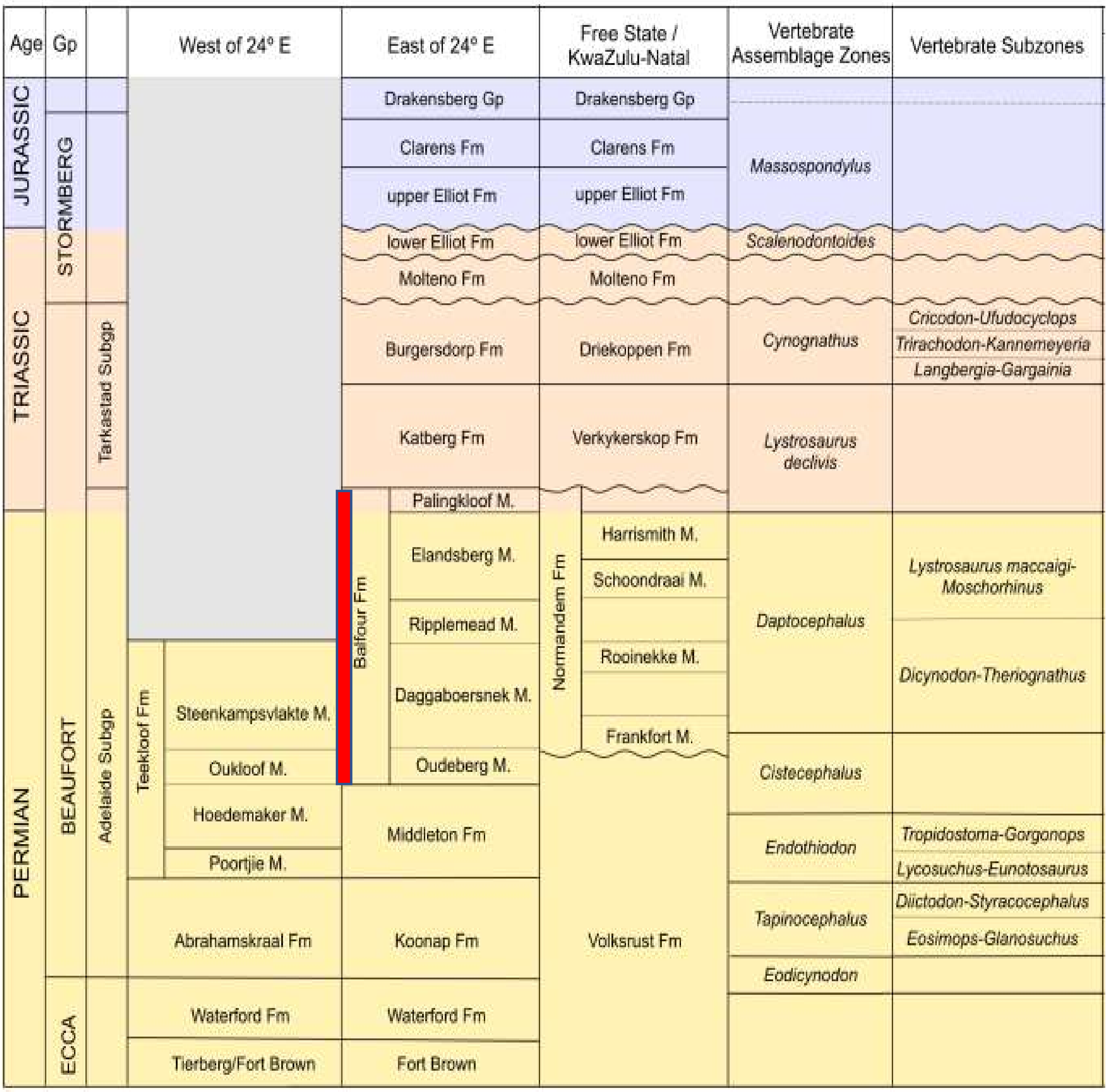


***Figure 8**: Vertebrate biozonation range chart for the Main Karoo Basin of South Africa.*
Solid lines indicate known ranges, dotted lines indicate suspected but not confirmed ranges, single dot represents the stratigraphic position of the taxa that have only been recovered from a single bed. Wavy lines indicate unconformities. (PLYCSR=Pelycosauria and MAMMFMES+Mammaliaformes. Gp=group, Subgp-Supbroup, Fm=Formation, M=Member
The geology of the proposed development is indication by the red line.

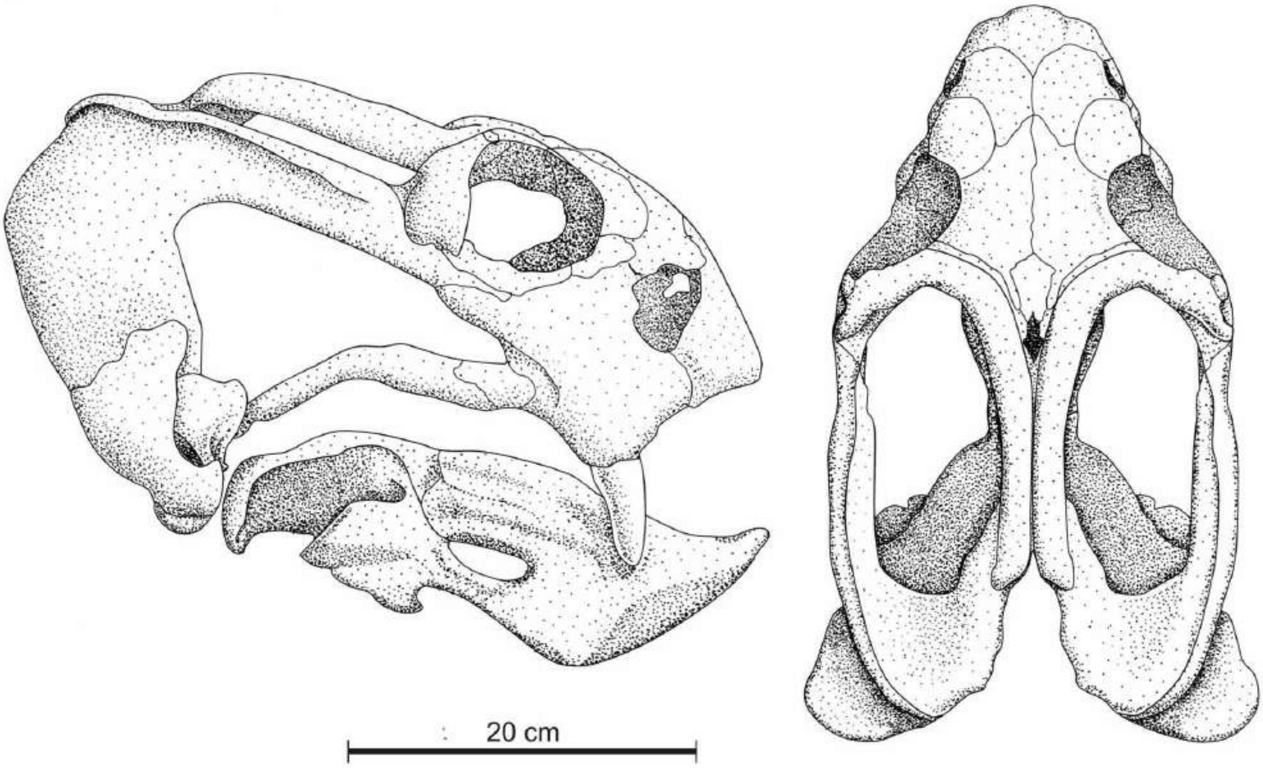


***Figure 9**: Lateral and dorsal views of skull of the dicynodont Daptocephalus leoniceps, the main biozone defining fossil (Image taken from Viglietti, 2020) and dorsal views (Image taken from Viglietti, 2020).*

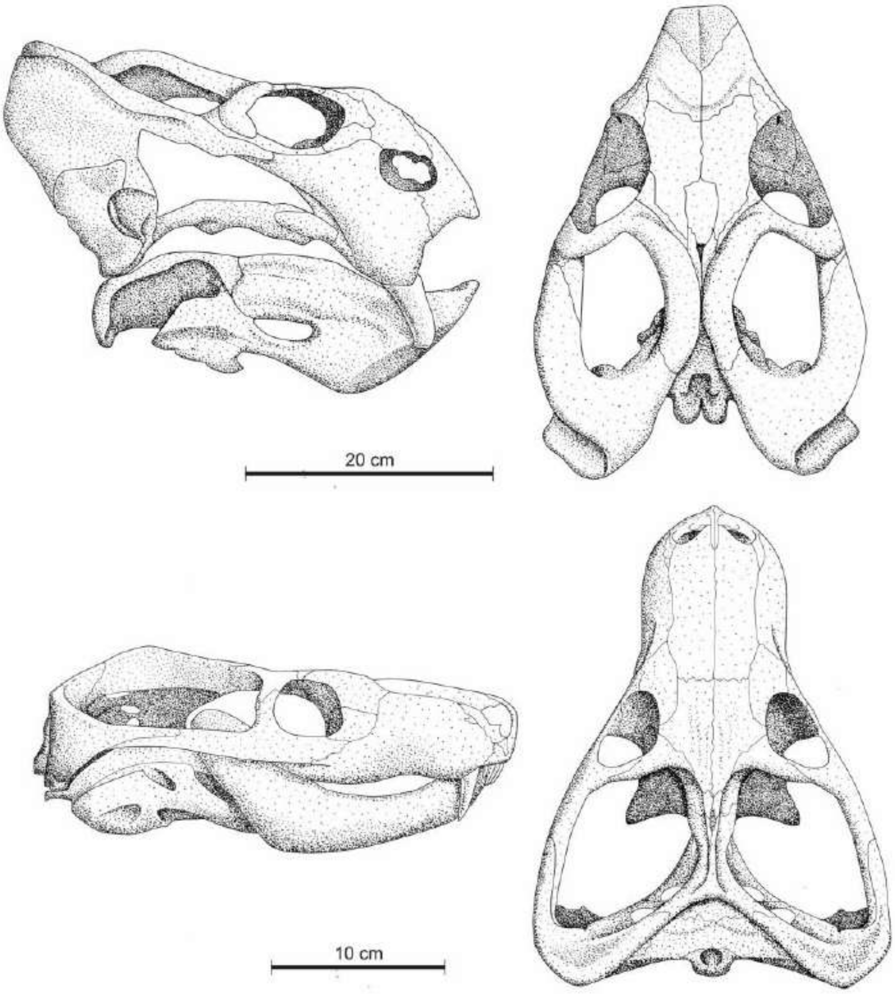


***Figure 10**:Skulls of the biozone defining fossils of the Dicynodon-Theriognathus Subzone in lateral and dorsal views. Dicynodon lacerticeps (top), Theriognathus microps (bottom) (Image taken from Viglietti, 2020).*

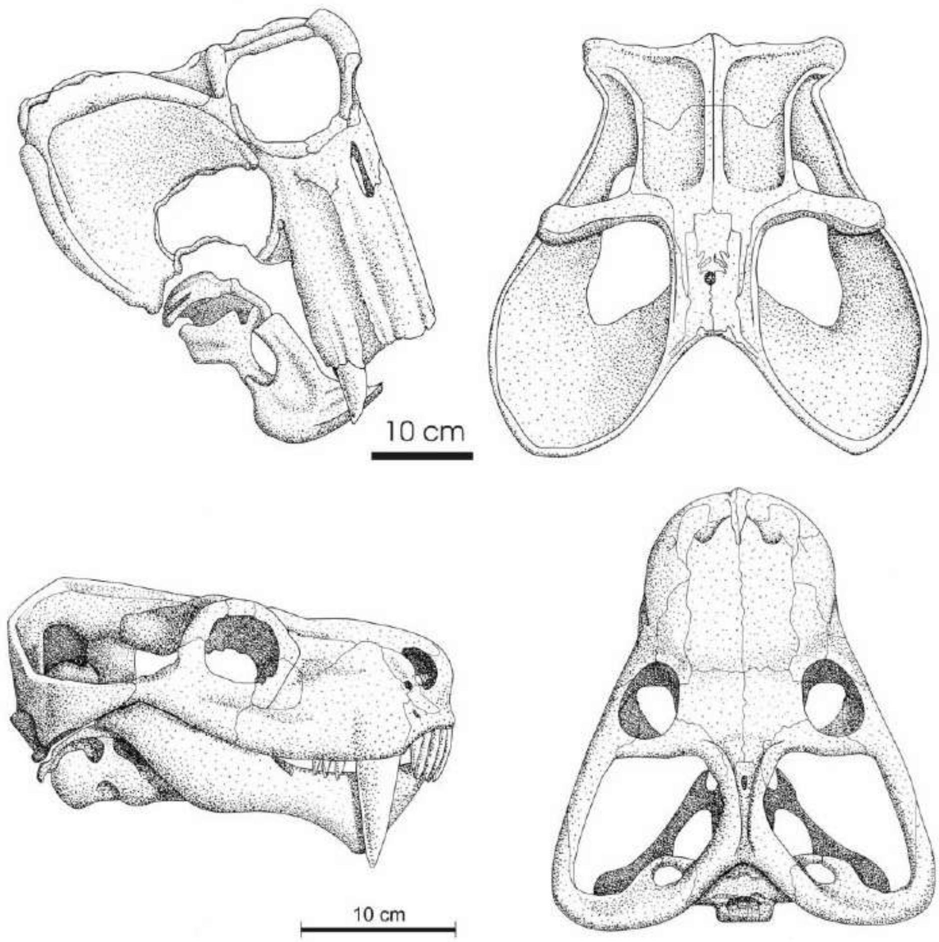


Figure 11: *Biozone defining fossils of the Lystrosaurus maccaigi- Moschorhinus Subzone. The skulls of the Lystrosaurus maccaigi (top) and Moschorhinus kitchingi (bottom) in lateral (Image taken from Viglietti, 2020).*

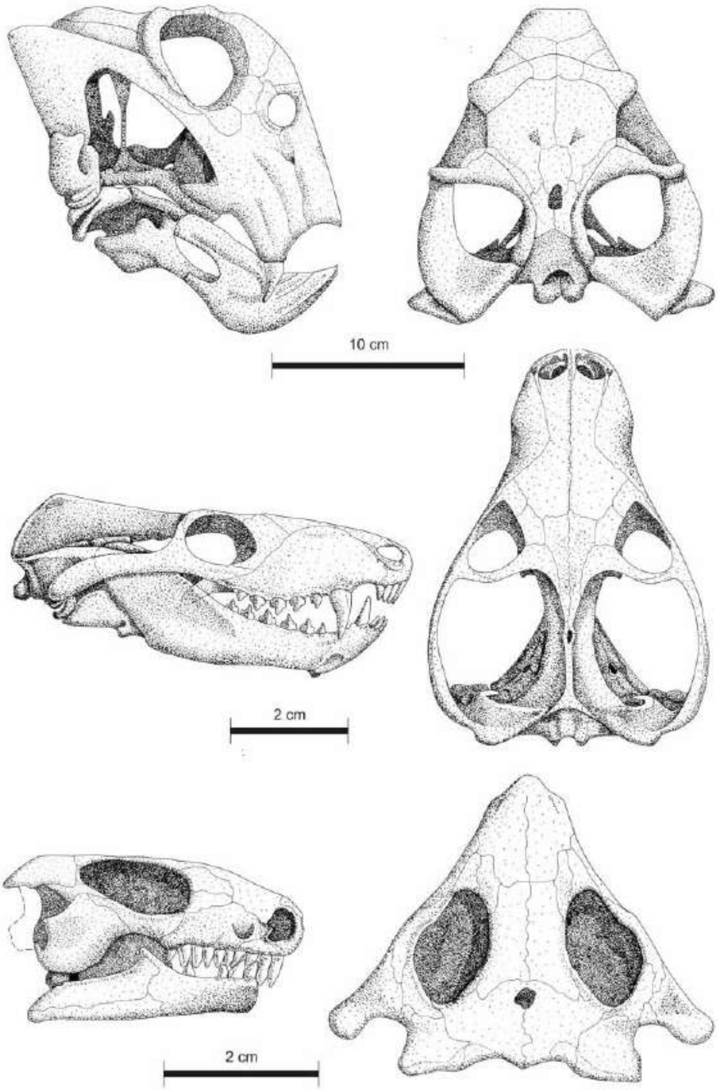


***Figure 12**: Lateral and dorsal views of the index taxa defining the Lystrosaurus declivis Assemblage Zone. (top) Lystrosaurus declivis, (centre) Thrinaxodon liorhinus, (bottom) Procolophon trigoniceps (Image taken from Botha and Smith, 2020). Image taken from Viglietti, 2020.*

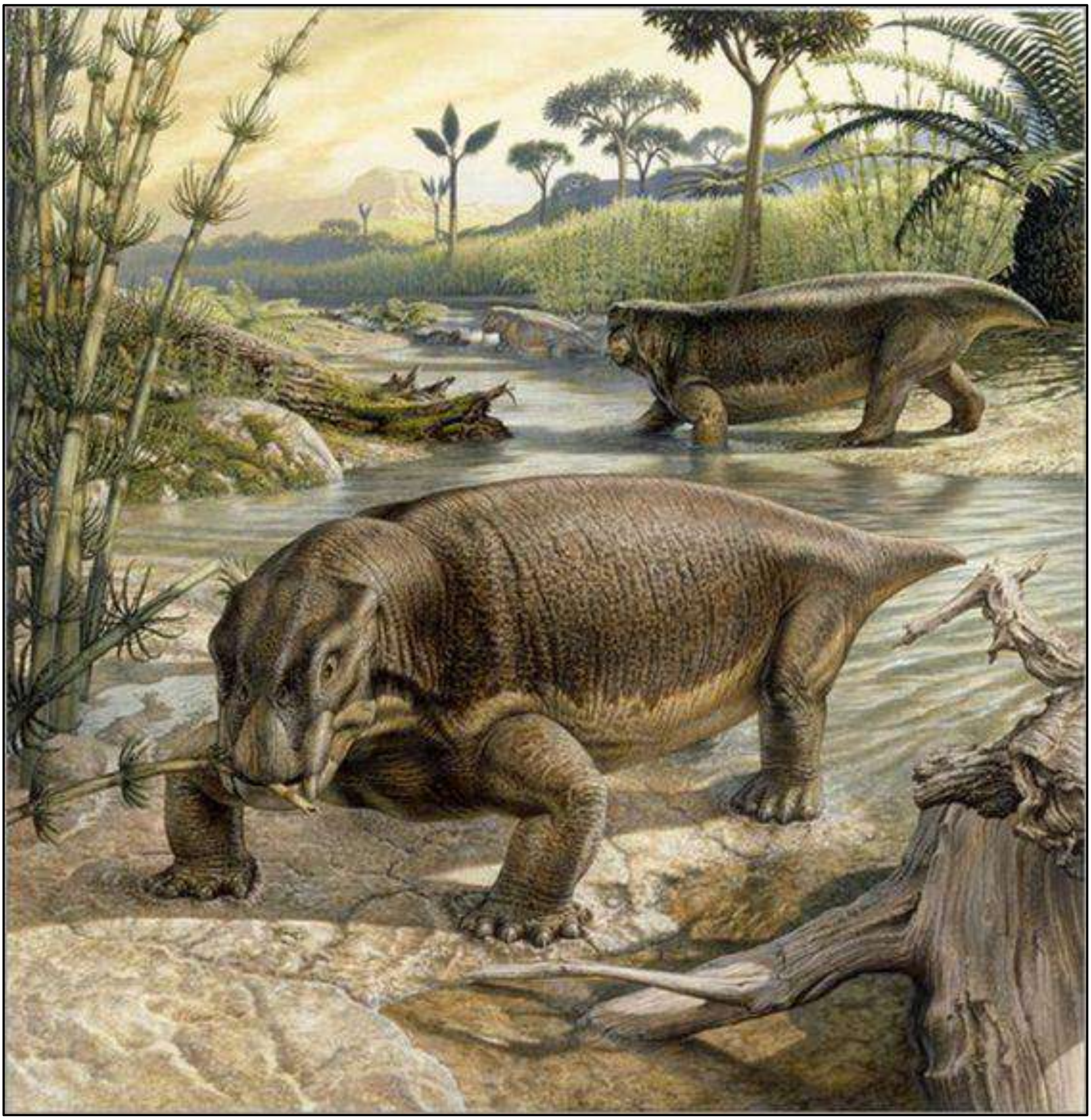


Figure 13: *Reconstruction of Lystrosaurus sp.*

https://i.pinimg.com/564x/ac/7b/13/ac7b132d1d9882e6d9f9af804820a21e.jpg

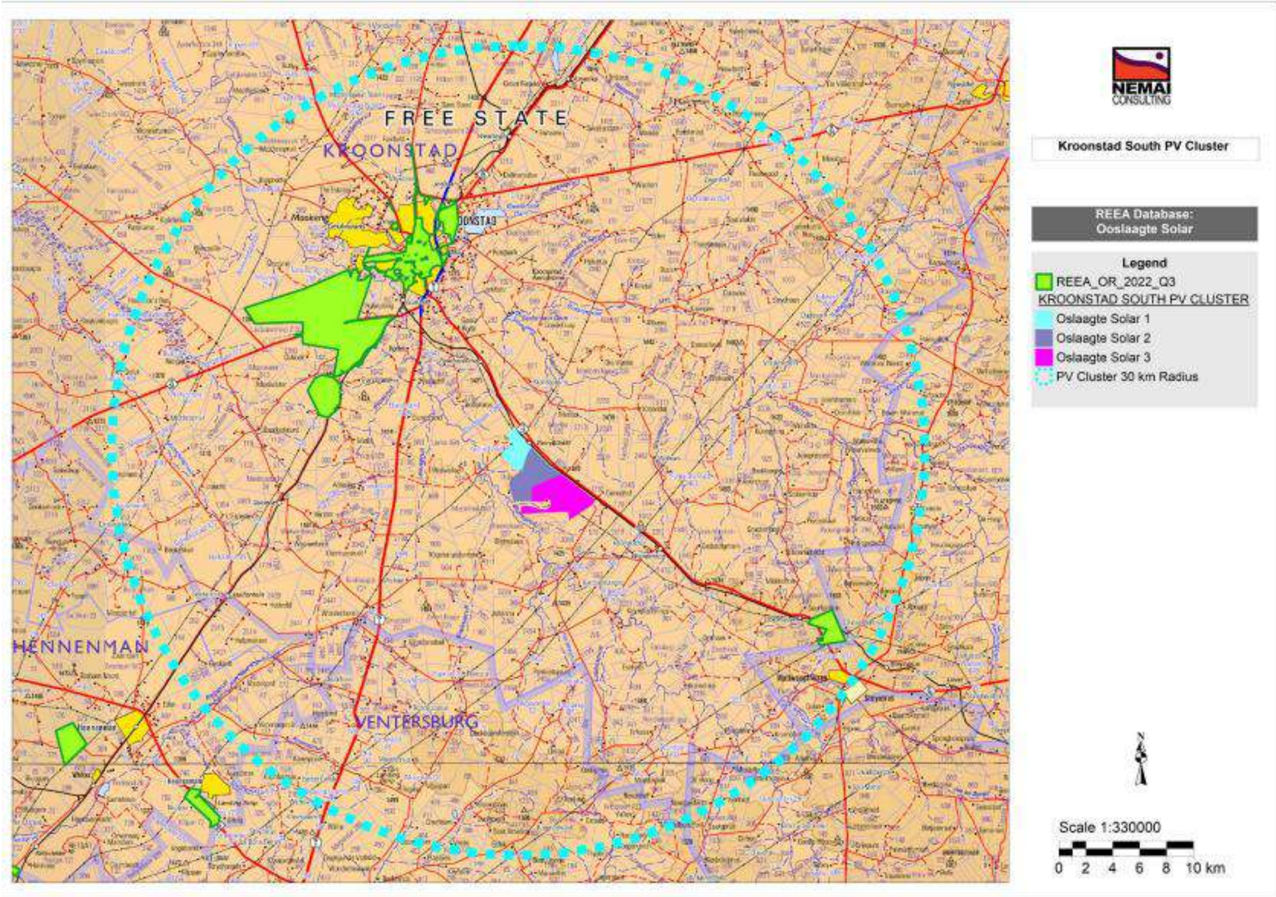


Figure 14:*Renewable energy applications in relation to the Project (within a 30km radius)*

Solar Facilities to the north, and west of the proposed development will have a Low to Very High Palaeontological Sensitivity (Figure 4). However, it is important to note that the quality of preservation of these different sites will most probably vary and it is thus difficult to allocate a Cumulative Sensitivity to the projects. If all the mitigation measures are carried out, a conservative estimate of the Cumulative impacts on fossil Heritage will vary between Low and Medium.

6. GEOGRAPHICAL LOCATION OF THE SITE

The Project is located approximately 20km to the south east of Kroonstad central business district (CBD) and falls within Ward 1 of the Moqhaka Local Municipality, in the Free State Province. The R76 runs along the eastern boundary of the site. (Figure 1-2).

The Project footprint covers a combined area of approximately 810ha. The Project will connect to the Eskom National Grid via 132 kV powerlines from the facility substation to a new 132/400 kV Main Transmission Substation (MTS).

The construction of a 400/132kV Main Transmission Substation (MTS) and three (3) 400kV LILO powerlines which is 4.55 kilometers (km) in length. The proposed lines originate approximately south east of the MTS and terminates at the proposed MTS. Five (5) 132kV powerlines, from the proposed five (5) solar energy facilities (Oslaagte Solar 1, Oslaagte Solar 2, Oslaagte Solar 3, Leeuwspruit Solar 1 and Leeuwspruit Solar 2) will enter the new 400/132kVkV MTS.

7. METHODS

The aim of a desktop study is to evaluate the possible risk to palaeontological heritage in the proposed development. This includes all trace fossils as well as all fossils in the proposed footprint. All possible information is consulted to compile a desktop study, and this includes the following: all Palaeontological Impact Assessment reports in the same area; aerial photos and Google Earth images, topographical as well as geological maps.

7.1 Assumptions and Limitations

The focal point of geological maps is the geology of the area and the sheet explanations of the Geological Maps were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas is also used to provide information on the existence of fossils in an area which has not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally **assumed** that exposed fossil heritage is present within the footprint. A field-assessment will thus improve the accuracy of the desktop assessment.

8. ADDITIONAL INFORMATION CONSULTED

In compiling this report the following sources were consulted:

- Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984)
- A Google Earth map with polygons of the proposed development was obtained from Nemai Consulting
- 1:250 000 2726 Kroonstad (2000) Geological Map (Council for Geosciences, Pretoria)
- Updated geological shape files (Council for Geosciences, Pretoria)
- Palaeosensitivity map on SAHRIS (South African Heritage Resources Information System) website
- National Environmental Web-based Screening Tool

- Published geological and palaeontological literature as well as
- Relevant PIAs in the area that includes that of (Almond 2020a-c, 2021)
- A comprehensive site-specific field survey of the development footprint for the project was conducted on foot and motor vehicle in May 2023.

9. SITE VISIT

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 13 May 2023. No fossiliferous outcrops were identified during the site visit.

Figure 15:*General view of the proposed development indicates a low topography with grassveld vegetation.*

10. ASSESSMENT METHODOLOGT

10.1 Method of Environmental Assessment

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national, or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table below.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

10.2 Impact Rating System

Impact assessment must take account of the nature, scale, and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 5: The rating system

NATURE		
The Nature of the Impact is the possible destruction of fossil heritage		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).

2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		

This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible, and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: **(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity = X.** The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive

Table 6: Impacts on Alternative 1							
Impacts	Extent	Duration	Magnitude	Reversibility	Irreplaceable loss	Cumulative effect	Impact
Pre-mitigation	1	4	3	4	4	2	45
Post mitigation	1	4	1	4	4	2	15

Table 7: Impacts on (Alternative 2)							
Impacts	Extent	Duration	Magnitude	Reversibility	Irreplaceable loss	Cumulative effect	Impact
Pre-mitigation	1	4	3	4	4	2	45
Post mitigation	1	4	1	4	4	2	15

Impact Summary

Environmental parameter	**Issues**	**Rating prior to mitigation**	**Average**	**Rating post mitigation**	**Average**
Planning Phase Alternative 1 Oslaagte Solar 3 PV Facility	No Impact	0	No Impact	0	No Impact
Construction Stage Alternative 1 Oslaagte Solar 3 PV Facility Loss of fossil heritage	Destroy or permanently seal-in fossils at or below the surface that are then no longer	45	Negative Medium impact	16	Negative Low impact

	available for scientific study				
Operational Phase Alternative 1 Oslaagte Solar 3 PV Facility	No Impact	0	No Impact	0	No Impact
Decommissioning Phase Alternative 1 Oslaagte Solar 3 PV Facility	No Impact	0	No Impact	0	No Impact
Planning Phase Alternative 2 Oslaagte Solar 3 PV Facility	No Impact	0	No Impact	0	No Impact
Construction Stage Alternative 2 Oslaagte Solar 3 PV Facility Loss of fossil heritage	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	45	Negative Medium impact	16	Negative Low impact
Operational Phase Alternative 2 Oslaagte Solar 3 PV Facility	No Impact	0	No Impact	0	No Impact
Decommissioning Phase Alternative 2 Oslaagte Solar 3 PV Facility	No Impact	0	No Impact	0	No Impact

11. FINDINGS AND RECOMMENDATIONS

The proposed Oslaagte Solar 3 PV Facility is largely underlain by the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) with a very small portion of Jurassic dolerite and Quaternary alluvium in the west of the development. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) and the DFFE (Department of Forestry, Fisheries and the Environment) Screening Tool the Palaeontological Sensitivity of the Adelaide Subgroup is Very High (Almond and Pether, 2009; Almond *et al*., 2013). Updated Geology (Council of Geosciences) indicates that the proposed development is underlain by the Balfour Formation of the Adelaide Subgroup. Two Layout alternatives have been considered for this project. The first alternative is the original layout of the proposed development while the second alternative was determined after input of the different specialist studies. As the geology of the alternatives are the same there is no preference between the alternatives from a Palaeontological point of view.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on the weekend of 13 May 2023. No fossiliferous outcrop was detected in the proposed development. This could be attributed to the lack of outcrops as well as the lush grassy vegetation in the area. Based on the site investigation as well as desktop research it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. A medium Palaeontological Significance has been allocated for the construction phase of the PV development pre-mitigation and a low significance post mitigation. The construction phase will be the only development phase impacting Palaeontological Heritage and no significant impacts are expected to impact the Operational and Decommissioning phases. As the No-Go Alternative considers the option of ‘do nothing’ and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The Cumulative impacts of the development near Kroonstad is considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

12. CHANCE FINDS PROTOCOL

The following procedure will only be followed if fossils are uncovered during the excavation phase of the development.

Legislation

Cultural Heritage in South Africa (includes all heritage resources) is protected by the National Heritage Resources Act (Act No 25 of 1999) (NHRA). According to Section 3 of the Act, all Heritage resources include "all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens".

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

A fossil is the naturally preserved remains (or traces thereof) of plants or animals embedded in rock. These organisms lived millions of years ago. Fossils are extremely rare and irreplaceable. By studying fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material.

It is the responsibility of the Environmental Site Officer (ESO) or site manager of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ESO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

Chance Find Procedure

- If a chance find is made the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find.
- The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager

must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa.

- Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- If the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO. Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

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APPENDIX 1

CURRICULUM VITAE

PROFESSION:	Palaeontologist
YEARS' EXPERIENCE:	30 years in Palaeontology
EDUCATION:	B.Sc Botany and Zoology, 1988
	University of the Orange Free State
	B. Sc (Hons) Zoology, 1991
	University of the Orange Free State
	Management Course, 1991
	University of the Orange Free State
	M. Sc. *Cum laude* (Zoology), 2009
	University of the Free State

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently

EMPLOYMENT HISTORY

Part-time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part-time laboratory assistant	Department of Virology
	University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant	National Museum, Bloemfontein
and Collection Manager	1998–2022

TECHNICAL REPORTS

Butler, E. 2014. Palaeontological Impact Assessment of the proposed development of private dwellings on portion 5 of farm 304 Matjesfontein Keurboomstrand, Knysna District, Western Cape Province. Bloemfontein.
Butler, E. 2014. Palaeontological Impact Assessment for the proposed upgrade of existing water supply infrastructure at Noupoort, Northern Cape Province. 2014. Bloemfontein.
Butler, E. 2015. Palaeontological impact assessment of the proposed consolidation, re-division, and development of 250 serviced erven in Nieu-Bethesda, Camdeboo local municipality, Eastern Cape. Bloemfontein.
Butler, E. 2015. Palaeontological impact assessment of the proposed mixed land developments at Rooikraal 454, Vrede, Free State. Bloemfontein.
Butler, E. 2015. Palaeontological exemption report of the proposed truck stop development at Palmiet 585, Vrede, Free State. Bloemfontein.
Butler, E. 2015. Palaeontological impact assessment of the proposed Orange Grove 3500 residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape. Bloemfontein.
Butler, E. 2015. Palaeontological Impact Assessment of the proposed Gonubie residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape Province. Bloemfontein.
Butler, E. 2015. Palaeontological Impact Assessment of the proposed Ficksburg raw water pipeline. Bloemfontein.
Butler, E. 2015. Palaeontological Heritage Impact Assessment report on the establishment of the 65 mw Majuba Solar Photovoltaic facility and associated infrastructure on portion 1, 2 and 6 of the farm Witkoppies 81 HS, Mpumalanga Province. Bloemfontein.
Butler, E. 2015. Palaeontological Impact Assessment of the proposed township establishment on the remainder of portion 6 and 7 of the farm Sunnyside 2620, Bloemfontein, Mangaung metropolitan municipality, Free State, Bloemfontein.
Butler, E. 2015 . Palaeontological Impact Assessment of the proposed Woodhouse 1 photovoltaic solar energy facilities and associated infrastructure on the farm Woodhouse729, near Vryburg, North West Province. Bloemfontein.
Butler, E. 2015. Palaeontological Impact Assessment of the proposed Woodhouse 2 photovoltaic solar energy facilities and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.
Butler, E. 2015.Palaeontological Impact Assessment of the proposed Orkney solar energy farm and associated infrastructure on the remaining extent of Portions 7 and 21 of the farm Wolvehuis 114, near Orkney, North West Province. Bloemfontein.
Butler, E. 2015. Palaeontological Impact Assessment of the proposed Spectra foods broiler houses and abattoir on the farm Maiden Manor 170 and Ashby Manor 171, Lukhanji Municipality, Queenstown, Eastern Cape Province. Bloemfontein.
Butler, E. 2016. Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoort concentrated solar power facility and associated infrastructure on portion 1 and 4 of the farm Carolus Poort 167 and the remainder of Farm 207, near Noupoort, Northern Cape. Prepared for Savannah Environmental. Bloemfontein.
Butler, E. 2016. Palaeontological Impact Assessment of the proposed Woodhouse 1 Photovoltaic Solar Energy facility and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.
Butler, E. 2016. Palaeontological Impact Assessment of the proposed Woodhouse 2 Photovoltaic Solar Energy facility and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.
Butler, E. 2016. Proposed 132kV overhead power line and switchyard station for the authorised Solis Power 1 CSP project near Upington, Northern Cape. Bloemfontein.
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Butler. E., 2022. Palaeontological Impact Assessment of the Kentani, Braklaagte, Klipfontein, Klipfontein 2, Leliehoek and Sonoblomo PV Facilities located near Dealsville in the Free State Province
Butler. E., 2022. Palaeontological Impact Assessment for the proposed Harvard 1 Solar Photovoltaic (PV) facility on Portion 5 of Farm Spes Bona no 2355, Mangaung Metropolitan Municipality in the Free State.
Butler. E., 2022. Palaeontological Impact Assessment for proposed Harvard 2 Solar Photovoltaic (PV) facility on Portion 8 of Farm Spes Bona No 2355, Mangaung Metropolitan Municipality in the Free State.
Butler. E., 2022. Palaeontological Impact Assessment for the proposed Doornrivier Solar 1, southwest of Matjhabeng (formerly Virginia) in the Free State
Butler. E., 2022. Palaeontological Desktop Assessment for the proposed Leeuwbosch PV solar photovoltaic (PV) plant and associated infrastructure on Portion 37 of the Farm Leeuwbosch No. 44 near Leeudoringstad within the Maquassi Hills Local Municipality in the Dr Kenneth Kaunda District Municipality in the North West Province.

APPENDIX 2

PALAEONTOLOGICAL SITE VERIVICATION REPORT

Oslaagte 3 Solar PV Project

(Part of the Kroonstad Southern PV Cluster)

CONTENTS

1. INTRODUCTION

Nemai Consulting CC (Nemai) was appointed by Oslaagte Solar 3 (Pty) Ltd (the "Applicant") to conduct the Environmental Impact Assessment (EIA) for the proposed 480 MW Solar Photovoltaic (PV) Project west of Kroonstad, in the Free State Province (the "Project").

The electricity generated by the Project will be transmitted through a 132kV power line from the new facility substation to a new 400/132 kV Main Transmission Substation (MTS) and then onto the National Grid via 400 kV LILO powerlines. The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within SA.

Table S1: Details of the affected properties

Farm Name	21-digit Surveyor General (SG) Code
PV Site, 132kV Power Line Route and Main Transmission Substation	
Oslaagte 2564	F02000000000256400000
400 kV Powerlines	
Oslaagte 2564	F02000000000256400000
Mooidraai 953	F02000000000095300000
Wolvekop 314	F02000000000031400000
Klein Geluk 2088	F02000000000208800000
Fraaiuitzicht 576	F02000000000057600000
Zonderweg 1699	F02000000000169900000

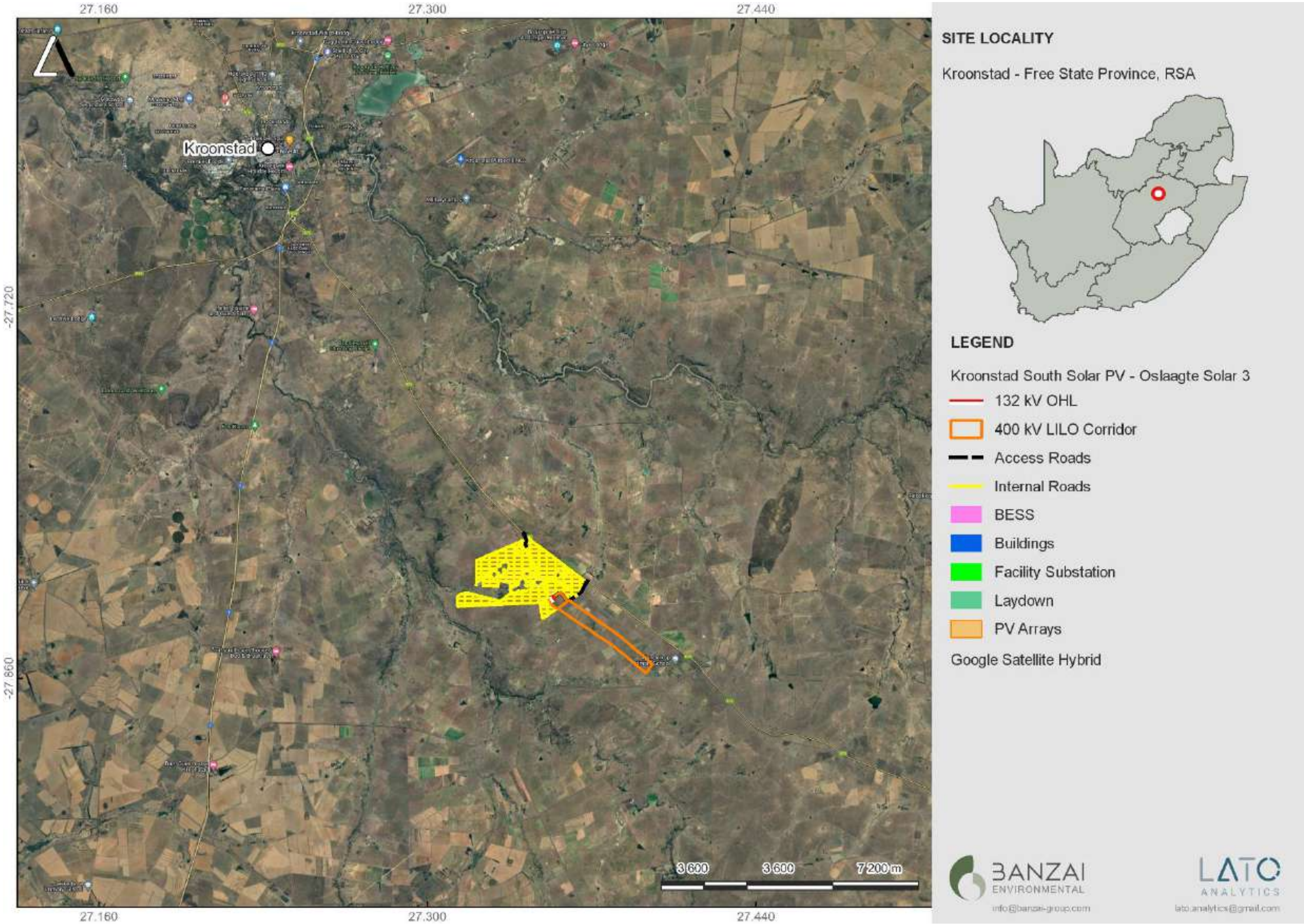


Figure S1: Regional locality Map of the proposed Oslaagte Solar 3 PV Facility near Kroonstad in the Free State Province.

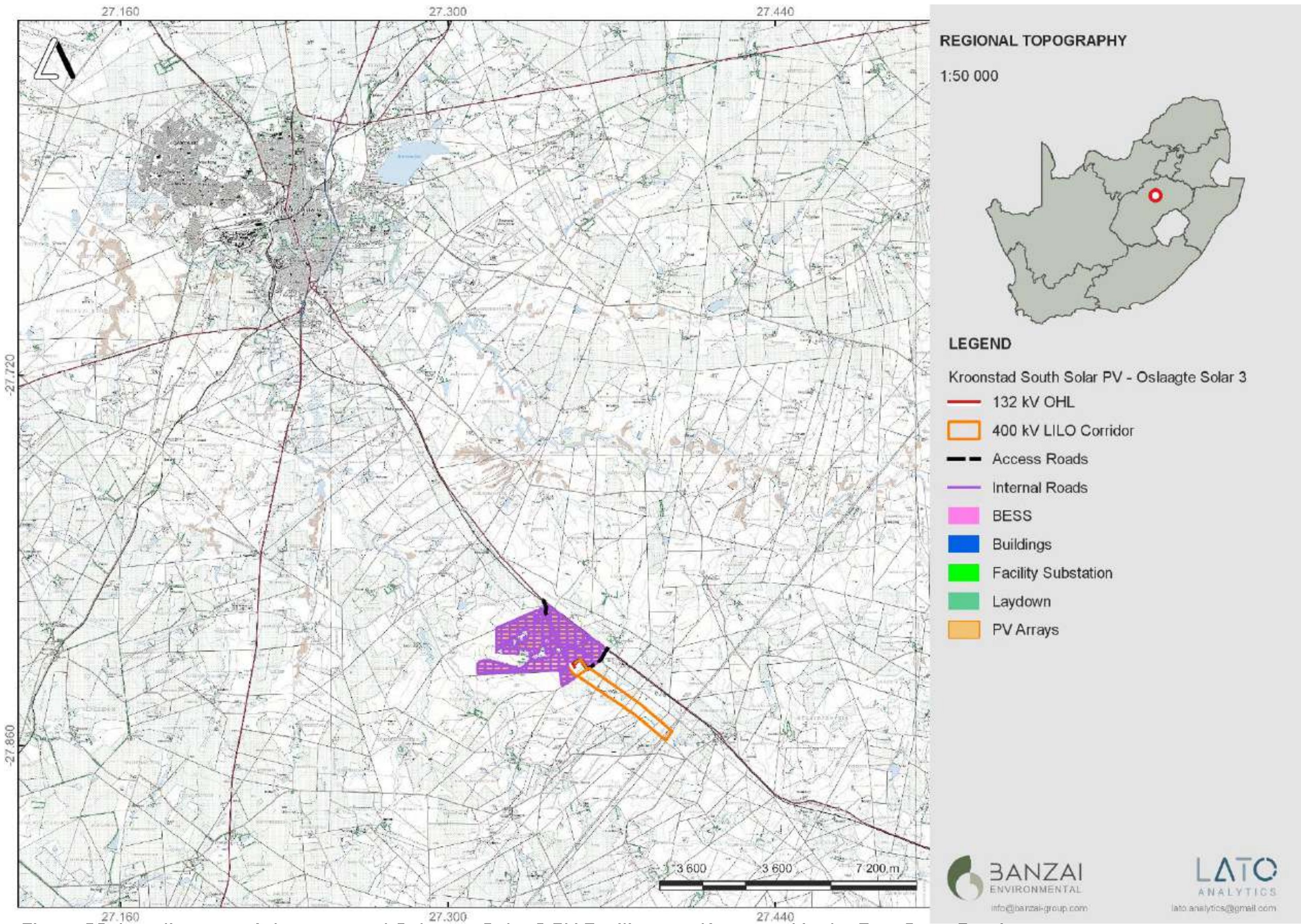


Figure S2: Locality map of the proposed Oslaagte Solar 3 PV Facility near Kroonstad in the Free State Province.

2. TECHNICAL DETAILS FOR THE PROPOSED DEVELOPMENT

Table S2: Technical information

No.	Component	Alternative 1 - Description / Dimensions	Alternative 2 - Description / Dimensions
1.	Height of PV panels	Up to 5 m	Up to 5.5 m
2.	Area of PV Array	Up to approximately 445.5 ha	Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems. Area: Up to 760 ha
3.	Area occupied by inverter / transformer stations / substations	Up to 1 ha	It is estimated that the maximum size of the facility substation will not exceed 2 ha. Each facility will require inverter-stations, transformers, switchgear and internal electrical reticulation (underground cabling).
4.	Capacity of on-site substation	High voltage (132 kV)	The facility substation will collect the power from the facility and transform it from medium voltage (up to 33 kV) to high voltage (132 kV).
5.	BESS	Area up to ± 5ha	Area: up to ± 5 ha
6.	Area occupied by both permanent and construction laydown areas	Temporary: Up to 7ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)	Temporary construction laydown area up to 10 ha. Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
7.	Area occupied by buildings	Up to 1.5 ha	Up to 1.5 ha
8.	Length of internal roads	Up to 33 km	Up to 33 km
9.	Width of internal roads	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.
10.	Height of fencing	Up to 3.5m	Up to 3.5m
11.	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing	Type will vary around the site, welded mesh, palisade and electric fencing

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations [4 December 2014, Government Notice (GN) R982, R983, R984 and R985, as amended), various aspects of the proposed development may have an impact on the environment and are considered to be listed activities. These activities require environmental authorisation (EA) from the Competent Authority (CA), namely the Department of Small Business Development, Tourism and Environmental Affairs (DESTEA), prior to the commencement thereof.

In accordance with GN 320 of 20 March 2020 and GN 1150 of 30 October 2020[1] (i.e., "the Protocols") of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool). Elize Butler as Palaeontology Specialist have been commissioned to verify the sensitivity of the Bultfontein Solar PV Cluster and associated infrastructure site under these specialist protocols.

3. SITE SENSITIVITY VERIFICATION METHODOLOGY

The Palaeontology Sensitivity Verification was undertaken by the following methodology:

- The site sensitivity is established through the National Environmental Web-Based Screening Tool
- The Site is mapped on the relevant Geological Map to determine the underlying geology of the development
- Then the site is mapped on the South African Heritage Resources Information System (SAHRIS) PalaeoMap, and the Sensitivity of the proposed development established.
- Other information is obtained by using satellite imagery and
- Palaeontological Impact Assessments and Desktop Assessments of projects in the same area are studied.
- A comprehensive site-specific field survey of the development footprint for the combined projects was conducted on foot and motor vehicle by Banzai Environmental in May 2023.

4. OUTCOME OF SITE SENSITIVITY VERIFICATION

The geology of the proposed Oslaagte Solar 3 PV near Kroonstad in the Free State is depicted on the 1: 250 000 Kroonstad 2726 (2000) Geological Map (Council for Geosciences, Pretoria) (Figure S3, Table S2). This map indicates that the study area is mainly underlain by the Adelaide Subgroup (Pa, green)

[1] GN 320 (20 March 2020): Procedures for The Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation

(Beaufort Group, Karoo Supergroup) while a very small portion in the west is underlain by dolerite and quaternary alluvium.

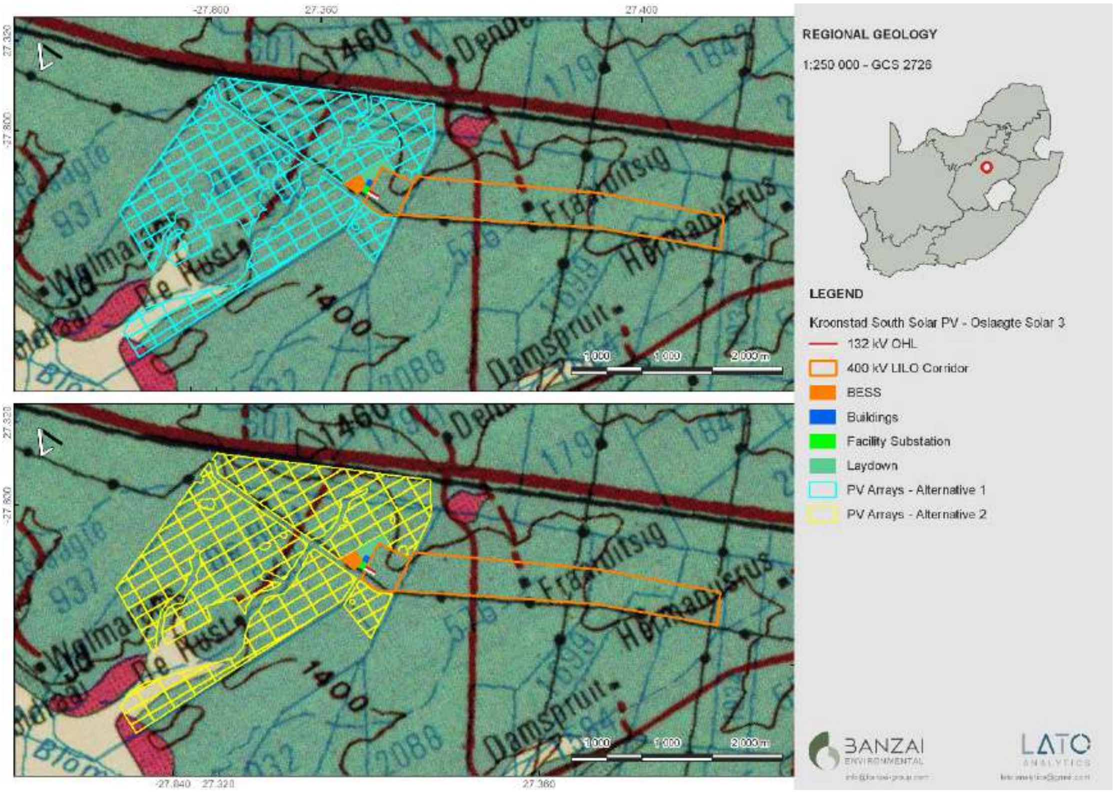
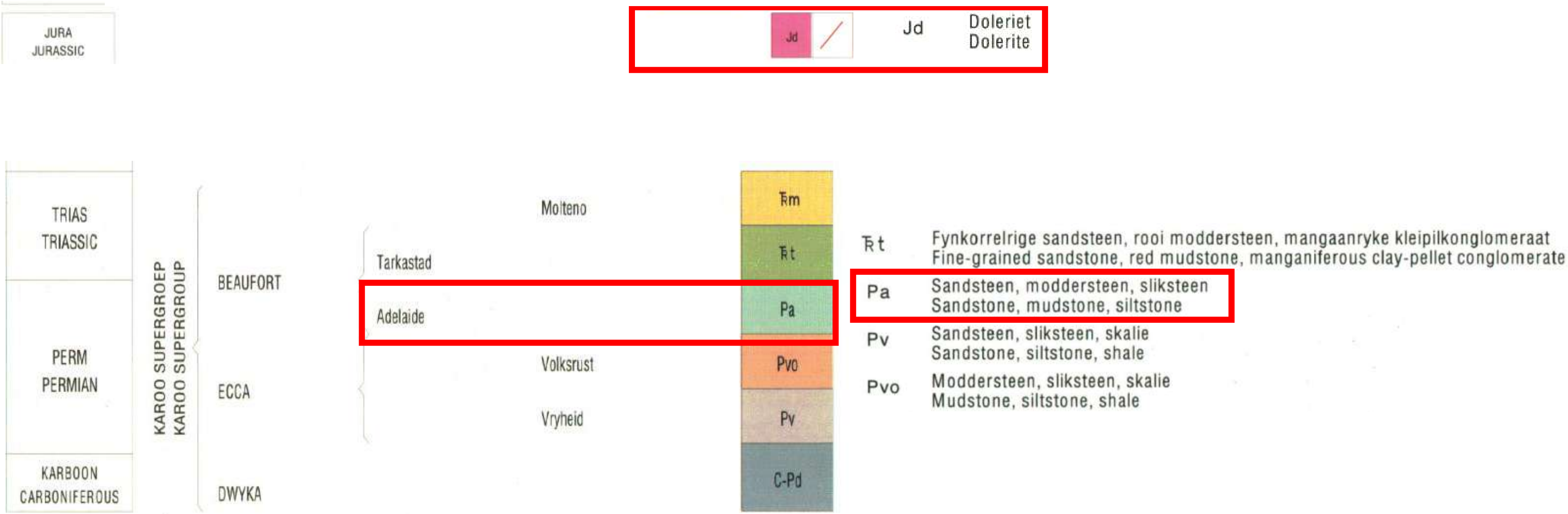


Figure S3: Extract of the 1: 250 000 Kroonstad 2726 (2000) Geological Map (Council of Geoscience, Pretoria) indicating that the Oslaagte Solar 3 PV development and associated infrastructure is underlain by Quaternary alluvium and a small portion of dolerite in the west, while the largest portion is underlain by the Adelaide Subgroup (Balfour Group, Karoo Supergroup).

Table S3: Legend to the Kroonstad 2726 (2000) Geological Map (Council for Geosciences, Pretoria).

Relevant sediments are indicated in a red square



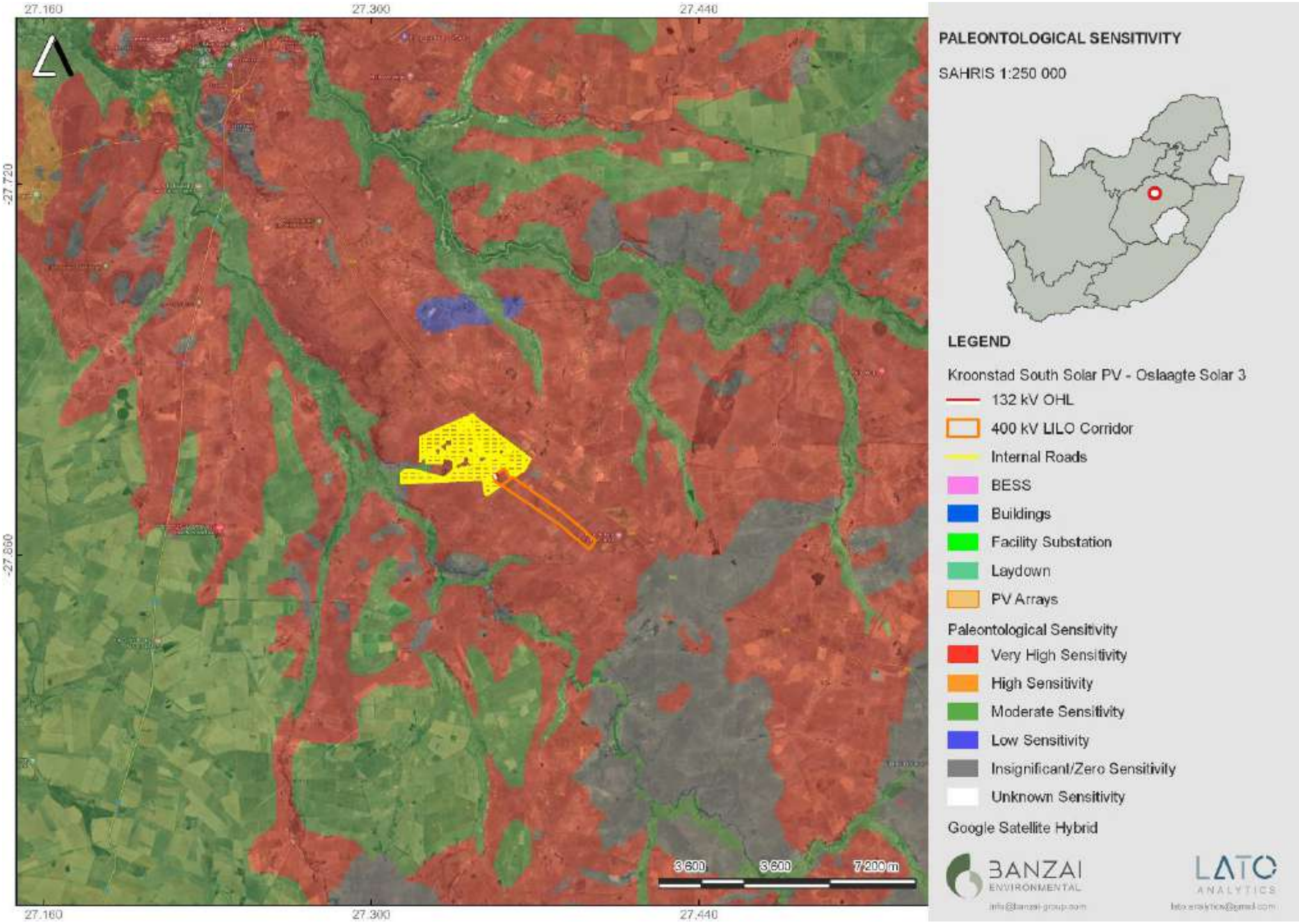


Figure S4: Extract of the 1: 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed Oslaagte Solar 3 PV development and associated infrastructure.

Table S4: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).		
Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The PalaeoMap of the South African Heritage Resources Information System (Figure S3, Table S4) indicates that the Palaeontological Sensitivity of the Oslaagte Solar 3 PV development is Very High (red), moderate (green) and Zero (grey, (Almond and Pether, 2009; Almond *et al*., 2013).

The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is Very High (dark red).

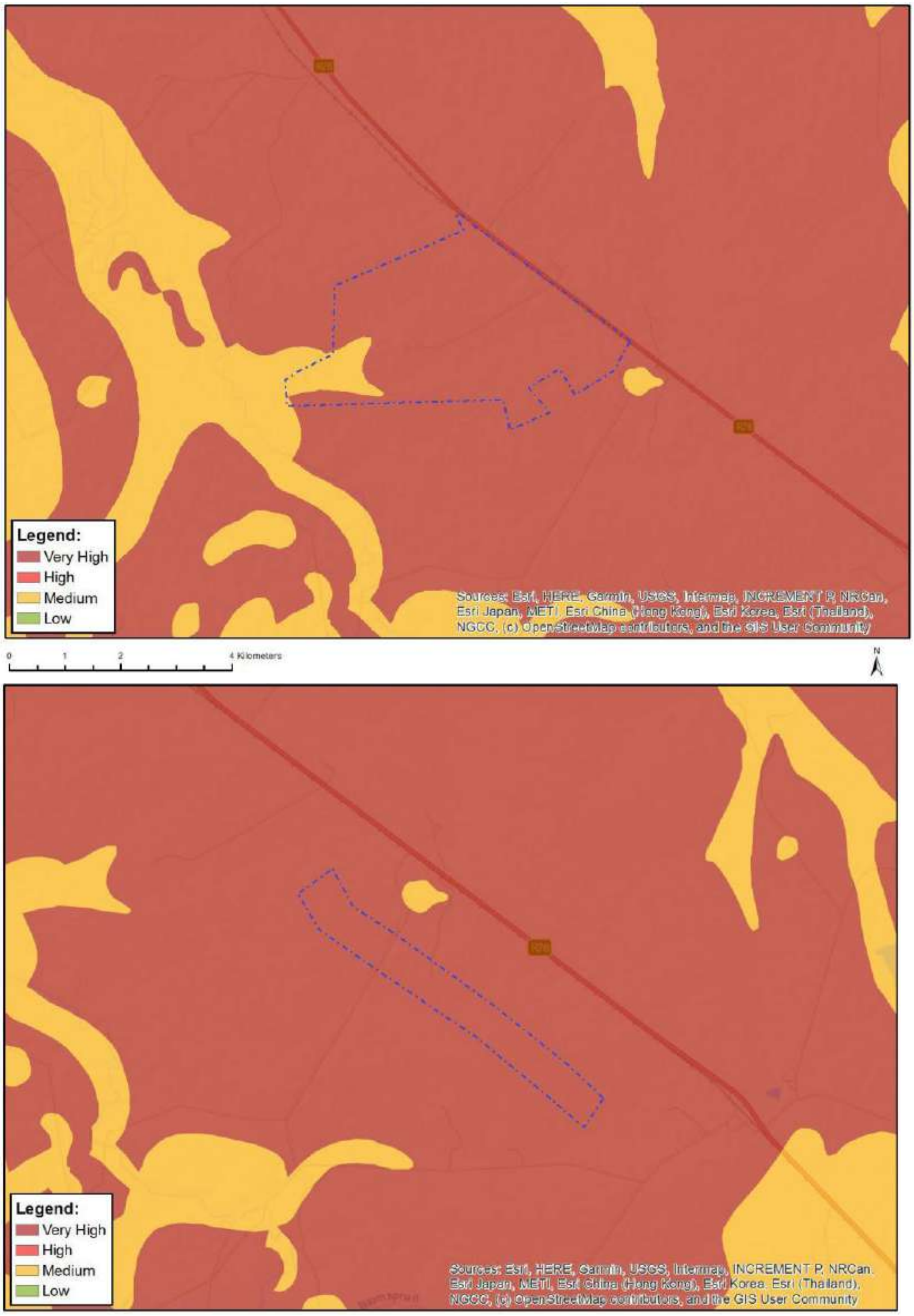


Figure S5: Palaeontological Sensitivity of the Oslaagte Solar PV 3 facility (top) and power line (bottom) by the National Environmental Web-bases Screening Tool.

5. CONCLUSION

The Site Sensitivities of the proposed Oslaagte Solar PV 3 has been verified and it was found that:

The SAHRIS Palaeosensitivity map indicates that the Palaeontological Sensitivity of the development is Very High.

And

The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is Very High.

These maps indicate that the proposed Oslaagte Solar PV 3 development is highly Sensitive from a Palaeontological point of view. A site investigation in May 2023 did not detect any fossiliferous outcrops. This classification (National Environmental Web-bases Screening Tool and SAHRIS) is thus contested here based on actual conditions recorded on the ground during the site visit in May 2023.

APPENDIX E7: Social Impact Assessment

PROPOSED 480MW OSLAAGTE SOLAR 3 PHOTOVOLTAIC PROJECT SOUTH OF KROONSTAD, FREE STATE PROVINCE

Social Impact Assessment Report

March 2023

Prepared for: Oslaagte Solar 3 (Pty) Ltd

Title and Approval Page

Project Name:	Proposed 480MW Oslaagte Solar 3 Photovoltaic Project South of Kroonstad, Free State Province
Report Title:	Social Impact Assessment Report
Report Status:	Draft EIA

Client	Oslaagte Solar 3 (Pty) Ltd

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Report Reference:				R-PRO-REP|20170216

Authorisation	Name	Signature	Date
Author:	Caroline Tanhuke		21 March 2023
Reviewer:	Ciaran Chidley		15 May 2023

Amendments Page

Date:	Nature of Amendment	Amendment Number:
15 May 2023	Draft for public review	0

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List of Abbreviations

AIDS	Acquired immunodeficiency syndrome
BESS	Battery Energy Storage System
BID	Background information document
CBD	Central Business District
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
FDDM	Fezile Dabi District Municipality
GCCA	Generation Connection Capacity Assessment
GDP	Gross Domestic Product
GIS	Geographic Information System
GVA	Gross Value Added
HIV	Human Immunodeficiency Virus
IAP	Interested and Affected Party
IEP	Integrated energy plan
IFC	International Finance Corporation
ILO	International Labour Organisation
IRP	Integrated Resource Plan
ISO	International Organisation for Standardization
LDM	Lejweleputswa District Municipality
MLM	Moqhaka Local Municipality
MTS	Main transmission substation
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SIA	Social Impact Assessment
SMME	Small Medium and Micro Enterprises
TMDM	Thabo Mofutsanyana District
XDM	Xhariep District Municipality

1 INTRODUCTION

The team of Caroline Tanhuke and Ciaran Chidley of Nemai Consulting have been appointed to undertake the Social Impact Assessment (SIA) as part of the environmental authorisation process for the proposed 480MW Oslaagte 3 Solar Photovoltaic Project.

This solar PV generator aims to provide 480MW of electricity to the electrical grid. The project is being prepared for submission to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within South Africa. The proposed project is located to the south-east of the city of Kroonstad in the northern Free State Province.

One of the specialist studies required by the Environmental Impact Assessment (EIA) is a Social Impact Assessment. This report fulfils the requirements of the Social Impact Assessment, and its recommendations will be included into the EIA.

1.1 Terms of Reference

The terms of reference for the study are as follows:

- Describe the social baseline conditions that may be affected by the project;
- Describe the approach proposed for assessing the potentially significant issues that should be addressed by the SIA during the EIA phase;
- Determine the specific local social impacts of the project;
- Identify the potential social issues associated with the project;
- Suggest suitable mitigation measures to address the identified impacts; and
- Make recommendations on preferred options from a social perspective.

1.2 Structure of the report

The remainder of the report is structured as follows:

Section 2: Project Description – This section provides an introduction and motivation to the project. It includes a description of the study area.

Section 3: Legislation – A description of the statutory and regulatory requirements that informed this report.

Section 4: Definition of the Study Area – Defines the studies areas for the SIA.

Section 5: Methodology – Outlines the methodology used to determine the social impacts of the proposed project.

Section 6: Status Quo Analysis – A desktop analysis of the baseline situation in the regional study area.

Section 7: Local Study Area Overview – Provides an analysis of the social aspects of the local study area. The section includes a discussion on the findings that resulted from community engagement, site visits and stakeholder participation.

Section 8: Identification of Impacts - Aspects and Impacts – The identification of the project activities and an investigation into what aspects of these activities will result in social impacts.

Section 9: Analysis of Alternatives – Decision making with regards the preferred project alternatives from a social perspective.

1.2 Specialists' Details

This report is written by Caroline Tanhuke and Ciaran Chidley. Ciaran Chidley obtained bachelor's degrees in civil engineering, economics and philosophy, and holds a Master of Business Administration. His experience over the past 26 years includes economic and social assessments for a wide variety of linear and site-based infrastructure and industrial projects. Caroline Tanhuke holds a B.A Environmental Management (Geography) Degree and has three years of experience. Her experience in assessing social impacts of infrastructure projects include renewable energy infrastructure, powerlines and pipelines. She has conducted social facilitation projects throughout South Africa.

1.3 Specialist Declaration

Nemai Consulting operates as an independent consultant conducting environmental impact assessments and associated specialists' studies. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget).

2 PROJECT DESCRIPTION

Electricity demand is increasing in South Africa, and 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 intends to develop and implement as identified in the approved Integrated Resource Plan (IRP) 2019.

To this end the proponent has proposed the subject of this report, a solar photovoltaic generation facility.

2.1 Project Components

Oslaagte Solar 3 (Pty) Ltd has proposed the development of the 480MW Oslaagte Solar 3 Photovoltaic (PV) Project near Kroonstad, in the Free State Province .The electricity generated by the Project will be injected into the Eskom National Grid system via 132 kV powerlines from the facility substation to a new 132/400 kV Main Transmission Substation (MTS).Oslaagte Solar 3 intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within south Africa, in compliance with the National Energy Act was promulgated in 2008 (Act 34 of 2008).

The solar energy functions by the conversion of solar energy into electricity. The generation of electricity using solar energy is a non-consumptive use of a natural resource that requires no fuel for continued operation. In comparison to typical coal-fired power plants, solar energy creates a negligible amount of greenhouse gases during its existence. And in the operational phase of solar power, it does not emit carbon dioxide, sulphur dioxide, or any other kind of air-pollution.

Photovoltaic technology produces direct current which is then converted to alternating current via power electronic inverters. Figure 1 below provides an overview of a typical Solar PV Power Plant project.

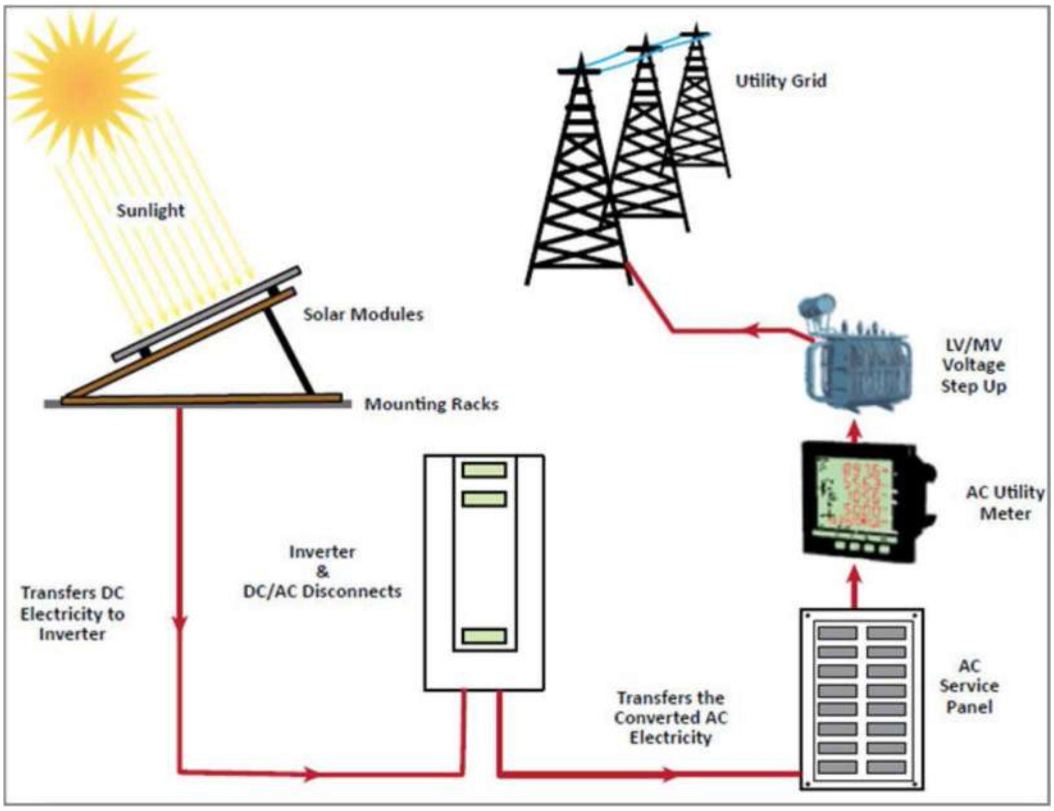


Figure 1:Overview of the solar power plant

(Source: International Finance Corporation, 2015. Utility-Scale Solar Photovoltaic Power Plants)

Energy is harvested from the solar modules, which are angled toward the sun using mounting racks. The energy harvested is in the form of direct electrical current, which is processed through the inverters to convert this electrical power into alternating electrical current which can be used by the national electrical system. The alternating current is transferred via the facility substation onto the national grid.

The project part of the cluster of three facilities, all located in close proximity to one another and using the same electricity transmission infrastructure. The three projects in the cluster are shown in Figure 2 below.

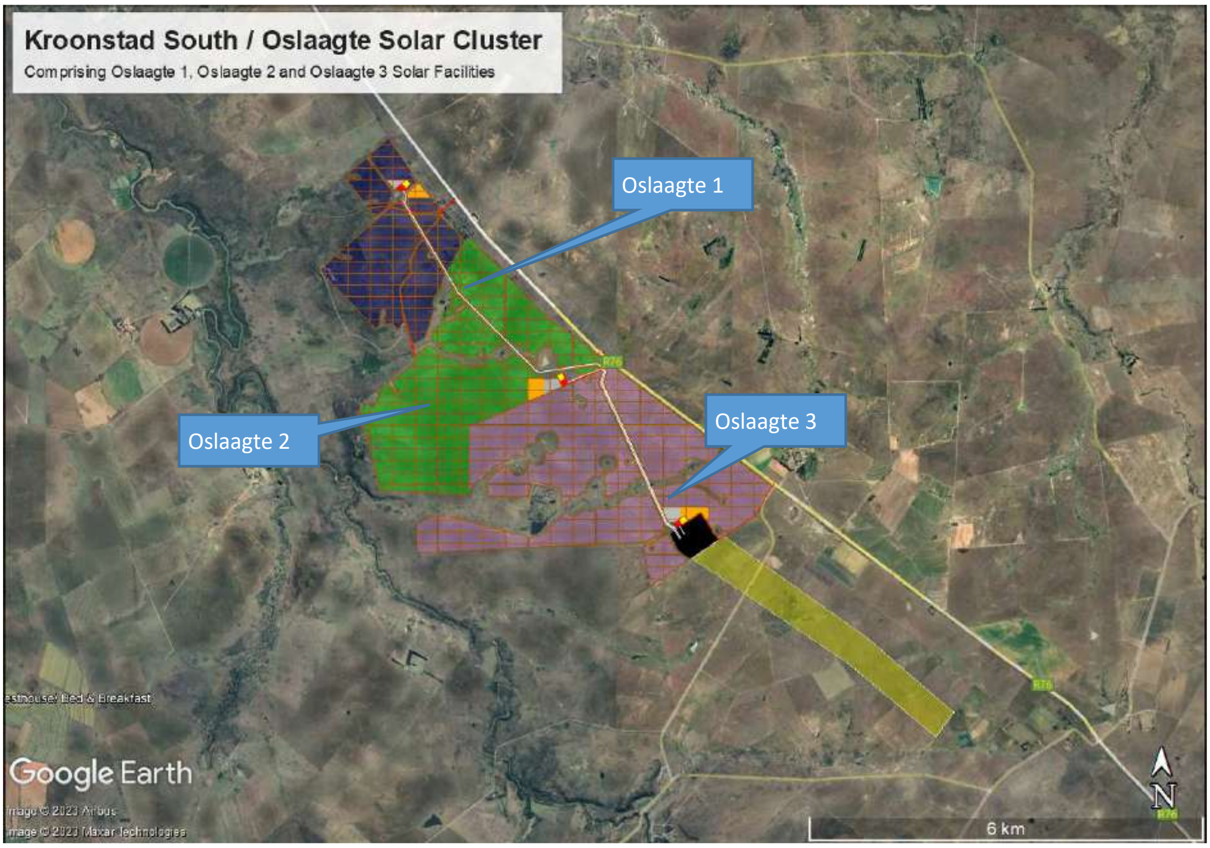


Figure 2: Kroonstad / Oslaagte Solar Cluster

The proposed Oslaagte Solar 3 will cover approximately 810 ha and will include the following infrastructure:

- PV modules and mounting structures which will consist of either Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems;
- Inverters and transformers;
- Battery Energy Storage System (BESS) area up to five hectares;
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance;
- Facility grid connection infrastructure, including: 33kV cabling between the project components and the facility substation; a 132kV facility substation; 33kV or 132kV cabling or powerline between the facility substation and the proposed Main Transmission Substation or the Kroonstad Switching Station;
- Temporary construction laydown area up to five hectares;

- Permanent laydown area up to one hectare (to be located within the area demarcated for the temporary construction laydown);
- Internal roads will be up to six metres wide, to allow access to the Solar PV modules for operations and maintenance activities.
- Main Access Road is up to eight metres wide. The site is accessible via the R76.

The proposed Solar PV Projects have a design life of a minimum of 25 years. The extension of the life of the plant will be considered when assessing the plant's economic viability to remain operational after its end of life.

The subject of this report is the Oslaagte Solar 3 PV Facility, which is shown in Figure 3 below.

The project area is considered to have favorable solar irradiation levels (Global Horizontal Irradiation of 2094.7 kWh per m2 per annum) which makes it ideal to generate solar energy using PV Panels (World Bank, 2019). Based on the latest Generation Connection Capacity Assessment (GCCA) that was released by Eskom in March 2022, the GCCA confirms that the Free State Cluster currently has 4 113 MW generation connection capacity available.

2.2 Project Locality

Oslaagte Solar 3 Photovoltaic (PV) Project is located approximately 16.5km to the southeast of Kroonstad Central Business District (CBD) and falls within Ward 2 of the Moqhaka Local Municipality, in the Free State Province. The R76 runs along the eastern boundary of the site.

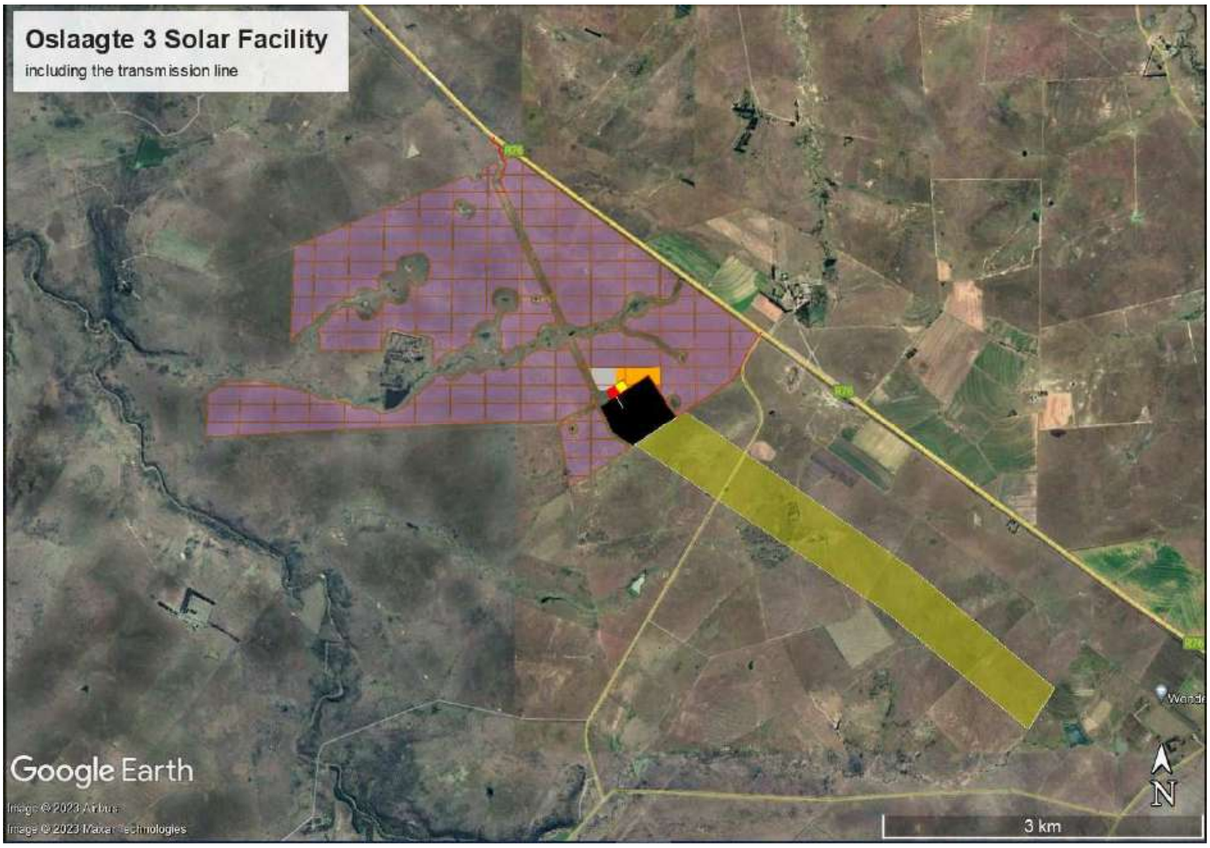


Figure 3: Oslaagte Solar 3

The facility is located at the north of the cluster with access being provided through an access road on the R76.

The project is located on the farm Oslaagte 2564. The grid connection infrastructure is located on the farms Oslaagte 2564, Mooidraai 953, Wolvekop 314, Klein Geluk 2088, Fraaiuitzicht 576 and Zonderweg 1699.

2.3 Social Stimulus

Solar PV creates several social impacts which are created at different stage of the value chain. The value chain can be conceptualised as being the following events (IRENA and CEM, 2014):

- Project planning – consulting work conducted by specialists;
- Manufacturing – raw material sourcing and component manufacture and assembly. Component manufacturing covers the solar modules, transformers, inverters, electrical cabling, combiner boxes and module support structures;
- Installation – a labour intensive process involving civil engineering contractors, module installation and electrical engineering contractors;
- Grid Connection – carried out by specialised electrical engineering contractors. This work allows the solar park to contribute to the national grid, thereby contributing to stabilising supply of electricity;
- Operations and Maintenance – a long-term activity requiring regular plant monitoring, equipment inspections and repair services; and
- De-commissioning – plant at the ned of their lifespan require activities such as recycling the modules and disposal or reselling of components.

The potential for creating value within the regional study area and into the broader Free State economy is depends on the level of development of the renewable energy sector. The major cost items for a solar park are the modules, the transformers, and the inverters – these will be imported items. The cabling and electrical systems can be manufactured in South Africa. The economic value created through installation and grid connection can be created within South Africa, with much of the labour and semi-skilled workers being available within the regional study area.

As South Africa’s level of development in the renewable energy field increases, so the value captured within the country will increase all along the value chain.

2.3.1 Job Creation

The number of direct and indirect jobs created for the construction phase was estimated in 2007 as being 69.1 per MW installed, and 0.73 / MW installed during the operations and maintenance phase (IRENA and CEM, 2014). The definition of “jobs” in this case would be work opportunities of any duration above one month. For the proposed project, this yields total values of 8 292 during construction, and 88 during operations and maintenance. These jobs are not all created on the construction site, they are distributed throughout the value chains of these two phases, at different parts of the country where the value is being created.

The Independent Power Producers programme, managed by the Department of Energy has local content requirements and targets for the bid windows. Some of these targets are:

- Job creation for SA citizens – a minimum of 50% and a target of 80%; and
- Local content for SA manufactures – a minimum of 45% and a target of 65%, the minimum has been increased by 10% from bid window 2.

The proportion of employment from local communities for all renewable energy projects have been reported (Department of Energy, 2019). The Department of Energy reports that of the 33 518 job years created for the entire renewable energy procurement programme, 18 435 job years were attributable to people from the local community – this is a proportion of 55%. This proportion can be attributed to the proposed project. The Department of Energy also cites figures that 8% of employment was female and 41% was from the youth category (Department of Energy, 2019). These proportions can also be attributable to the project.

An estimate of the number of direct job years to be created by the proposed project can be derived from the Department of Energy Report using the figures to date for the Limpopo Province. A provincial breakdown is provided for 3 projects (all completed) which all use Solar PV technology. It was reported that 118MW of energy was generated, creating 1 240 job years to date (which included all of the construction jobs) and estimated at 2 917 job years over the 20-year life of the projects (Department of Energy, 2019). Applying these proportions to the proposed project yields the total job years of 16 910, made up of 11 866 job years for operations and maintenance and a construction phase job phase year estimate of 5 044. No estimate has been made for the Battery Energy Storage portion of the project since no data is available to make an estimate.

The table below summarises the job creation estimates for the proposed project. Readers should bear in mind the various sources for this information, the assumptions made and the dates of the data – together these factors combine to set the degree of accuracy for these estimates at 20%.

Table 1: Job Creation Estimate

Description	Total No.	Local No.
Total Jobs Created (durations above one month)	33 518	18 435
Planning and Construction Phase	33 168	18 242
Operation and Maintenance Phase, 20 years	350	193

Table 2: Estimated Job Years Created

Description	Total No.	Local No.
Total Job Years Created	16 910	9 300
Planning and Construction Phase	5 044	2 774

Description	Total No.	Local No.
Operation and Maintenance Phase, 20 years	11 866	6 526

2.3.2 Economic Value Creation

The contribution of the project to South Africa's Gross Domestic Product (GDP) can be estimated from published literature. A Department of Energy report using the figures for renewable project delivery to date for the Limpopo Province provides an indication. A provincial breakdown is provided for 3 projects (all completed) which all use Solar PV technology. It was reported that 118MW of energy was generated, creating R3.6 billion in GDP contribution (Department of Energy, 2019). Applying this proportion to the proposed project yields a total GDP contribution of R14.6 billion. This captured the total impact of the project on the nation's economy, both through direct and indirect spending.

The local content for Solar PV projects has varied over the four bid windows. Bid window 1 achieved 50% local content, bid window 2 achieved 52%, bid window 3 achieved 55% and bid window 4 achieved 75% (Department of Energy, 2019). This increasing trend demonstrates the possible impact that the proposed project could have on the South African value chain. To date, the average local content spend for PV projects in South Africa has been R46.5 billion versus a comparable total project value of R90.3 billion – a percentage of 51%.

If this value is applied to the proposed project value of R14.6 billion, a local value chain addition of R7.5 billion can be estimated. The proportion of value attributable to the regional study could not be estimated and figures from the literature are not available.

3 Relevant Legislation, Standards and Guidelines

Legislation, policy, plans and strategy provide an important framework and governance of the SIA. This section provides a summary of the prevailing acts, policies, plans and strategy which were considered by this study.

3.1 The Constitution of South Africa (Act 7 of 1996)

The Constitution emphasizes human rights with the intention of establishing a society based on democratic values; social justice and fundamental human rights. Furthermore, The Constitution recognizes the general need to improve the quality of life of all citizens. These constitutional rights can be used to support reasonable environmental demands. Other fundamental rights in the Constitution which support environmental demands include:

- The right to life (Section 11).
- The right to human dignity (Section 10).
- The right to privacy (Section 14).
- Certain socio-economic rights.

Socio-economic rights relevant to environmental rights:

- The right of access to adequate housing (Section 26).
- The right of access to sufficient food and water (Section 27).
- The right of access to health care services (Section 27).
- The rights of children to basic nutrition and shelter, and to be protected from maltreatment; neglect; abuse or degradation (Section 28).

3.2 National Development Plan (2011)

The National Development Plan (NDP) of 2010 proposes to "invigorate and expand economic opportunity through infrastructure, more innovation, private investment and entrepreneurialism.

The Plan aims to ensure that all South Africans attain a decent standard of living through the elimination of poverty and reduction of inequality. The core elements of a decent standard of living identified in the Plan are:

- Housing, water, electricity and sanitation;
- Safe and reliable public transport;
- Quality education and skills development;
- Safety and security;
- Quality health care;
- Social protection;
- Employment;
- Recreation and leisure;
- Clean environment; and
- Adequate nutrition.

3.3 National Energy Act (Act 34 of 2008)

The National Energy Act was promulgated in 2008 (Act 34 of 2008); and one of the key objectives of the Act was to promote diversity in the supply of energy and its sources. The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and; in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and; on an annual basis; review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development.

The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply constriction and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process; eight key objectives were identified; namely:

- Objective 1: Ensure security of supply.

- Objective 2: Minimize the cost of energy;
- Objective 3: Promote the creation of jobs and localization.
- Objective 4: Minimize negative environmental impacts from the energy sector.
- Objective 5: Promote the conservation of water.
- Objective 6: Diversify supply sources and primary sources of energy;
- Objective 7: Promote energy efficiency in the economy; and
- Objective 8: Increase access to modern energy.

3.4 National Environmental Management Act (Act 107 of 1998)

The National Environmental Management Act (NEMA) and the principles contained therein have a significant influence on the need to identify and assess social impacts. The NEMA principles are based on the basic rights as set out in Chapter 2 (Bill of Rights) of the Constitution as referred to above.

According to Barber (2007:16) the following NEMA principles have an important impact on social issues:

- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably;
- Development must be socially, environmentally and economically sustainable;
- Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must consider the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option;
- Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons;
- Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination;
- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured;
- Decisions must consider the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge;
- Community well-being and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means;
- The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in light of such consideration and assessment;

- The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected;
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law;
- The environment is held in public trust for the people. The beneficial use of environmental resources must serve the public interest and the environment must be protected as the peoples' common heritage; and
- The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.

3.5 Guideline for Involving Social Assessment Specialists in EIA Processes (Barbour, 2007)

These guidelines direct the role of social assessment specialists in the Environmental Impact Assessment (EIA) process within the South African context.

3.6 Social Impact Assessment: Guidance document (2015) (Vanclay, Esteves, Aucamp, & Franks, 2015)

This document encapsulates the core values of the international SIA community providing a set of principles to guide SIA practitioners in incorporating the social element into environmental impact assessments.

3.7 International Labour Organisation

A guide on gender issues in employment and labour market policies: working towards women's economic empowerment and gender equality.

"The objective of this resource guide is to strengthen the capacities of International Labour Organisation (ILO) constituents and development policy makers in the formulation of employment policies. There is a well-known proclivity among many policymakers and practitioners to treat employment as a "residual" of economic growth" (Otobe, 2014).

3.8 International Organisation for Standardization, ISO 14001:2004

The International Organisation for Standardization (ISO) is used for identifying impacts. The ISO 14001: 2004 – Environmental Management Systems definitions for aspect, activity and impact are used in keeping with best practice.

ISO 14001:2004 specifies requirements for an environmental management system to enable an organization to develop and implement a policy and objectives and information about significant environmental aspects. It applies to those environmental aspects that the organization identifies as those which it can control and those which it can influence.

4 DEFINITION OF THE STUDY AREA

A study area is defined by the International Finance Corporation (IFC) as "an area that is likely to experience impacts from, or exert influence over, the Project or activity being evaluated" (IFC World Bank, 2012). For the purposes of this study, a study area that conforms to existing administrative boundaries, has been identified.

Three study areas have been delineated for the purposes of analysing the project and its social impacts: a regional study area which comprises the affected local municipality; and a local study area which is the Ward in which the project is located, and a direct study area which is the site's close neighbours upon which the project will be located. For the purposes of the study, a distance of five kilometres from the site has been selected as the direct study area, using the centre of the solar park as the centre of the five-kilometre circle.

4.1 Regional Study Area

The regional study area is the Moqhaka Local Municipality within Free State Province, the regional study area most likely to have direct positive or negative impacts. These impacts include economic pull (job creation), in-migration of workers and multiplier effects in the local and regional economy due to the proximity of the Project footprint. Figure 4 shows the regional study area of Oslaagte Solar 3 PV situated in Moqhaka Local Municipality.

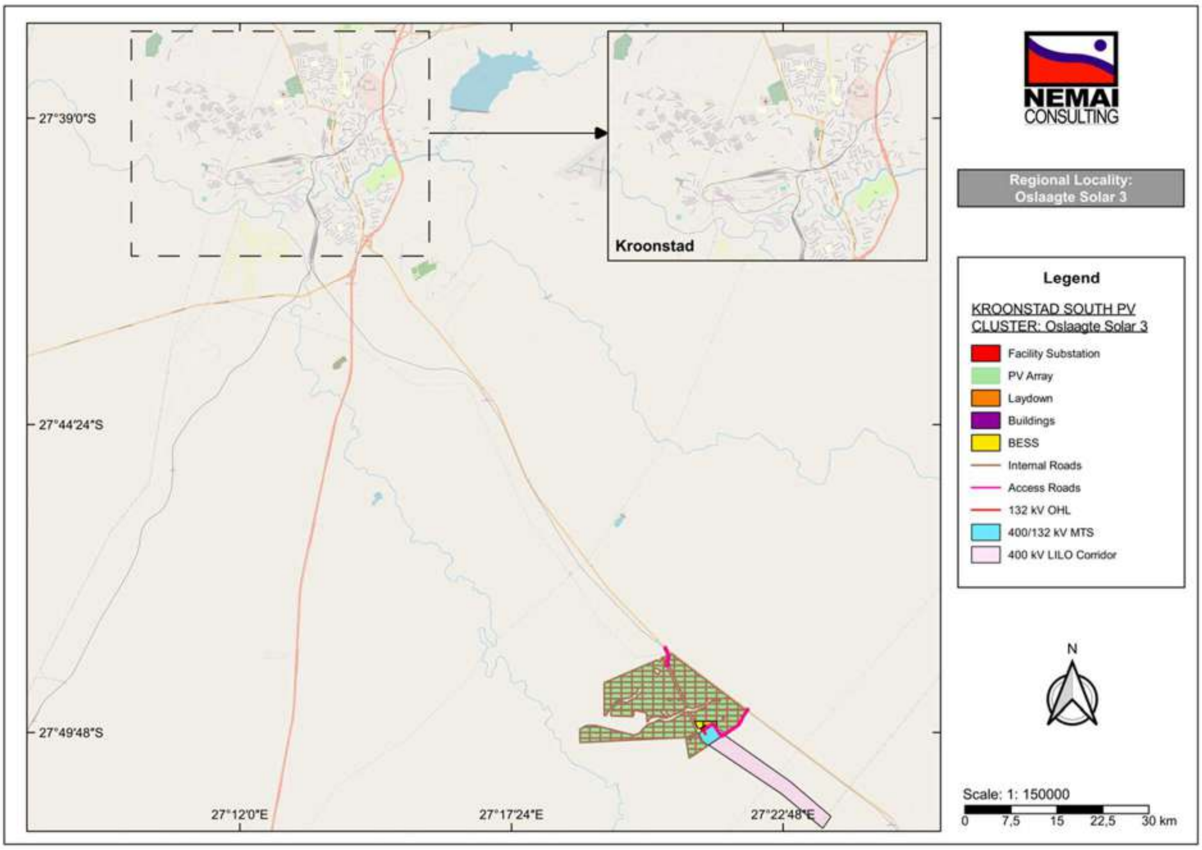


Figure 4: Oslaagte Solar 3 in Moqhaka Local Municipality

For the purposes of the regional analysis, the precise layout of the panels will not have any consequence for the social impact assessment.

4.2 Local Study Area

The local study area is in Ward 2 of the Moqhaka Municipality. The areas are shown in Figure 5 below, shaded in green.

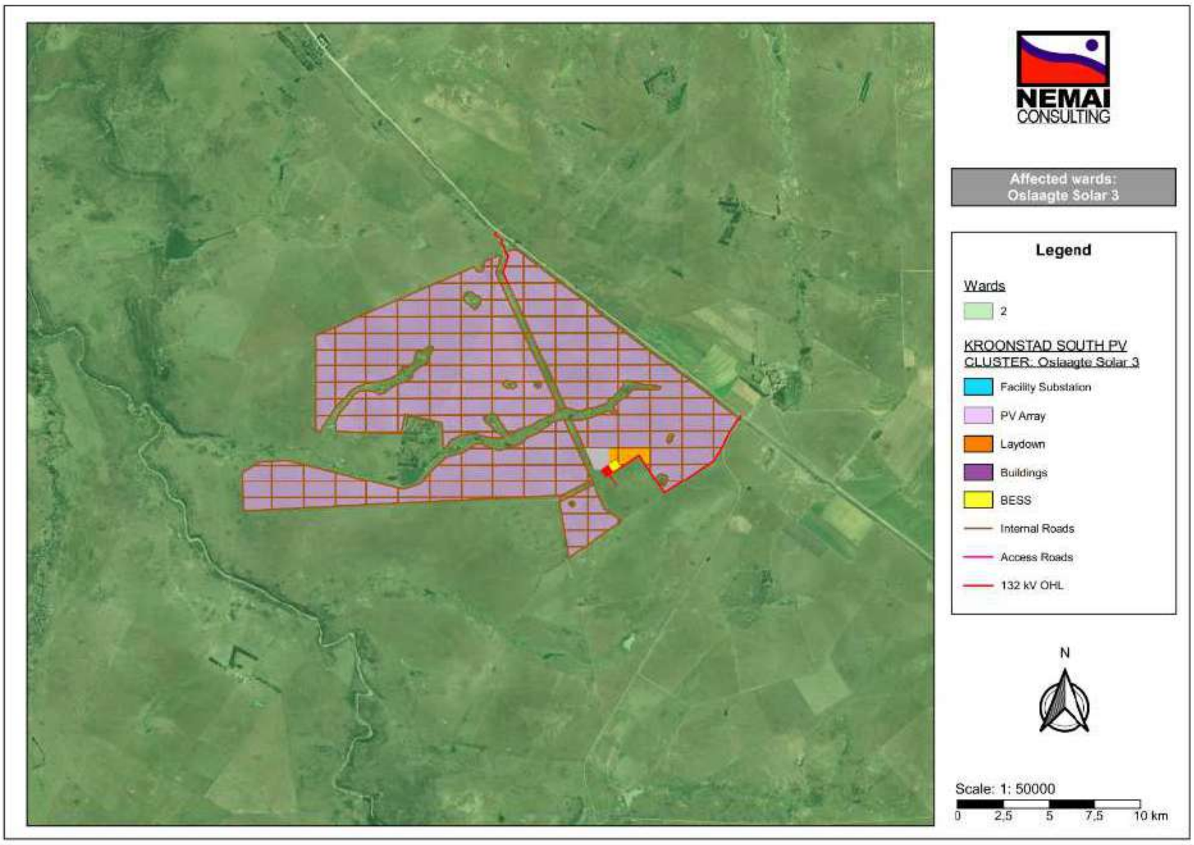


Figure 5: Oslaagte Solar 3 PV in Moqhaka Local Muncipality

4.3 Direct Study Area

The direct study area is the area immediately adjacent to the project. This study area is shown in the Google map below.

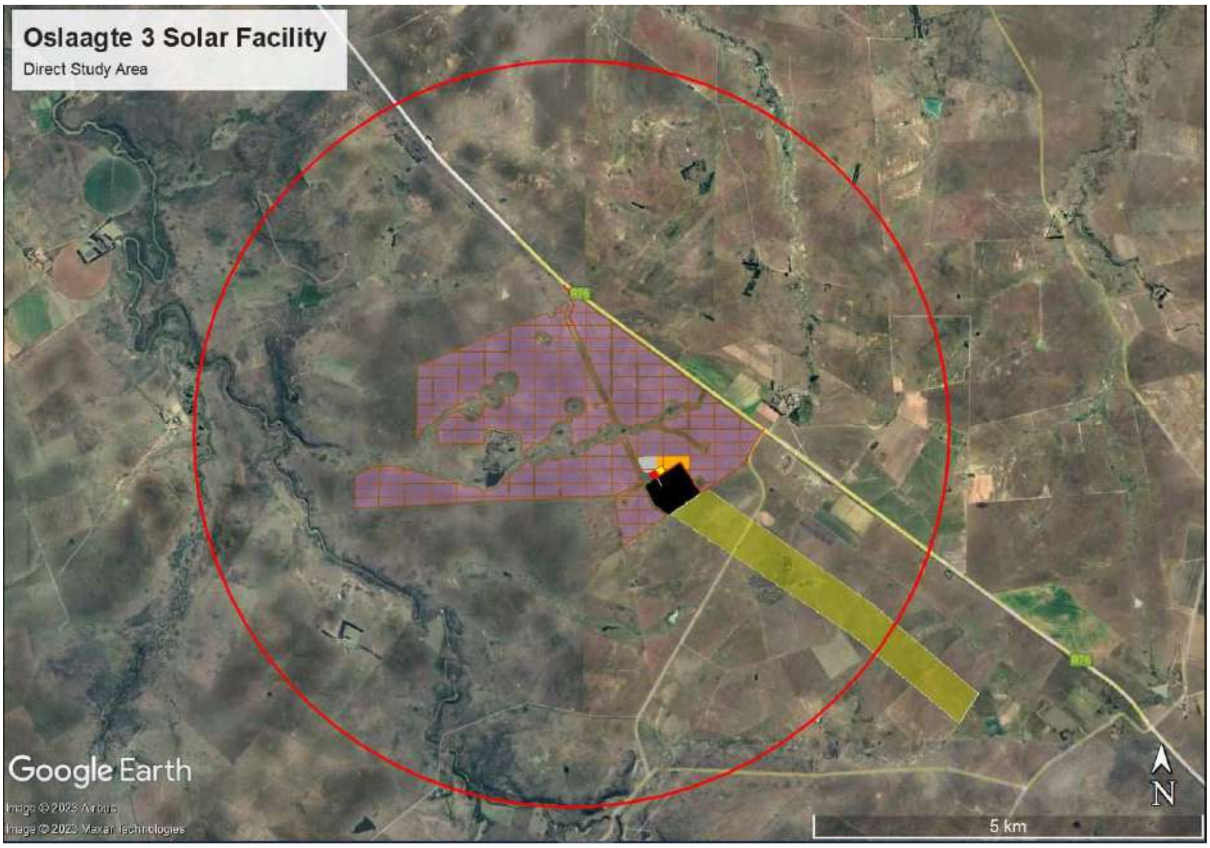


Figure 6: Oslaagte Solar 3 Direct Study Area

The direct study area was used for the possible impactor assessment carried out using Google Earth and documented in Appendix One of this report. The radius of the direct study area was used as a guide when compiling social receptors, with local features being decisive as to whether they were selected as part of the analysis.

5 METHODOLOGY

The information presented in this report was obtained through the following data collection methods.

5.1 Sourcing of Information and Data Analysis

The Socio-Economic Impact Assessment sets out the socio-economic baseline of the study area; predicts social and economic impacts and makes recommendations for mitigation of negative social and economic impacts and measures which can be taken to enhance the positive social and economic impacts.

The baseline study is based on both primary and secondary data. Primary data was collected directly from engagements with community members, landowners and business owners. Secondary data was accessed through South African economic and social databases. Articles and internet searches were also used and are referenced in the text and in the reference sections of this report.

The profile of the baseline conditions includes describing the current status quo of the community; including information on a number of social and economic issues such as:

- Demographic data.
- Socio-economic factors such as income and population data.
- Access to services.
- Institutional environment.
- Social Organization (Institutional Context); and
- Statutory and Regulatory Environment.

5.2 Primary Data

5.2.1 Public Participation

The Public Participation Process granted Interested and Affected Persons an opportunity to comment on the project during the Scoping and EIA phase. Comments and responses used during this process have formed one of the basis of the analysis of the socio-economic impacts considered in this report.

Further primary data was collected for the purposes of the study; these were collected using the following approaches:

- Rapid Rural Assessment: A survey was conducted to capture visual observations on the social dynamics, community proceedings, community resources and infrastructure.
- Stakeholder Consultations: Consultations with the affected communities carried out by members of the project team along each project component to discuss the proposed project and to gather their concerns and feedback on the project; and
- Key Informant Interviews: Informal discussions with the IAP's to help inform the baseline were conducted during site visits and as well as during the scoping phase. These included community members and authority members.

5.3 Secondary Data

An assessment of the EIA and Scoping phase was conducted to provide an understanding of the project detail; location and possible impacts.

The required information was collected using different sources, these included Statistics South Africa Census data as well as a review of relevant municipal, district and other literature. The discussion of the demographics and the development profile of the study area is carried out using Census 2011 data produced by Statistics South Africa. The Census 2011 data is the most comprehensive dataset available for the subject areas, and it is currently the best data at hand. Where possible, information from the Community Survey 2016 was included in the analysis. The ward and municipal data have been extracted using the project Geographic Information System, and the data for the affected areas will be presented in tables and figures throughout the report.

5.4 Geographic Information System

A Geographic Information System (GIS) was used to conduct an analysis of the area. The use of GIS brings together the demographic and socio-economic data to enable a thorough analysis of the project area.

5.5 Impact Assessment

The determined impacts are clustered around a common-issue and are assessed before and after mitigation. The identification of the socio-economic impacts associated with the project is issues-based, with the main headings referring to a common theme addressing several related impacts. Under each of these issues, the specific impacts and potential mitigation strategies are discussed for pre-construction, construction, operation and decommissioning phases.

5.6 Assumptions and Limitations

The following assumptions and limitations underlie this socio-economic impact assessment:

- The information obtained during the public participation phase provides a comprehensive account for the community structure and community concerns for the project.
- The study was done with the information and the time frames available to the specialist at the time of executing the study. The specialist took an evidence-based approach in the compilation of this report and did not intentionally exclude information which is relevant to the assessment; and
- No relocation of families will take place for this project.

6 STATUS QUO ANALYSIS

This section has been compiled from research of the Moqhaka Local Municipality (MLM) and the Fezile Dabi District Municipality (FDDM) IDP documents giving broad background information on the project area and surrounding municipality. Statistics South Africa and Wazi Map have also been used as a resource for the statistical information. The following section presents the socio-economic profile of the study areas.

6.1 Project Locality Context

The Free State Province is the third largest province in the country; but has the second smallest population and the second lowest population density. The province is situated on the center of South Africa and borders other provinces which are inclusive of Mpumalanga; Gauteng; Eastern Cape; North West; Kwazulu-Natal and the Northern Cape; the exceptions being Limpopo and the Western Cape Province.

Free State covers an area of 130 011 square kilometers and in the year 2016 it was recorded to have a population size of 2.8 million people and comprises of four district municipalities, the Fezile Dabi District Municipality (FDDM); Lejweleputswa District Municipality (LDM); Thabo Mofutsanyana District Municipality (TMDM) and Xhariep District Municipality (XDM) (FS IDP, 2020).

Fezile Dabi District Municipality is a Category C municipality, which was established in the year 2000. The municipality is located in the northern part of the Free State Province and covers an area of 20 830 square kilometers. The municipality is the smallest district in the province, making up 16% of its geographical area. The district consists of four local municipalities, the Moqhaka Local Municipality; Metsimaholo Local Municipality; Ngwathe Local Municipality and Mafube Local Municipality. The district has a population size of 527 788; with an annual population growth rate of 1.6 %. In 2019 the district had a total of 166 004 households with a population density of 23.8 people per square kilometers (Fezile Dabi IDP, 2020).

6.2 Moqhaka Local Municipality

Moqhaka is a Sesotho word meaning “crown” and the Moqhaka Local Municipality is one of the four municipalities located in the southern part of the Fezile Dabi District; in the Free State province. It neighbors the N1 national road as well as the most important four-way railway junction in the country. The municipality has a geographical area of 7 925 square kilometers; which makes it the biggest municipality of the four. Cities and towns found in the municipality are Kroonstad, Renovaal, Steynsrus, Vierfontein, and Viljoenskroon. Kroonstad is the major town in the municipality and is the seat of local government. The town plays a crucial role in the district’s economy through its large agricultural community. In addition, industrial activities such as transport; business services and mining are important contributors in the district’s economy.

6.3 Demographics

The Moqhaka Local Municipality has been experiencing a decrease in population size over the years; there were approximately 154 732 people in 2016, which is a decline from 160 532 people captured in 2011, resulting in a -0.84% population growth per annum. Moqhaka LM can be described as a less urbanized area when compared to its surrounding municipalities, therefore the decrease in the population size could be attributed to the migration of people from rural to urban areas in search of improved social and economic opportunities (Municipal IDP, 2020). Figure 7 below shows the change in population size over the years.

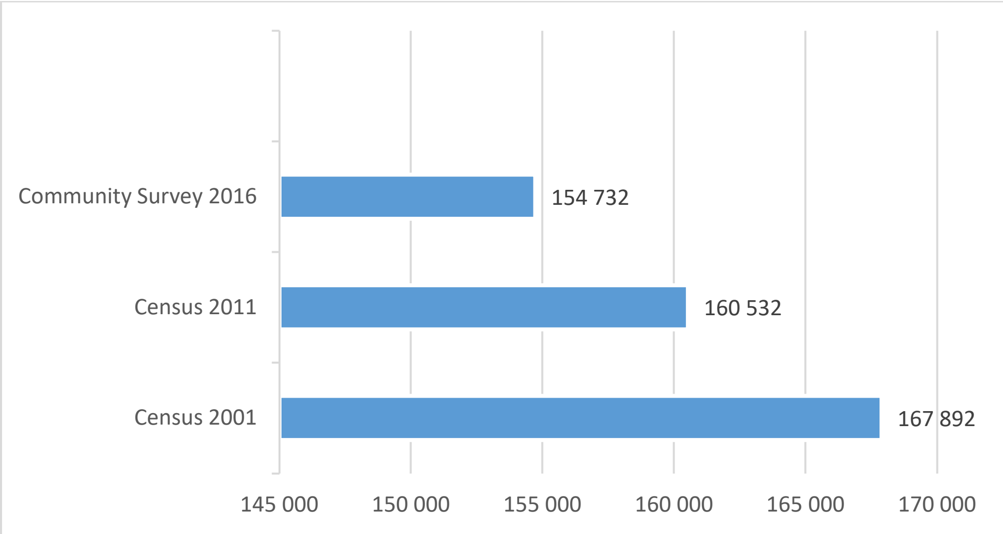


Figure 7: Population Overview

Source: Statistics SA: Community Survey 2016

The decline in population in the municipality has been sustained over the sixteen years in which data has been collected.

6.4 Household Dynamics

The Community Survey recorded 45 661 households in 2011 which increased to 53 601 in 2016; this is an increase of approximately 17% of households in a period of four years. To achieve this despite a decrease in overall population size, the average household size dropped from 3.5 in 2011 to 2.9 in 2016. As the population migrates out of the local municipality, smaller households are being formed with the remainder of the population.

Out of the 53 601 households; 13% live in informal dwellings and approximately 86% live in formal dwellings. An index ratio of males to females indicates that the majority of households comprise of males as their heads; with Moqhaka LM being 59%; Fezile Dabi being 61% and the provincial level accounting for 58% (StatsSA, 2011 & 2016). Table 3 represents the demographic data below.

Table 3: Regional Study Area Demographic Data

Indicator Name		Free State	FDDM	Moqhaka LM
Head of Household	Male	58%	40%	59%
	Female	42%	61%	41%
Population Group	Black/African	89%	86%	88%
	Colored	3%	2%	3%
	White	8%	12%	9%
	Indian/Asian	0%	0%	0.2%
Spoken Languages	Sesotho	71%	75%	82%
	Afrikaans	11%	12%	11%

Indicator Name		Free State	FDDM	Moqhaka LM
	Isizulu	2%	4%	Not comparable
	Isixhosa	5%	4%	2%
	Other	2%	2%	1%

Source: Statistics SA: Community Survey 2016

The Sesotho language is the most spoken language in the Free State; across the District and the Local Municipalities; which can be attributed to the fact that there are more African people who live in these areas. Afrikaans is the second most spoken language in both the Secondary and Regional study area, resulting in the decline of other spoken languages by 2016 (STATSSA, 2016).

6.5 Education

The South African constitution has made access to quality basic education; including adult basic education a right that should be made available and accessible to everyone irrespective of race and gender. Moqhaka LM has witnessed a decline in the number of children who are 20 years and above without any formal education; in 2011 there were 5.4% which reduced to 4% in 2016 (StatsSA, 2011-2016).

There were 32% of people above 20 years of age who completed matric in 2016, although the percentage is still relatively low it is a positive change from the 28% of the population who attained this level 2011. In 2016 there were only 3% of people having completed higher education. The youth unemployment rate was 47% in 2011 (Municipal IDP, 2017-2022). The low levels of matric completion could have had a ripple effect on the decreased number of children completing their higher education as well as the high youth unemployment rate across the municipality. (StatsSA, 2011-2016).

Table 4 presents the education profile below.

Table 4: Education Profile for Those above 20 Years of Age

Highest Education Level	Free State	FDDM	Moqhaka LM
No Schooling	105 014 (13%)	21 576 (15%)	3 924 (9%)
Some or Completed Primary School	84 968 (11%)	13 621 (10%)	4 510 (11%)
Some or Completed Secondary School	544 168 (70%)	101 894 (71%)	32 281 (77%)
Higher Education	21 915 (6%)	6 646 (4%)	1 454 (3%)

Source: Statistics SA: Community Survey 2016

6.6 Economy

The Fezile Dabi district's economy is sustained by several industries which range from manufacturing; electricity, mining and community services to name a few. The manufacturing industry is the highest contributor towards the GVA within the district (27%); the second highest contributor being the mining industry (18%); which is then followed by the community services (13%). The agriculture sector is lagging behind with a -3% average annual growth, which was the lowest within the district; followed by the electricity sector with 0.43% (Fezile Dabi IDP, 2020: 23).

The overall economy in Moqhaka LM is dominated by agriculture and therefore there is a total of 7 221 agricultural households in the municipality; in most cases each household engages in more than one agricultural activity as a way of generating income (StatsSA, 2016).

Figure 8 displays household income in the municipality below.

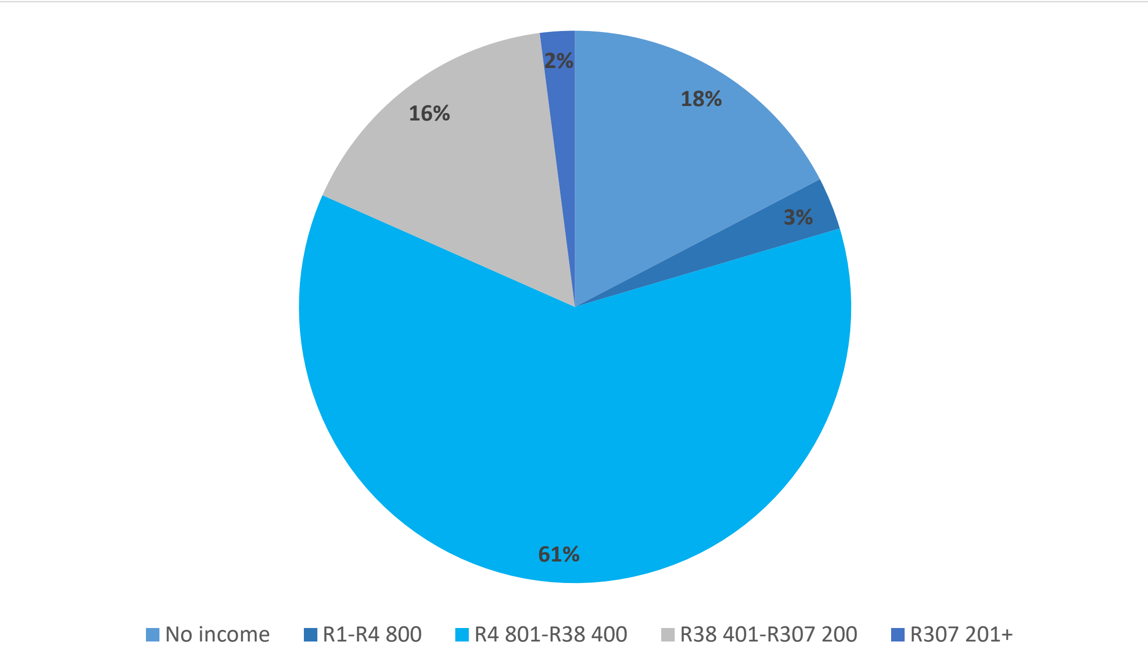


Figure 8: Household income in Moqhaka Municipality [R/annum]

Source: Statistics SA: Community Survey 2016

Household income is dominated by low-income families, with 82% of the families earning les than R38 000 per annum in 2016. Two percent of households earnt more than R307 200 per annum.

6.7 Labor Force

In 2011 approximately 36 040 (34%) people were employed in Moqhaka municipality, which is relatively lower than the employment rate in both Free State 649 661 (36%) and Fezile Dabi 117 732 (37%). From those employed in Moqhaka LM 66% of them were employed in the formal sector and 17% in the informal sector (Census 2011). The above figures point to the fact that the study area comprises of a high number of individuals who are not economically active (people who are either too young or too old to work).

Figure 9 gives an overview of the employment and unemployment rates below.

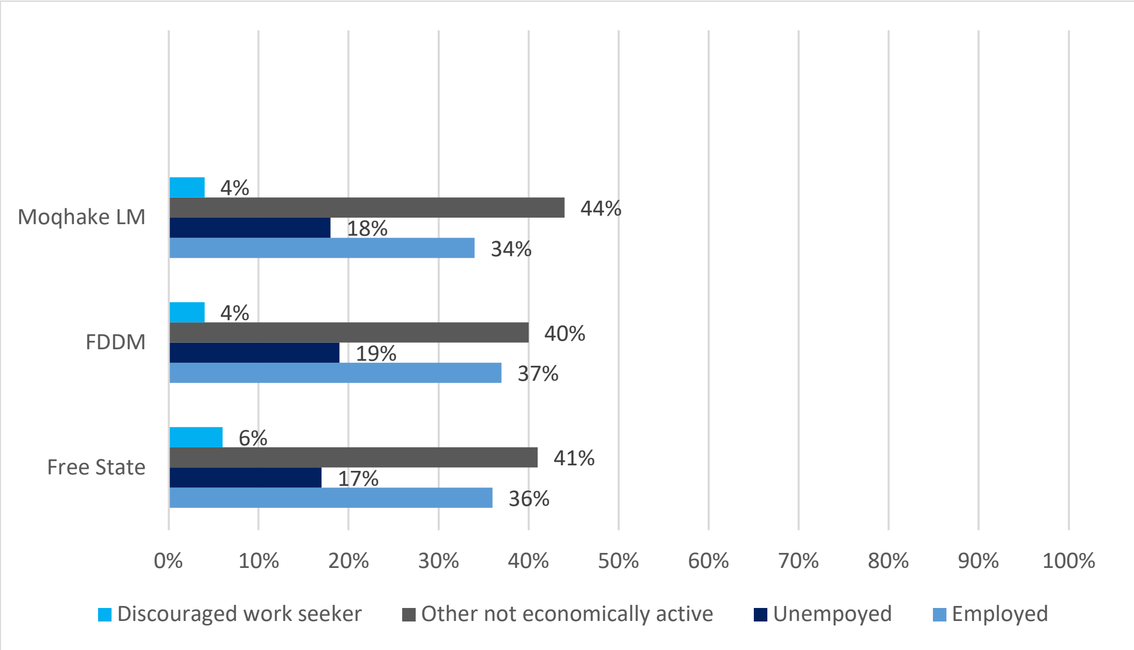


Figure 9: Employment and Unemployment rates

Source: Statistics SA: Census 2016

The employment and income measures both point to high levels of poverty in the municipality, low employment rates being the cause of low income. It is suggested that the low attainment of higher than matric education is a contributing factor to this dynamic.

6.8 Access to Electricity

Moqhaka LM is currently providing approximately 129 101 (83%) of the population with pre-paid electricity, which is higher than the rate in Fezile Dabi 397 373 (80%) and also higher than the rate in Free State 2 325 719 (82%). A further 4 458 (3%) of the population are yet to be granted access to electricity in the municipality; which is less when compared to Fezile Dabi 32 081 (6%) and Free State with 134 750 (55) of the population that are still without electricity supply. A further 1 210 (1%) of the population in Moqhaka LM rely on other sources for energy; which could vary from gas; paraffin and/or candles; which is an indicator of the improvement of the distribution of electrical supply throughout the municipality over the years (Community Survey, 2016).

6.9 Water and Sanitation

There has been an increased access to the usage of flush/chemical toilets at Moqhaka LM, with 143 242 (93%) of the population making use of these facilities; 408 294 (83%) in Fezile Dabi and the overall province accounting for 2 035 212 (72%). By 2016 only 7% of the overall households in the municipality were still making use of alternative toilet facilities; ranging from pit toilets and the bucket system (Community Survey, 2016). Table 5 displays the distribution of other household services below.

Table 5: Household Services

Area	Households (% of total)			
	Flush Toilet with Sewerage	Piped Water Inside Yard	Weekly Refuse Removal	No Access to Electricity
Free State Province	2 035 212 (72%)	1 520 464 (54%)	1 978 504 (70%)	134 750 (5%)
Fezile Dabi District	408 294 (83%)	226 331 (46%)	416 032 (84%)	32 081 (7%)
Moqhaka LM	96 397 (81%)	74 670 (63%)	102 055 (86%)	4 856 (4%)

Source: Statistics SA: Census 2016

In South Africa Rand Water is the leading supplier of water services across the country and by 2016; 140 246 (91%) of the population in Moqhaka LM were receiving water from a regional or local service provider; which was less than the rate in Fezile Dabi with 461 591 (93%) and less than the rate in the Free State with 2 669 748 (94%) (Community Survey, 2016).

Half of the population in Moqhaka LM which is approximately 77 361 (50%) of households have piped water inside the house; which is higher than the rate in Fezile Dabi; 239 196 (48%) and higher than that in the provincial level 1 064 388 (38%). By 2016 only 1 642 (1%) of the population were reported to receive water on community stand in Moqhaka LM; 3 193 (1%) in Fezile Dabi and 20 649 (1%) in the Free State (Community Survey, 2016). It can be concluded that the study area is gradually being modernized and this is evident in that boreholes for water supply and pit latrine toilets are being phased out.

7 LOCAL STUDY AREA OVERVIEW

This section gives an overview of the local study area and its receiving environment within a five-kilometer radius of the proposed project cluster.

7.1 Land Use and Infrastructure

The project area is dominated by agriculture, being crop, livestock and game farming. The proposed site is currently grazing land, whilst game such as springbok, buffalo and lion are located on some of the adjacent farms. Crops such as maize, sunflower, potatoes and pumpkins are produced on farms in the area, with livestock being Bonsmara beef cattle, sheep and chicken. The hunting season is from May to August, which brings in tourists and makes the area busier than other times of the year.

Figure 10: Sunflower farm

According to Kotzé et al.(2020) "about 70% of the land surface is currently used for grazing on natural (unplanted) rangelands and these rangelands are of paramount importance for the protection of the immensely rich biodiversity of a region". The project area is rich in biodiversity. Land use intensity has resulted to severe economic losses over the years. Decreasing grazing capacity has a likelihood of reduced yields, decreased quality, and increased control costs to the socio-economic environment. It is thus possible that migrating game animals that contribute immensely to biodiversity within this area will be impacted by the project. Pro-active mitigation and management measures as highlighted by the biodiversity specialist can be of significance in addressing issues related to grazing land.

The image below depicts the nature of grazing land in the project area.

Figure 11: Grazing Land

The closest central business district is in Kroonstad. The town is located approximately 16.5km north of the project site. Surrounding rural areas and small towns rely on Kroonstad central for commercial, industrial and administrative services. The city center is easily accessible along the R76 from the project site. Steynsrus is small farm town, located twenty kilometers south-east of the Oslaagte farm. Many of the people who work in the direct study area live in this town. Both towns are social receptors in close proximity to the study area.

The Zoutspruit Guesthouse is roughly two kilometers from the project site. The facility offers ecotourism activities such as hiking, outside entertainment, mountain biking and hospitality services. The project's impact on Zoutspruit is likely to contribute positively to the growth of sustainable tourism in this direct area.

Figure 12 below depicts a graph of elevation from the Zoutspruit guesthouse to an area within the Oslaagte Solar Cluster.

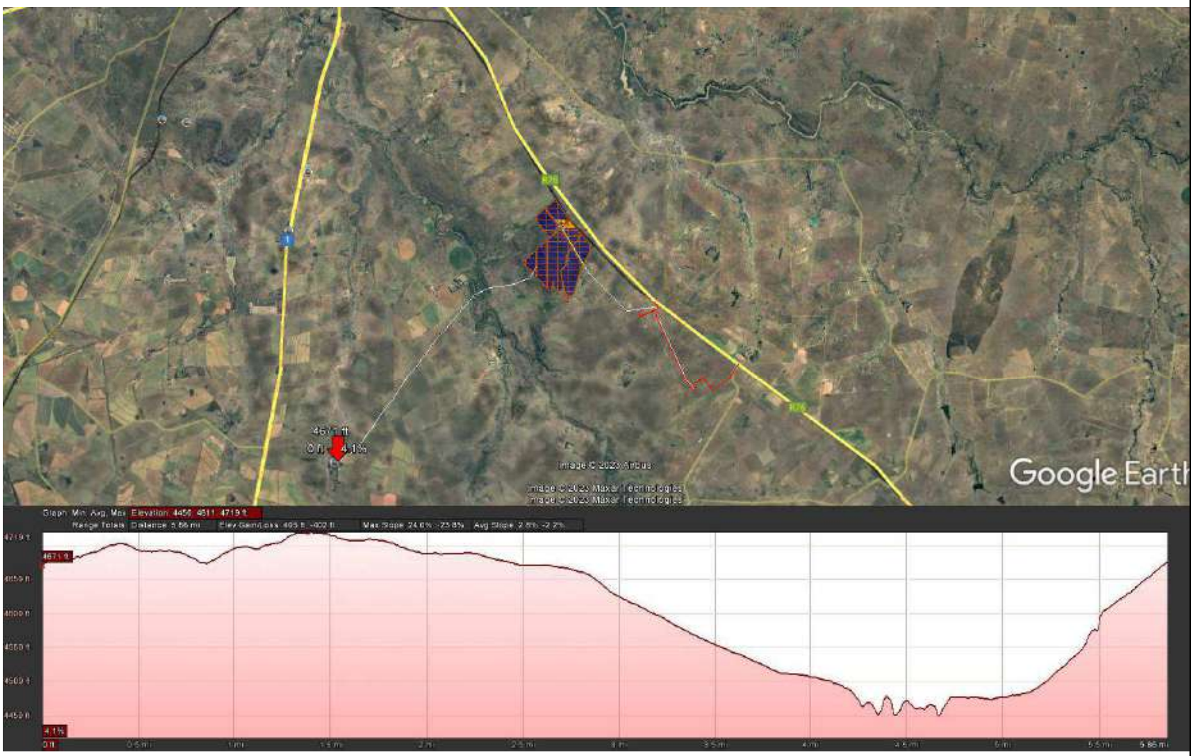


Figure 12: Elevation Profile from Zoutspruit Guesthouse to Oslaagte

Source: Google Earth

The guesthouse will have a very limited view of the solar panels, there being a small ridgeline between the guesthouse and the proposed solar farm.

7.2 Profile of the Receiving Environment

This section of the report details the status quo of the social environment.

7.2.1 Access to basic services

Basic services such as water, electricity and sanitation are provided and supplied by landowners. Solar powered properties were also identified in the area.

Water tanks, reservoirs, piping and boreholes were visible water infrastructure in the area and on the adjacent properties.

The farm communities rely on flush or chemical toilets inside their houses, with septic tank systems processing the waste. Farm based solid waste management systems are in place and some landowners manage their solid waste using reduce-reuse-recycle principles. Municipal waste collection services do not cover the project area. In some cases, households also rely on communal dumps as convenient methods of refuse disposal.

7.2.2 Identified Economic Activities.

The area is dominated by agriculture and tourism. Crop farming or animal husbandry are the dominant economic activities, although game farming and hunting are significant contributors to local economic activity.

7.2.3 Community Facilities

Education, health and administrative facilities are in located within Kroonstad and in Steynsrus. Local communities travel to access these facilities.

7.2.4 Road infrastructure

The main roads that service the project area are the N1 and R76, with feeder routes being gravelled. The R76 is undergoing reconstruction and rehabilitation. A railway line runs alongside the road and according to local interviewees, this line has not been functional for several years. The images below provide some context for the receiving environment.

Table 6: Images of the Receiving Environment

	
Existing Railway Line	Women Employed in the R76 Road Upgrade Project.

Roadworks along the R76

7.2.5 Livelihoods

The IFC PS5 defines livelihoods as “the full range of means that individuals, families, and communities utilise to make a living, such as a wage-based income, agriculture, fishing, foraging and other natural resource-based livelihoods, petty trade and bartering”.

Engagements within the community, stressed the male dominated nature of employment in the area. Examples of generally male employment included farm work and seasonal work at farms and lodges. This phenomenon led to an over-representation of men in the project area, since most of this work is carried out by people who do not live at home when carrying out their duties. It was stated that this absence of men living within a family structure within the five-kilometre boundary contributes to family structures breakdown patterns. Moreover, women face limited options of obtaining employment from the existing farms.

The agricultural sector is the dominant income contributor within this area, however economic opportunities are limited and poverty is entrenched. Stakeholders in the regional area indicated that in some cases this leads to substance abuse and prostitution.

The agricultural sector is the dominant income contributor within this area. Due to limited economic opportunities, background contributing factors such as poverty, economic and environment challenges have resulted to the excessive substances abuse and to prostitution amongst.

Farm communities within the five-kilometre radius comprised of farm managers, caretakers, farm workers, and their immediate families. The low-income levels are reflected by the limited opportunities within the area and dependence from the agricultural sector. According to interviewees the maximum income received by most male agricultural workers is about R3 000 per month and the working hours are more than 12 hours a day. The gazetted minimum wage is roughly 50% below the living wage. This challenges the capacity of farm workers to engage in sustainable livelihoods.

7.2.6 Crime, Safety & Security

The closest police station to the project site is in Kroonstad Central. According the to the South Africa Police Service's Fourth Quarter Crime Statistics for 2012/2022, this station is not amongst the top 30 crime stations in the country and crimes most common at the station are: common assault; common robbery; robbery with aggravating circumstances, assault with the intent to inflict grievous bodily harm and sexual offences. Stock and cattle theft is one of the most common economic crimes in this area.

According to local people, a growing informal settlement (Snake Park) located approximately six kilometres to the south-east of the project area has had a noticeable negative impact on crime levels in the area.

7.3 Stakeholder Engagement

The World Bank's Environmental and Social Framework (2018:97), defines the stakeholder engagement process as a process that is inclusive and conducted throughout the project life cycle. The procedure further supports the development of strong, constructive, and responsive relationships that are important for successful management of a project's environmental and social risks.

The following stakeholder engagement methodologies were carried out as part of either the public participation process of an earlier Scoping process and as part of direct contacts with the affected parties.

7.3.1 Comments Made by the Public

The process of collating comments and inputs is still ongoing. Site notices have been placed around the project area to sensitise IAP about the project. A database of the potentially affected parties and community elected representatives were sent email notifications which included a Background Information Document (BID). This document provided an overview and description of the proposed project. The overall socio-economic comments received during the commenting period have been incorporated into this report.

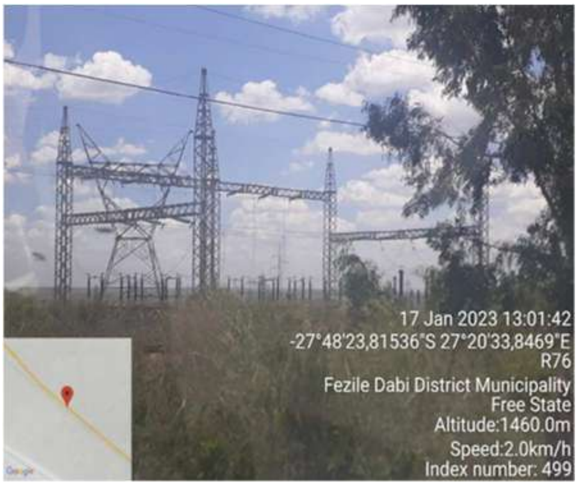
7.3.2 Primary Data Collection Report

A baseline study of the area's infrastructure was conducted on Google Earth prior to the site visit. The analysis of properties and infrastructures were observed within a five-kilometre radius around the project area.

7.3.3 Rapid Rural Assessment Process.

A site visit was conducted on 16 and 17 January 2023. The purpose of the visit was to compile and collect primary data on the receiving social environment, and to understand the expectations of the local communities with reference to the proposed project. During the site visit, the following key socio-economic characteristics were observed in the receiving environment.

Figure 13: Key Socio-Economic Characteristics of the Project Area



Substation

Grazing Land

Oslaagte Farm Workers Housing

Wonderkop Primary School, now used as housing

Homestead using borehole water	Solar Powered Security Camera

7.3.4 Social Assessment Informant Survey

Barrow, CJ (2000) shows that the purpose of random interviews is to involve the diverse public, all groups in decisions making even from those that are reluctant or marginalised. The following interviews took place with the listed people in the table below.

Table 7: List of Interviewed People

Name	Designation
Ms S	Snake Park Informal Settlement Resident
Mr MD	General Worker at Oslaagte
Mr MM	Resident
Mr MDf	Resident
Ms D M	Resident
Ms ZG	Landowner
Mr F	Landowner

The purpose of the face-to-face stakeholder interactions were to establish and record unbiased views and or comments of the proposed project, as to ensure that all comments and issues raised during the EIA phase is included in the SIA report which will be submitted to DEA and the information about the project has been properly disseminated to the local community.

A questionnaire was compiled and used as a technique to gather inputs and comments from the local communities.

Overall, attitudes towards the project were mixed, with differing expectations of proposed project. Opposition from some of the adjacent landowners was noted in which they expressed concern regarding increased crime rates, a failing political system, farm intrusion and existing poor service delivery. Moreover, concerns about the adjacent agricultural land depreciating in value due to long term solar facilities were a concern.

On the other hand, some of the residents expressed interest in the proposed project as it has the likelihood of creating opportunities in terms of jobs, skills development and increased economic stimulus in the area.

Table 8: Summary of the Community Attitudes

Key Needs / Issues Identified	Mitigation Measure
Livelihood and economic opportunities	• There is a need to create more economic opportunities that will benefit adjacent communities, with special emphasis on the empowerment of women and the youth.

Key Needs / Issues Identified	Mitigation Measure
	• Implementation of diverse economic activities and radically drive farming communities to be fully involved. • Create broad based economic activities.
Development of skills for the youth.	• Introduce skills development programmes that will target matriculants, school leavers and the unemployed as this will curb the employment expectations from the seasonal jobs available in the farms. • Create technology and sustainable innovations that will further develop skills for the youth. • Implement training programmes that will maximise employment opportunities for the local community.
Roads Development	• Improvement of feeder routes in the project area
Security	• There is a need to increase/improve security measures.

8 IDENTIFICATION OF IMPACTS

8.1 Impacts and Mitigation Framework

Socio-economic impacts are expected to arise because of a proposed project. All impacts discussed in this section will follow a context of nature, extent, magnitude, duration, probability, and significance.

ISO 14001-2004 defines impacts as “any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization’s environmental aspects”.

When considering an assessment of the impacts and their mitigation, the following definitions as per the table below apply.

Table 9: Impact and Mitigation Quantification Framework

Nature	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 socio-economic functions and processes are not affected or minimally affected. **Medium** – affected environment is notably altered; natural and socio-economic functions and processes continue albeit in a modified way. **High** – natural or socio-economic 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 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.
Mitigation	Information on the impacts together with literature from socio-economic science journals, case studies and field work will be used to provide mitigation recommendations to ensure that any negative impacts are decreased, and positive benefits are enhanced.
Monitoring	Monitoring usually involves developing and implementing a monitoring programme to identify deviations from the proposed action and to manage any negative impacts. The recommended mitigation measures will also include monitoring measures.

A well-designed, well implemented, professionally managed solar park can bring significant socio-economic benefits to the communities that it serves. If configured or operated in a way that ignores significant socio-economic needs or potential impacts, the proposed project may have significant socio-economic costs or liabilities for the stakeholders and affected communities.

Therefore, assessing socio-economic impacts is a complex process due to the multi-dimensional nature of the human interactions. This occurs in situations where a particular impact affects a group of stakeholders differently. An inter-connection of impacts can also be encountered whereby several impacts are related and when assessed cumulatively; their impacts may be of significance.

The impact assessment scores both before and after mitigation were arrived at by the specialist team engaging in a modified version of the Delphi technique, where the team discussed the scores, and through a process of iteration arrived at a consensus for each of the values. Where additional information was needed to decide, the technique would be halted, the necessary information would be uncovered and included in the report, and the technique would be recommenced.

8.2 Identification of Activities and Aspects

An "Activity" is defined as a distinct process or risks undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation (International Organization for Standardization, 2011).

An aspect is defined as elements of an organisation's activities, products, or services that can interact with the environment.

To capture the impacts associated with the proposed infrastructure, an activity – aspect – impact table was created refer to the *table* below.

Table 10: Activity, Aspects and Impacts of the Project

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
Land and Servitude Rights Acquisition	Land Acquisition		Loss of agricultural production
			Loss of land (including, structures and cultivated areas) through project infrastructure
			Community dissatisfaction
	Servitude Rights		Some restrictions on use of productive land
Scheme Operations	Electricity generation	Economic growth and induced impacts.	
	Supply of goods and services to the project	Opportunity for local business	
		Opportunity for local labour force	
	Administration and Technical Input	Employment of staff locally	
		Skills development	
Construction Phase	Access into properties		Security concern
			Risk of intrusion
	Solar Park Construction – piling, frame erection and solar panel mounting, electrical installation and rehabilitation	Employment of people locally	
		Sourcing of equipment, machinery, and services locally	
			Noise
			Dust
		Employment of local people	
			Injuries on site
			Increased community conflicts due to employment of outsiders
			Influx of people seeking employment and associated impacts (e.g., cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS)

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
		Sourcing of equipment, machinery, and services locally	
			Livestock and game animal safety
	Transport of goods to site and employment of staff		Increased traffic
	Transmission Line	Employment of people locally	
			Security concerns when contractor's access private property
		Sourcing of equipment, machinery, and services locally	
			Damage or wear to access roads
	Rehabilitation		Security Concerns
			Damage to property or equipment

8.3 Impact and Mitigation Assessment

Taking these impacts into account and based on the project description as well as the applicable legislation and policy and planning issues, the following socio-economic impact variables have been identified as being associated with the project. These impacts are in accordance with Vanclay's list of socio-economic impact variables (Vanclay, 2002; Wong, 2013) clustered under the following seven main categories as follows:

Health and Well-Being Impacts

- Risk of intrusion
- Injuries
- Health risks
- Social pathologies

Quality and the Living Environment Impacts

- Risk of intrusion
- Dust
- Noise

Economic and Material Well-Being Impacts

- Loss of land
- Restrictions on land

- Economic and social stimuli
- Informal settlements
- Damage to property

Cultural Impacts

- Cultural resistance
- Influx of job seekers
- Community conflict over non-local employment

Gender Relations Impacts

- Cultural resistance
- Risk to the vulnerable

These categories are not exclusive, nor fully inclusive of the project specific impacts, and at times tend to overlap as certain processes may have an impact within more than one category.

Cumulative impacts can be both positive and negative. Cumulative impacts refer to the impacts that are incremental on the environment that results from the impacts of the proposed action when added to the existing and near future actions. These impacts can also be temporary in nature (by being restricted to the construction phase) and permanent (occurring in both the construction and operation phase).

8.4 Impacts during the Planning Phase

The planning phase of any project ensures the analysis of potential impacts, this allows the assessment of any risk to be measured from a scale of high, medium, or low. This pro-active approach ensures the identification of key socio-economic issues that can be mitigated before moving further to other phases of development in the project.

The assessment of the key social issues for the proposed project were identified based on the project related information including specialist studies, primary data collection methodologies, project team's familiarity with the project area and experience with similar project studies.

8.4.1 Institutional, legal, political and equity

The institutional, legal political and equity impacts associated with the project include:

- Loss of land through project infrastructure
- Some restrictions on use of productive land

During the planning phase of the project, it is expected that there will be some legal and institutional challenges that affect both the local community and the project implementers. With the nature of the project being construction, it is understood that a predetermined portion of land will be made available for the purposes. However, since this is farm area, the loss of land to the project will come with economic downsides for those in the community who generally realise agricultural benefits. There will also be restrictions subjected on the use of otherwise productive land because of the infrastructure to be installed. Although these impacts will likely only be felt once the project is operational, the legal aspect that tenders the land acquisition would be made known at the planning phase.

There are mitigation measures that can be planned to account for the negative impacts so that the social experience is not too distressful. These are below:

Table 11: Planning Phase Impacts - Institutional, Legal, Political and Equity

<table>
<tr><td colspan="2">Environmental Feature</td><td colspan="5">Institutional, Legal, Political and Equity</td></tr>
<tr><td colspan="2">Project life cycle</td><td colspan="5">All Phases</td></tr>
<tr><td colspan="2">Potential Impact</td><td colspan="5">Proposed Management Objectives / Mitigation Measures</td></tr>
<tr><td colspan="2" rowspan="3">Loss of land through project infrastructure</td><td colspan="5">• Where the construction takes place will result in the land being acquisitioned and so adequate steps must be taken to ensure that the owner is not treated unfairly in the process.</td></tr>
<tr><td colspan="5">• Promptly address any concerns raised by the public in a transparent manner.</td></tr>
<tr><td colspan="5">• Include all relevant community members in decisions affecting them.</td></tr>
<tr><td colspan="2">Some restrictions on use of productive land</td><td colspan="5">• Once the project is operational, the land will be dedicated exclusively to the project and so its prior productivity will no longer apply. This must be clearly communicated and the owner should be adequately compensated.</td></tr>
<tr><td></td><td>Nature</td><td>Extent</td><td>Magnitude</td><td>Duration</td><td>Probability</td><td>Significance</td></tr>
<tr><td>Before Mitigation</td><td>Negative</td><td>Site</td><td>Moderate</td><td>Long Term</td><td>High</td><td>2</td></tr>
<tr><td>After Mitigation</td><td>Negative</td><td>Site</td><td>Low</td><td>Long Term</td><td>High</td><td>1</td></tr>
<tr><td>Significance of Impact and Preferred Alternatives</td><td colspan="6">The impact on project progress could be significant if grievances are not addressed. This can be effectively mitigated through the establishment of a grievance procedure and adherence to local by-laws

The impact has no consequence for project alternatives.</td></tr>
</table>

8.5 Impacts During the Construction Phase

The construction activity will impact the social environment both positively and negatively. Given the nature of the project area, construction activity is likely to cause several social nuisances as well as possible economic implications on the communities and commercial activities. With a project of this nature, most social impacts are experienced during the construction phase, as this is when construction related activities, relating to the influx of labour and the use of construction machinery occurs.

8.5.1 Economic Opportunities

- Economic and social stimuli
- Informal trading

The project is expected to bring economic benefit to the local community through employment opportunities for labourers and locally owned businesses.

In addition to the economic value added, the construction phase was estimated to produce some 1 387 job years in the regional study area. Considering experience with renewable project implementation in South Africa, 111 job years (8%) are likely to accrue to females, and a total of 624 years (41%) are likely to accrue to youth.

The official youth unemployment rate in the region is likely higher than the general unemployment rate, this being the trend nationwide. This project has the potential to impact positively on this rate should employment practises targeted at workers (male and female) under 35 years old be adopted.

The high number of impoverished households shows that there are vulnerable communities in the study area. It is recommended that the appointed contractor use local SMME's and local unskilled labour as far as possible during the construction phase to enhance any local economic impact. In addition, this would increase the skills in the area after construction is completed.

In this way more project revenue will stay in the area, raising economic activity and increasing welfare, resulting in induced economic opportunity. In South Africa, most employment is generated through small and medium business. Given the size of the proposed project, should contracts between local SMMEs be implemented, it is likely that there will be an increase in employment by SMMEs for the duration of the contracts.

In particular, the project has the potential to create several opportunities for existing and new local SMMEs. These opportunities range from site clearing, to fencing, parts of the construction scope and supply of materials. There are also opportunities for community members to provide labour, catering, accommodation, and other services to the new workers.

Where possible, the project proponent should support and encourage the procurement of SMMEs and local or regional suppliers in line with government policy.

Education levels provide an indication of the level of skill in the community and the degree to which the community skills base can be increased. Attempts to break the poverty cycle of the project areas will require more than secondary school education. Higher education or further skills training is required. It is therefore important that the community members under-go skills development. It is recommended that the project proponent institute a skills development program during construction.

The project proponent should monitor the employment process. Employment audits should be conducted. It is important that women are also provided employment opportunities. Audits should pay attention to the employment process of women to ensure that exploitation does not take place.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 12: Construction Phase Impacts - Economic Opportunities

Environmental Feature	Economic Opportunities
Project life-cycle	Construction phase

Potential Impact	Proposed Management Objectives / Mitigation Measures
Economic and social stimuli arising from the developmental initiative of the project.	• Local SMMEs should be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.
	• Youth development should be considered as an initiative so that there is a benefit of transferring skills to the community. This can be achieved through the assistance of the local municipality.
	• The main contractor should employ non-core labour from the regional study area as far as possible during the construction phase.
Informal trading being established at the site boundaries	• Spaza/informal trader shops may open next to the site to cater for construction workers. These should be controlled by the contractor to limit their footprint and to ensure that the MLM By-laws are complied with.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Regional	Medium	Short Term	Likely	1
After Mitigation	Positive	Regional	Large	Short Term	Likely	3
Significance of Impact and Preferred Alternatives	Individuals who will benefit during the construction are limited to those who actively participate in the construction activity through employment, sub-contracting or other economic opportunities. Active participation should be encouraged. The benefits on such a construction will take place irrespective of which site alternative is preferred.					

8.5.2 Gender Relations

- Cultural resistance

Gender relations are recognised as an important factor in the efforts to achieve equity across society. Particularly in the workforce, more female representation is necessary to account for the number of female-headed households, which in Moqhaka Municipality stands at 41%. Construction is a male-dominated industry; however, skills development initiatives directed at women may mean it is an industry that could benefit from equitable representation.

Although equal access to employment across gender lines is a recognised right, the application of this right is often executed without careful consideration of the factors that may frustrate this right amongst women in the workplace. In this regard women are often subjected to cultural factors within the workforce from both peers on the job and from management who may resist both employing and promoting women, often based on cultural prejudices. Consequently, the International Labour Organisation points out that:

“Societies therefore have an obligation to create conducive social environment for all their citizens to be able to exercise their right to work, fully utilizing their human potential. Furthermore, evidence has shown that when women are employed and have their own income in their hands, there exist both direct and indirect social benefits for themselves and their households" (Otobe, 2014, p. 1).

With the employment of women during the construction and operational phases of the project it is important to ensure that cultural factors do not hinder the process of employing women and ensuring that they enjoy equal opportunities to men in the workforce.

Following on from the above, the division of labour is a critical aspect that will also lead to various impacts during both the construction and operational phases of the project. During the construction and operational phases of the project women will be integrated into the workforce, however, this will come with various challenges. Women and men work on different tasks, have different biological, sex, gender and health needs, and have different roles within the family, all of which need to be considered in order to create a workplace, without discrimination, that is accessible to both women and men on an equal basis (World Health Organization, 2006).

In introducing women into the workforce, it must be noted that women are over-represented amongst the poorer sectors of society, particularly within the more rural communities, and under-represented, both vertically in terms of responsibility and seniority as well as horizontally in respect of certain functional areas and job categories (Otobe, 2014, p. 22). This is especially the case in the local project area where the proportion of women to men is higher than the provincial average. Thus, the potential labour force is dominated by women.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 13: Construction Phase Impacts - Gender Relations

Environmental Feature	Gender Relations
Project life-cycle	All phases
Potential Impact	Proposed Management Objectives / Mitigation Measures
Cultural resistance towards women because of increased gender representation in the workforce	• Sensitise staff in respect of gender sensitive issues that are pertinent to the workplace.
	• Ensure gender inclusivity and equity with respect to all compensation.
	• Prioritise gender inclusivity and equity in access to resources, goods, services and decision making with the aim of empowering women.
	• Promote equal job opportunities for women and men during the construction and operational processes.
	• Prioritise and articulate gender inclusivity and equity in the project documents by including specific strategies and guidelines for implementation.
	• The project documents should also include clear mechanisms through which the actual implementation of the activities and the impact on the ground can be monitored and evaluated.

		• Develop a grievance procedure to specifically address gender matters.				
		• Factors such as culture should be considered when planning for gender activities since they play a great role in influencing gender relations.				
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Short term	High	2
After Mitigation	Negative	Site	Low	Short term	High	1
Significance of Impact and Preferred Alternatives	The impact on project equity promotion would be moderate if this impact were not addressed. This can be effectively mitigated through the design of a specific gender-focused. The impact has no impact on alternative project layouts.					

8.5.3 Property and Production

- Risk of intrusion
- Livestock and game animal safety
- Loss of agricultural production
- Damage to property

During the construction phase, it is expected that there will be impacts on the agriculture, livestock, and game animals, as well as on the property of locals. As the area of development and its surrounds is farmland, where crops, livestock, and game are kept, the productivity there will inevitably be affected. There is a risk of construction workers intruding on the neighbouring farms, not necessarily with intent to cause harm, but which could nevertheless be dangerous. The livestock and game in the area are valuable and so it is necessary to ensure that there is no chance of them wandering close to the construction site. It is also important to communicate well with the local community about the construction schedule so that farming activities are not unduly interrupted. Also, there is the chance that local property may be damaged during construction.

In relation to the analysis above, the following impacts and mitigation measures are presented:

Table 14: Construction Phase Impacts - Property and Production

Environmental Feature	Property and Production
Project life-cycle	Construction phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Risk of intrusion	• The project proponent should ensure entrance management and control.
Livestock & game animals Safety	• There should be clear demarcation of the area in development so that livestock and game animals are prevented from wandering nearby.

<table>
<tr><td colspan="2">Loss of agricultural production</td><td colspan="5">• The project proponent should ensure that the schedule for construction is made available to the local community so that they can suitably prepare.</td></tr>
<tr><td colspan="2">Damage to property</td><td colspan="5">• If a risk exists of damage taking place on a property as a result of construction, a condition survey should be undertaken prior to construction;
• The contractor is to make good and acknowledge any damage that occurs on any property as a result of construction work;
• Where crops and agricultural machinery are damaged, compensation is to be paid to the farmer for the proven loss of these crops;
• The farmer should be compensated for any loss of income experienced at the account of the contractor.</td></tr>
<tr><td></td><td>Nature</td><td>Extent</td><td>Magnitude</td><td>Duration</td><td>Probability</td><td>Significance</td></tr>
<tr><td>Before Mitigation</td><td>Negative</td><td>Local</td><td>Medium</td><td>Short Term</td><td>Likely</td><td>1</td></tr>
<tr><td>After Mitigation</td><td>Positive</td><td>Local</td><td>Minor</td><td>Short Term</td><td>Likely</td><td>3</td></tr>
<tr><td>Significance of Impact and Preferred Alternatives</td><td colspan="6">Costs related to damage and theft should be borne by the developer.

There are no alternatives suggested.</td></tr>
</table>

8.5.4 Disturbances Arising from Construction

- Increase in dust
- Noise impacts

During the construction phase, there is a potential for communities to be exposed to increased dust, noise, and other disturbances. The site is in an isolated area where the number of community receptors is limited.

The generation of dust stems from activities such as clearing of vegetation, piling and vehicle movement during the construction phase. This situation will be worse during the dry season and during windy seasons. Airborne particulates may pose a hazard to residents downwind of the construction site that suffer from upper respiratory tract problems. Mitigation through dust suppression will allow for this impact to be effectively managed.

During the construction, equipment will be required for the site clearance, and during piling and trench excavation for electrical connections. A degree of noise generation will be unavoidable. The degree of noise, frequency of noise and individual perception are all important considerations when determining the impact on noise. Adequate warning of high noise events such as blasting (if required owing to the nature of the subsoil material) should be communicated to the affected communities prior to carrying out such activities. Construction times should be limited to normal working hours.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 15: Construction Phase Impacts - Disturbances Arising from Construction

Environmental Feature	Disturbances Arising from Construction					
Project life-cycle	Construction phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Increase in Dust	• Dust and disturbance can be mitigated through the use of appropriate dust suppression mechanisms. • Adherence to road signage can be added as an advantage and a measure to manage the increase in dust levels; • Mitigation measures management should be adhered to according to the relevant specialist studies.					
Noise impacts	• Prior notice should be given to surrounding communities of noisy event such as blasting. • Construction work should take place during working hours – defined as 07h00 to 17h00 on weekdays and 07h00 to 14h00 on Saturdays. Should overtime work be required, that will generate noise, consultation with the affected community or landowner should take place.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Disturbances and irritation during construction is to be expected. These can then be successfully mitigated through contractor specifications that are issued at a tender stage and through the continuous monitoring of contractor proceedings and performance during construction phase. Negative impacts owing to the construction will unfortunately be experienced irrespective of the site and routing alternative that is most preferred and chosen.					

8.5.5 Worker Health and Safety

- Injuries on site
- Protecting the vulnerable

The impacts of construction can affect the health and safety of those working on the construction site. These impacts can be mitigated in the Environmental Management Programme (EMPr) and through adherence to the Occupational Health and Safety Act 85 of 1993.

Given that the project will employ females are part of the workforce, gender considerations should enjoy priority. The workplace should be free of harassment and employment practises should be transparent and free from any coercion or trading. The workplace should make adequate provision for separate gender changing areas and ablution facilities.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 16: Construction Phase Impacts - Worker Health and Safety

<table>
<tr><td colspan="2">Environmental Feature</td><td colspan="5">Worker Health and Safety</td></tr>
<tr><td colspan="2">Project life cycle</td><td colspan="5">Construction Phase</td></tr>
<tr><td colspan="2">Potential Impact</td><td colspan="5">Proposed Management Objectives / Mitigation Measures</td></tr>
<tr><td colspan="2">Injuries on Site</td><td colspan="5">The provisions of the OHS Act 85 of 1993 and the Construction Regulations of 2014 should be implemented on all sites;
Account should be taken of the safety impacts on the local community when carrying out the longitudinal aspects of the project, such as the powerline;
Contractors should establish HIV/AIDS awareness programmes at their site camps.
Gender sensitive work place practises should be planned for and adopted on site. Employment practises should be demonstrated free of coercion or harassment.</td></tr>
<tr><td colspan="2">Protecting the Vulnerable</td><td colspan="5">There should be a policy on harassment that is well understood by all.
There should be separate changing facilities for men and women, and they should be clearly marked as such.
There should separate toilet facilities for men and women, and they should be clearly marked as such.</td></tr>
<tr><td></td><td>Nature</td><td>Extent</td><td>Magnitude</td><td>Duration</td><td>Probability</td><td>Significance</td></tr>
<tr><td>Before Mitigation</td><td>Negative</td><td>Local</td><td>Medium</td><td>Short Term</td><td>Likely</td><td>2</td></tr>
<tr><td>After Mitigation</td><td>Negative</td><td>Local</td><td>Low</td><td>Short Term</td><td>Moderate</td><td>1</td></tr>
<tr><td>Significance of Impact and Preferred Alternatives</td><td colspan="6">The significance of the impact is high as community attitudes can be altered. The implementation of the overall mitigation measures is essential and necessary to minimise the impact from workers' health and safety and community impacts.</td></tr>
</table>

8.5.6 Influx of Job Seekers

- Job seekers influx into the community
- Community conflict over employment of non-locals
- Increased health risk
- Increased social pathologies

It is expected that this influx will be limited owing to the large pool of potential workers for the project being available in the Moqhaka Local Municipality. The fact that Kroonstad is close to the construction site will ensure that labour is able to live at home for the duration of the construction project.

An influx of workers is often characterised by higher health risks, particularly if the influx is male dominated. These include a higher disease burden and rise in HIV/AIDS rates. There is an increased risk associated with the gathering of construction workers in a concentrated area and the availability of disposable income which may attract prostitution. In this regard the World Bank (Gender in Agriculture Sourcebook, 2009, pp. 367-368) indicates that there is a strong link between infrastructure projects and health as:

"Transport, mobility, and gender inequality increase the spread of HIV and AIDS, which along with other infectious diseases, follow transport and construction workers on transport networks and other infrastructure into rural areas, causing serious economic impacts."

It is expected that this influx will be limited owing to the large pool of potential workers for the project being available in the Moqhaka Local Municipality. The fact that Kroonstad and Steynsrus are close to the construction site will obviate the need for communal living conditions that may increase the chances for the spread of disease.

There should also be awareness and education campaigns on health and social risks such as HIV/AIDS, COVID-19 and crime prevention. Furthermore, social pathologies, such as alcohol abuse, risky sexual behaviour, and gambling should be considered, and appropriate measures taken to limit adverse consequences from this.

The above discussion above has generated the below impact table.

Table 17: Construction Phase Impacts - Influx of Job Seekers

Environmental Feature	Influx of Job Seekers
Project life cycle	Construction Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Job seekers influx into the community.	• All employment of locally sourced labour should be controlled and formalised. No employment should take place from the project gate and contracts of employment should be entered into taking into account the Labour Relations Act; • If possible, and if the relevant Ward Councillors deems it necessary, the employment process should include the affected Ward Councillors and their ward committee. • To limit the growth of informal settlements in the project area, labour should be sourced from existing labour sending areas, from people who resided in the area prior to appointment. This process should include the Ward Councillor to ensure that only local residents are employed, rather than labour migrants. • No staff accommodation should be allowed on site; • To limit the growth of settlements near the project site the project proponent should provide worker transport to and from the work site for the duration of construction.
Increased community conflicts due to employment of local and non-local labourers	• Programmes should be developed to boost the local economy. These can be in the form of Corporate Social Responsibility (CSR) that will favour local empowerment.
Increase health risk	• Measures should be taken to provide condoms and, where necessary, access to counselling to address any risks to health.
Increased social pathologies such as crime, drug abuse and sexual behaviours.	• The mitigation method will require a change in community values and attitudes; This can be done through creating social awareness, and educating the workforce with regards crime awareness and social pathology prevention

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Short term	High	2

After Mitigation	Negative	Site	Low	Short term	High	1
Significance of Impact and Preferred Alternatives	The significance of the impact is high as community attitudes can be altered. The implementation of the overall mitigation measures is essential and necessary to minimise the impact from job-seekers influx and community impacts.					

8.5.7 Security

- Ensuring the security of the project site

There are safety concerns related to the construction activity. Landowners adjacent to similar projects, generally express security concerns, including an increase in crime rates once an area experiences an increase in population owing to the number of construction workers on site.

Mitigation measures include the project proponent, prior to construction, planning for the management of workers by taking measures such as readily identifiable clothing, having the site fenced and secured and taking measures to ensure workers do not congregate outside the site before or after working hours. A security policy must be drafted and strictly enforced by the contractors.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 18: Construction Phase Impacts - Security

Environmental Feature	Security					
Project life cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Ensuring the security of the project site	• The camp site for the project and the longitudinal construction sub-site laid down areas should be fenced for the duration of construction; • All contractors' staff should be easily identifiable through their respective uniforms; • A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards crime, trespassing and not gathering outside the site could be conducted. • Security staff should only be allowed to reside at contractor camps and no other employees.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Disturbances and irritation during construction are to be expected. These can then be successfully mitigated through contractor specifications that are issued at a tender stage and through the continuous monitoring of contractor proceedings and performance during construction phase.					

8.6 Impacts on Operational Phase

8.6.1 Economic Impact

- Economic
- Local procurement
- Job creation and skills development

Jobs created during the operational phase of the project will be limited when compared to the construction phase, but 175 jobs will be created directly by the project over its 20-year operational lifespan. In total it was estimated that 96 jobs in total will be created in this timeframe in the South African economy as a result of the project.

Economic opportunities will range from the supply of labour and skills to the project, supply of materials and equipment and an increase in wholesale and retail trade in the regional economy.

To ensure that economic activity derived from the project is localised as far as possible, measures should be adopted to increase local procurement of the human resources.

As a result of the analysis above, the following operational phase impact/mitigation table has been generated.

Table 19: Construction Phase Impacts - Economic Impacts (positive)

Environmental Feature	Economic Impacts (positive)					
Project life-cycle	Operational Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Economic	• The solar park will stimulate the local economy through the provision of jobs and through local procurement. • It will contribute to the improvement of the national electricity supply at a price that has been set by a competitive bidding process					
Local Procurement	• Local SMMEs should be given an opportunity to participate in the operation of the project through the supply of services, material or equipment.					
	• A procurement policy promoting the use of local business where possible, should be put in place and applied throughout the operational phases of the project.					
Job Creation and Skills Development	• Women should be given equal employment opportunities and encouraged to apply for positions.					
	• A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills whilst in employment.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Regional	High	Long Term	Likely	3
After Mitigation	Positive	Regional	High	Long Term	Likely	3

Significance of Impact and Preferred Alternatives	The solar park in the regional study area will provide economic stimulus to the regional study area for the long-term. The solar park should adopt policies that are supportive of local procurement and support for local enterprises. Economic impact considerations require that the most cost-effective transmission power line route be adopted to service the project.

8.7 Economic and material well-being (negative)

There are indirect impacts from the project that may have economic impact. Impacts in this class for the project are:

- Loss of productive agricultural land/ grazing land.

Loss of productive/ grazing land

The implementation of the proposed project will have an impact on landowners in that land that would otherwise have been used for agriculture would now be re-purposed for use as a solar farm.

The authors view this as a low impact, given that the economic value of the agricultural yield from the land in the area is very much lower than the yield from a solar park. The economic impact – both in terms of contribution of the Gross Value Added to the regional study area, and in terms of jobs created, of the land being used as a solar park will outweigh any likely agricultural use.

The results of the agricultural specialist studies related to agriculture will be relied upon when assessing this impact.

As a result of the analysis above, the following impact/mitigation table has been generated. It applies to the planning phase of the proposed project.

Table 20 :Operational Phase Impacts - Economic Well Being (Negative)

Environmental Feature	Economic well-being (negative)					
Project life-cycle	Operational Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Loss of productive land	• A very low impact that does not require mitigation.					
Loss of grazing land	• A very low impact that does not require mitigation.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Low	Short Term	Low	1
After Mitigation	Negative	Local	Low	Short Term	Low	1
Significance of Impact and Preferred Alternatives	This impact is not considered significant. It should be noted that this study defers to the agricultural specialists with regards the impact of the project on regional production.					

9 ANALYSIS OF ALTERNATIVES

An analysis of the project alternatives is carried out below.

9.1 No-Go Alternative

The No-Go alternative will present the following implications:

- There will be no contribution employment and skills development to the local community.
- The local economy will remain unchanged as the area and will not attract new economic investment.
- The opportunity to improve the overall supply of electricity in the regional will be missed; and
- The economic stimulus presented by the project will be foregone.

There will be less economic development as there will be no opportunities for SMMES and local labourers. Having taken into consideration the project aims of electricity generation using renewable power sources and considering the assessment above which does not indicate any fatal socio-economic flaws, the benefits from the project going ahead, from a socio-economic perspective, will be larger than not proceeding. The "No-go" option is not supported by this study.

9.2 Technical Alternatives

No site or layout alternatives are proposed for this project. The internal layouts of the facility will not impact upon the social environment beyond the plant.

10 SITE SENSITIVITY VERIFICATION

The site sensitivity was verified by means of the methodology and findings of this report. There is no social theme for this project in the screening tool, hence this report conforms with the Environmental Impact Assessment regulations requirements.

The methodology establishes existing land use and includes motivation and evidence of such land use. The nature of this study and its impacts dictate that a larger study area than the immediate site and its adjoining properties be assessed. In this sense, the precise nature of the land development on the site is not relevant in this case.

11 IMPACT STATEMENT

An impact statement is required as per the NEMA regulations with regards to the proposed development.

The project site has few social receptors surrounding the site, and the project has a low footprint on the social environment. The social and economic impacts of the project are expected to be positive in the sense that the local economy will be stimulated and broadened. The negative impacts are limited in nature and scope and can be successfully mitigated by changes to the layouts of the panels and management rules and practises. It is therefore found that the project, once the recommended mitigation measures have been implemented, has a nett positive impact on the social environment of the regional study area.

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APPENDIX ONE: CENSUS OF POSSIBLE SOCIAL RECEPTORS

No	Description	Coordinates	Satellite Image
1	Dwellings	27°49'12.65" S 27°22'19.93" E	
2	Feeder road	27°49'25.19" S 27°22'05.05" E	

3	Farm Workers Homestead	27°49'45.39" S 27°22'28.33" E	
4	Dwellings	27°50'54.41" S 27°18'37.09" E	

5	Dwellings	27°49'04.72" S 27°18'12.56" E	
6	Dwellings	27°47'42.03" S 27°17'50.58" E	
8	Dwellings	27°47'08.64" S 27°17'30.96" E	

9	Structures	27°47'32.88" S 27°17'50.57" E	
10	Existing Substation	27°46'59.75" S 27°18'33.08" E	
11	Water catchment area	27°46'07.09" S 27°19'13.82" E	

12	Dwellings	27°47'27.60" S 27°21'29.47" E	
13	Plantation	27°48'11.67" S 27°22'06.99" E	
14	Zoulspruit Guesthouse	27°51'07.43" S 27°14'06.76" E	

15	School	27°51'30.98" S 27°24'32.29" E	
16	Dwellings	27°51'29.37" S 27°24'50.22" E	
17	Laydown area	27°51'28.43" S 27°25'03.17" E	

18	Farm Properties	27°51'11.95" S 27°25'19.26" E	
19	Informal settlement	27°51'23.13" S 27°25'22.48" E	

APPENDIX E8: Visual Impact Assessment

SPECIALIST ASSESSMENT

ENVIRONMENTAL VISUAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED OSLAAGTE SOLAR 3 PHOTOVOLTAIC PROJECT SOUTHEAST OF KROONSTAD, FREE STATE PROVINCE, SOUTH AFRICA.

ENVASS
GROUP OF COMPANIES

PREPARED FOR:	OSLAAGTE SOLAR 3 (PTY) LTD
PREPARED BY:	ENVIRONMENTAL ASSURANCE (PTY) LTD.
SUBMITTED TO:	NEMAI CONSULTING CC
MONTH:	MAY 2023
REPORT NUMBER:	SPS-VIA-049-23_24 OS3
VERSION:	0.1

DOCUMENT CONTROL	
Document Title	Environmental Visual Impact Assessment Report for the Proposed Oslaagte Solar 3 Photovoltaic Project Southeast of Kroonstad, Free State Province, South Africa.
Report Number	SPS-VIA-049-23_24 OS3
Version	0.1
Date	May 2023
Submitted to	Client: Nemai Consulting CC Contact Person: Jacqui Davis Position: Environmental Consultant
Distribution	1 x Nemai Consulting CC 1 x Environmental Assurance (Pty) Ltd

QUALITY CONTROL			
	Originated By:	**Internal Reviewer:**	**Technical Reviewer:**
Name	Richard Viljoen	Andre Buys	Carl Schoeman
Designation	Environmental Consultant	Environmental Specialist Pr.Sci.Nat - 119183	Environmental Specialist Pr.Sci.Nat - 114848
Signature			
Date	11-05-2023	12-05-2023	12-05-2023

DISCLAIMER

DECLARATION OF INDEPENDENCE

I, **Richard Viljoen**, in my capacity as a specialist consultant, hereby declare that I: -

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of this project, other than remuneration for the work performed in terms of the National Environmental Management Act 107 of 1998;
- Have and will not have vested interest in the proposed and/or existing activity nor will I engage myself in any conflicting interest associated with this project;
- I undertake to disclose and provide to the competent authority any material or information at my disposal regarding this project as required in terms of National Environmental Management Act 107 of 1998;
- Based on the information provided to me by the client and in addition to information obtained during the course of this study, I have presented the results and conclusion with regard to this project to the best of my professional ability;
- I reserve the right to modify aspects pertaining to this study should additional information become available through ongoing research and further work on this field;
- I undertake to have my work peer reviewed on a regular basis by a competent specialist in the field of study; and
- I am duly qualified and experienced to undertake the work at hand.

Richard Viljoen (Environmental Consultant)

Environmental Consultant	Relevant expertise
Richard Viljoen	Has completed a B.Ss. in Geography and Environmental Management, followed by a B.Sc. (Hons) Geography and Environmental Management and M.Sc. Environmental Science specialising in GIS and Remote Sensing. He has comprehensive experience and knowledge on compliance monitoring, project management and specialist reporting. As an environmental consultant, Richard has provided several environmental monitoring assessments, audits and specialist input services.

EXECUTIVE SUMMARY

This report has been prepared by Environmental Assurance (Pty) Ltd. (hereafter referred to as "ENVASS") as an independent environmental consultancy appointed by Oslaagte Solar 3 (Pty) Ltd to undertake a visual impact assessment for the proposed development of the Oslaagte 480MW Solar Photovoltaic (PV) Project southeast of Kroonstad, in the Free State Province, South Africa (referred to as the "Project"). The assessment is required as part of an application for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act 107 of 1998), for the approval of the proposed project. The scope of the assessment focussed on the current visual baseline conditions of the study area and the possibility of the proposed project having a visual impact.

RESULTS AND IMPACT STATEMENT

From the results obtained in this study, it is expected that the construction of the proposed project will contribute to localised visual impacts, however, the visual impacts are expected to be **moderate to low** if proactively managed. Mitigation measures are recommended under Section 9 to reduce potential visual impacts.

The assessment found that the proposed project itself will have the greatest potential visual impact among those activities assessed. Secondary visual impacts are expected to include dust generation during construction, solar glint and glare, and night-time illumination. Several mitigation measures have been identified to address the anticipated impacts.

The Project could potentially have a moderate visual impact on surrounding land users located near the proposed solar facility and associated infrastructure. This impact may be mitigated to low. The visual impact on the users of roads and the local residents and homesteads within the region (i.e., beyond the 5km radius) is expected to be low for the proposed solar energy facility, both before and after the implementation of mitigation measures. The potential visual impact of construction activities on sensitive visual receptors located near to the proposed solar energy facility is likely to be of moderate significance and may be mitigated to low. The potential visual impact associated with lighting at the facility at night and daytime glare is expected to be of moderate significance and may be mitigated to low.

The anticipated visual impacts are expected to be of low significance with the implementation of appropriate mitigation, and the project development is not considered to be fatally flawed from a visual perspective.

SPECIALIST'S RECOMMENDATION

Considering the project, it is the specialist's reasoned opinion that the proposed project be allowed, provided that the findings within this report are considered along with the recommendations made towards the management of the proposed project. In terms of visual impacts of the two (2) alternatives the visual impacts between the two are negligible. Therefore, the specialist's recommendation is that alternative two (2) be used as the preferred layout due to the reduced area of the infrastructure. All mitigation measures recommended herein should be considered and included in the Environmental Management Programme (EMPr) relevant to the proposed project.

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ACRONYMS

ACRONYM	EXPANSION
BESS	Battery Energy Storage System
DEM	Digital Elevation Model (*also* DTM or “Digital Terrain Model”)
DFFE	Department of Forestry, Fisheries and Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ENVASS	Environmental Assurance (Pty) Ltd.
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GIS	Geographic Information System
GPS	Global Positioning System
IDW	Inverse Distance Weighting
km	Kilometres
LiDAR	Light Detection and Ranging
NEMA	National Environmental Management Act
PV	Photovoltaic
SLR	Single Lens Reflex
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VP	Viewpoint
VT	Vegetation Type

GLOSSARY

TERM	DEFINITION
Cumulative impact	Cumulative impacts can result from individually minor but collectively significant activities taking place over a period.
Critical viewpoints	Important points from where viewers will be able to view the proposed or actual development and from where the development impact may be significant.
Environmental Impact Assessment	A public process that is used to identify, predict, or cause the least damage to the environment at a cost acceptable to society, in the long term as well as in the short term.
Field of view	The field of view is the angular extent of the observable world that is seen at any given moment. Humans have an almost 180º forward-facing field of view. Note that human stereoscopic (binocular) vision only covers 140º of the field of view in humans; the remaining peripheral 40º have no binocular vision due to the lack of overlap of the images of the eyes. The lower the focal length of a lens (see below), the wider the field of view.
Focal length	The focal length of a lens is a measure of how strongly the lens converges (focuses) or diverges (defocuses) light. Focal length refers to the "strength" of a lens, in other words how many times the lens magnifies an image (brings it closer) or widens an image (makes it look further away). The standard lens on most Single-Lens Reflex (SLR) cameras have a focal length of 50 mm. Using a 50 mm lens as a start, a 200 mm lens will magnify an image four times (i.e,. 4 x magnification). The focal length of an average human eye is 22 mm.
Impact (Visual)	A description of the effect of an aspect of the development on a specified component of the visual, aesthetic, or scenic environment within a defined time and space.
Land cover	The surface cover of the land usually expressed in terms of vegetation cover or the lack of it. Related to but not the same as Land use.
Land use	What land is used for based on broad categories of functional land cover, such as urban and industrial use and the different types of agriculture and forestry.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation, and physical processes.
Landscape	An area, as perceived by people, the character of which is the result of the action and interaction, of natural and/ or human factors.
Landscape character	These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur, they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetic attributes.
Landscape quality	A measure of the physical state of the landscape. It may include the extent to which typical landscape character is represented in individual areas, the intactness of the landscape and the condition of individual elements.
Landscape value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a variety of reasons.

TERM	DEFINITION
Mitigation	Any action taken or not taken in order to avoid, minimise, rectify, reduce, eliminate, or compensate for actual or potential adverse visual impacts.
Scenic value	Degree of visual quality resulting from the level of variety, harmony and contrast among the basic visual elements.
Sense of place	The character of a place, whether natural, rural or urban. It is allocated to a place or area through cognitive experience by the user.
Viewshed	The theoretical area within which an observer is likely to see a specific structure or area in the landscape. It is generated from a digital terrain model (DTM) made up of 3D contour lines of the landform. Intervening objects, structures or vegetation will modify the view shed at ground level.
Visual absorption capacity (VAC)	The ability of elements of the landscape to "absorb" or mitigate the visibility of an element in the landscape. Visual absorption capacity is based on factors such as vegetation height (the greater the height of vegetation, the higher the absorption capacity), structures (the larger and higher the intervening structures, the higher the absorption capacity) and topographical variation (rolling topography presents opportunities to hide an element in the landscape and therefore increases the absorption capacity).
Visual character	The overall impression of a landscape created by the order of the patterns composing it; the visual elements of these patterns are the form, line, colour and texture of the landscape's components. Their interrelationships are described in terms of dominance, scale, diversity and continuity. This characteristic is also associated with land use.
Visual exposure	Visual exposure is based on distance from the project to selected viewpoints. Visual exposure or visual impact tends to diminish exponentially with distance.
Visual quality	Subjective evaluation of the visible components of the environment by viewers.
Visually sensitive	Areas in the landscape from where the visual impact is readily or excessively encountered.

1. INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Environmental Assurance (Pty) Ltd (ENVASS), as an independent environmental consultancy, was appointed by Oslaagte Solar 3 (Pty) Ltd to undertake a visual impact assessment for the proposed development of the 480MW Oslaagte 3 Solar Photovoltaic (PV) Project southeast of Kroonstad, in the Free State Province (refer to Figure 1). This document reports on the visual impact assessment conducted and outlines findings and recommendations made towards the Environmental Impact Assessment (EIA) process undertaken for the proposed project.

1.2 LOCALITY

The proposed site is situated west of Kroonstad, approximately twenty (20) kilometres southeast of the central business district (CBD). It falls under the jurisdiction of the Moqhaka Local Municipality. The proposed project area near the R76 which runs along the eastern boundary of the site. The footprint of the project is approximately 810 hectares (ha). The surrounding area can be characterized by agricultural, residential, and commercial activities. According to the SA Renewable Energy EIA Application (REEA) Database, there are three (3) renewable energy applications recently made for properties located near Kroonstad. The proposed site elevation ranges from approximately 1383 to 1458 metres above mean sea level (mamsl). Predominantly flat, with a few small hills and rocky outcrops scattered throughout the area. The vegetation in the area consists mainly of grasses, shrubs, and trees. The surrounding area includes several reserves and game farms in the surrounding area, which are home to a variety of wildlife species. Overall, the landscape and terrain around Kroonstad are typical of the highveld region of South Africa, with wide open spaces and a mix of grassland and bushveld vegetation.

1.3 ACTIVITY DESCRIPTION

The proposed project consists of the following systems, sub-systems or components (amongst others):

- PV modules and mounting structures which will consist of either Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems.
- Inverters and transformers.
- Battery Energy Storage System (BESS) area up to 5ha.
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance.
- Facility grid connection infrastructure, including:
    - 33kV cabling between the project components and the facility substation.
    - A 132kV facility substation.
    - 33kV or 132kV cabling or powerline between the facility substation and the proposed Eskom collector switching station/Main Transmission Substation (MTS).
- Temporary construction laydown area up to 5 ha.

- Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
- Internal roads will be up to 6 m wide, to allow access to the Solar PV modules for operations and maintenance activities.
- Main access road is up to 8 m wide. The site is accessible via the R76.
- 400/132kV MTS (600m x 600m). The MTS includes a switching station.
- 400kV LILO powerlines between the new proposed MTS and the existing Eskom 400kV powerlines.

The project can be separated into three (3) phases namely the construction, operational and decommissioning phases. Per phase the following activities can conceivably occur and not limited.

- **Construction phase -** During the implementation of the Project, the following construction activities will be undertaken:
    - Pegging the footprint of the development;
    - 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 -** PV panels are guaranteed to produce at least 80% of their rated power for 20 to 30 years. In practice, PV panels will perform satisfactorily well beyond this timeframe. At the end of the 20 to30-year lifespan, two scenarios exist for the PV panels:
    - The old, redundant panels can be disposed of (at a registered disposal facility designated for this purpose); or

- The panels can be recycled, by either using their components to fix or make new panels, or be donated for use elsewhere (e.g., for the electrification of rural schools and clinics).

Table 1: Technical details of the proposed PV Plant (Nemai Consulting CC)

No.	Component	Alternative 1 - Description / Dimensions	Alternative 2 - Description / Dimensions
1	Height of PV panels	Up to 5 m	Up to 5.5 m
2	Area of PV Array	Up to approximately 445.5 ha	Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems. Area: Up to 760 ha
3	Area occupied by inverter / transformer stations / substations	Up to 1 ha	It is estimated that the maximum size of the facility substation will not exceed 2 ha. Each facility will require inverter-stations, transformers, switchgear and internal electrical reticulation (underground cabling).
4	Capacity of on-site substation	High voltage (132 kV)	The facility substation will collect the power from the facility and transform it from medium voltage (up to 33 kV) to high voltage (132 kV).
5	BESS	Area up to ± 5ha	Area: up to ± 5 ha
6	Area occupied by both permanent and construction laydown areas	Temporary: Up to 7ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)	Temporary construction laydown area up to 10 ha. Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
7	Area occupied by buildings	Up to 1.5 ha	Up to 1.5 ha
8	Length of internal roads	Up to 33 km	Up to 33 km
9	Width of internal roads	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.
10	Height of fencing	Up to 3.5m	Up to 3.5m
11	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing	Type will vary around the site, welded mesh, palisade and electric fencing

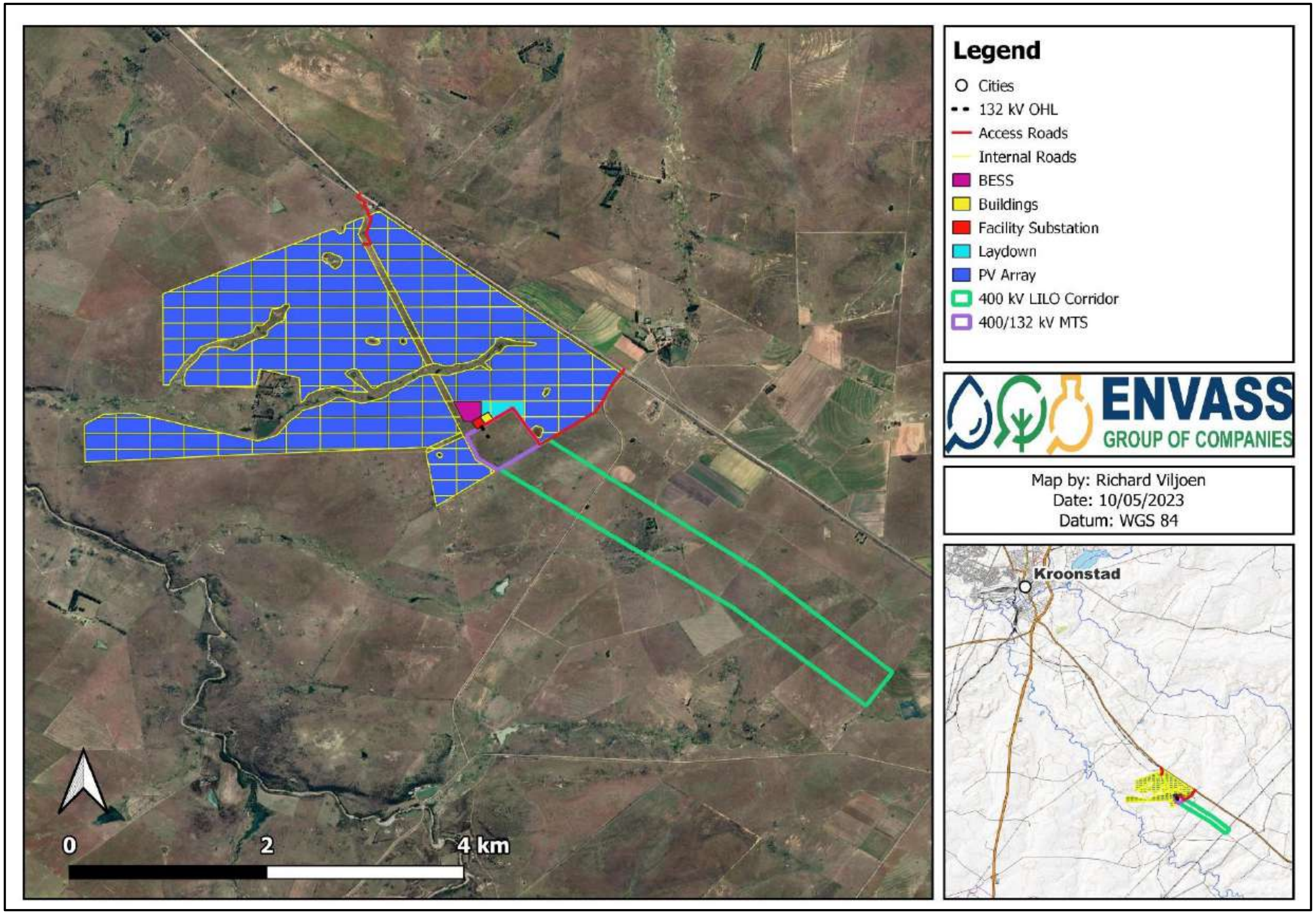

Figure 1: Proposed project locality and alternative 1 layout map

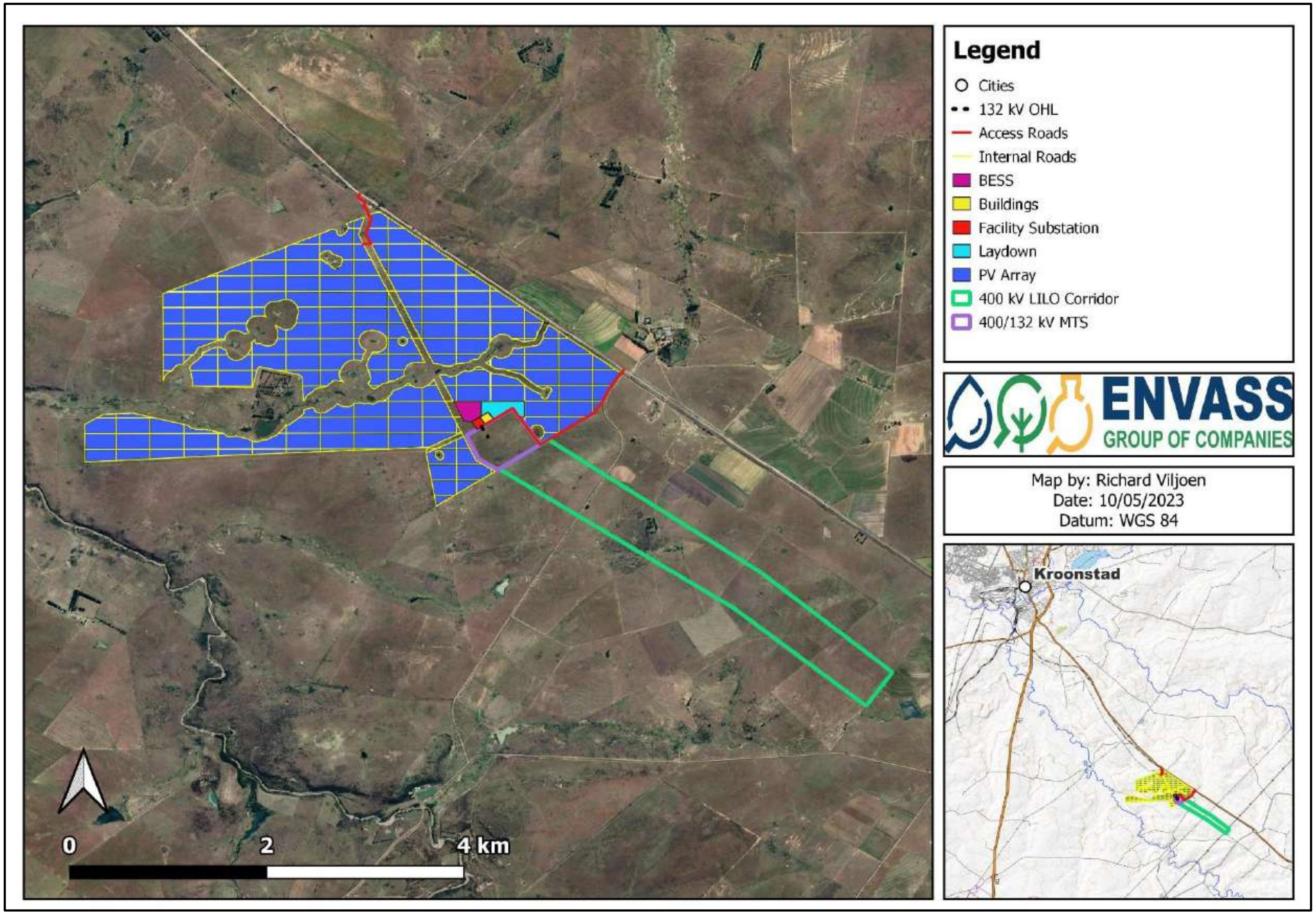

Figure 2: Proposed project locality and alternative 2 layout map

1.4 DELINEATION OF THE VISUAL STUDY AREA

The study area for the VIA comprises of the spatial extent of the project footprint and related activities, as well as an associated buffer area. For the purposes of this VIA, the study area was defined as a ten (10) km radius around the physical footprint of all surface components of the project. The distance of ten (10) km was selected based on the location of sensitive receptors, topography, and the elevation of the proposed area. For the purposes of this VIA, the term 'site' refers to the area that will be physically affected by the proposed activities. Similarly, the term 'study area' refers to the area that will potentially be visually affected by the project and represents the ten (10) km radius buffer around the visible components of the proposed infrastructure.

2. LEGISLATIVE CONTEXT AND REFERENCES

Section 28 of the National Environmental Management Act (NEMA, Act 107 of 1998) places a duty of care on any person causing, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing, or, insofar as such harm to the environment is authorised by law or cannot be reasonably avoided or stopped and rectify such pollution of the environment. The measures required in terms of subsection (1) may include measures to:

- Investigate, assess, and evaluate the impact on the environment.
- Inform and educate employees on the environmental risk of their work and the way tasks must be performed in order to avoid causing significant pollution or degradation of the environment.
- Cease, modify or control any activity or processes causing pollution or degradation.
- Contain or prevent the movement of pollutants or the cause of degradation.
- Eliminate any source of the pollution or degradation; or
- Remedy the effects of pollution or degradation.

In addition to this, the Protected Areas Act (57 of 2003) Section 17 is intended to protect natural landscapes and the National Heritage Resources Act (25 of 1999) provides legislated protection for listed proclaimed sites such as urban conservation areas, natural reserves and proclaimed scenic routes. This legislation is applicable to the study and will be used in the determination of the possible visual impact of the proposed development.

Requirements of Appendix 6 of the NEMA: EIA Regulations (2014, as amended). The following is an extract of the requirements:

Specialist reports

1. (1) A specialist report prepared in terms of these Regulations must contain—

(a) details of—

(i) the specialist who prepared the report; and

(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;

(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

(c) an indication of the scope of, and the purpose for which, the report was prepared;

(cA) an indication of the quality and age of base data used for the specialist report;

(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;

(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;

(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;

(g) an identification of any areas to be avoided, including buffers;

(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;

(i) a description of any assumptions made and any uncertainties or gaps in knowledge;

(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;

(k) any mitigation measures for inclusion in the EMPr;

(l) any conditions for inclusion in the environmental authorisation;

(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;

(n) a reasoned opinion—

(i) whether the proposed activity, activities or portions thereof should be authorised;

(iA) regarding the acceptability of the proposed activity or activities; and

(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;

(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and

(q) any other information requested by the competent authority.

(2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.

3. PURPOSE AND SCOPE

3.1 PURPOSE

The purpose of this assessment is to determine the visual impact of the proposed activity. The visual impact assessment will describe the existing visual characteristics of the proposed site and surrounding environment to establish the baseline characteristics of the receiving environment. If it is found that the possibility exists for visual impacts to pose a problem, recommendations will be made as to prevent and/or mitigate the possible impacts. This will be done to prevent disturbances to the receiving environment. This report also aims to give effect to the requirements and legislation as promulgated in South Africa. Please refer to Section 2 for detailed legislative requirements for the study. Key aspects for the purpose of this document are to:

- Description of the existing visual characteristics of the proposed site and its surroundings.
- Determining areas from which the proposed development will be visible.
- Visual Impact Assessment (VIA) in order to assess the significance of the visual impacts determined to be caused by the proposed development; and
- Recommendation of possible mitigation measures.

3.2 SCOPE

The scope includes the visual impact assessment of the proposed project (refer to Figure 1). This document reports on the visual impact assessment conducted, and outlines findings made supported by recommendations to the authorisation of the proposed project. The site is located approximately twenty (20) kilometres southeast of Kroonstad, Free State Province, South Africa.

4. METHODOLOGY AND UNDERTAKING

4.1 SITE ESTABLISHMENT

An initial desktop site assessment was conducted to determine suitable locations regarding the visual impact assessment. The result of the desktop study is the identification of areas or activities, which could possibly contribute to the deterioration of the visual characteristics of the area.

Site baseline characterisation (and subsequent fieldwork) occurred on the 25th and 26th of April 2023 for the visual assessment. The site baseline characterisation was conducted to undertake the visual assessment of the current characteristics of the receiving environment. The field survey included photographic evidence at the various viewpoints, which were used as a basis for determining the potential visual ability and visual impacts of the proposed development. Various viewpoints were identified based on the sensitivity and visual impact of the area.

The VIA was conducted following the methodology:

- Site visit and orientation.
- Describing the landscape character or visual baseline based on:

- Photographs of the project site and larger study area were taken during a field visit conducted on the 25th and 26th of April 2023.
- A review of available aerial photography and topographical maps, in relation to:
    - Natural elements; and
    - Human-made elements.
- Determining the area/s where the project will be visible from.
- Determining the visual resource value of the landscape in terms of:
    - The topographical character of the site and its surroundings and potential occurrence of landform features of interest;
    - The presence of water bodies within the study area;
    - The general nature and level of disturbance of existing vegetation cover within the study area; and
    - The nature and level of human disturbance and transformation evident.
- Determine the visual absorption capacity of the receiving visual landscape.
- Determining the receptor sensitivity to the proposed project.
- Determine the magnitude of the impact, by considering the proposed project in terms of aspects of VIA, namely:
    - Visibility.
    - Visual intrusion; and
    - Visual exposure.
- Assessing the impact significance by relating the magnitude of the visual impact to its:
    - Duration.
    - Severity; and
    - Geographical extent.
- To recommend mitigation measures to reduce the potential visual impacts of the project.

4.2 ASSUMPTIONS AND LIMITATIONS

The following is relevant to the field of VIA and the findings of this study:

- Determining the value, quality and significance of a visual resource or the significance of the visual impact that any activity may have on it, in absolute terms, is not achievable. Visual perception is by nature a subjective experience, as it is influenced largely by personal opinions and world views. For instance, what one viewer may experience as an intrusion in the landscape, another may regard as positive. Such differences in perception are greatly influenced by culture, education, and socio-economic background. A degree of subjectivity is therefore bound to influence the rating of visual impacts. It is therefore impossible to conduct a visual assessment without relying to some extent on the opinion of an experienced consultant, which is inherently subjective. The subjective opinion of the visual consultant is however unlikely to materially influence the findings and recommendations of this study, as a wide body of scientific knowledge exists in the industry of VIA, on which findings are based.
- A once-off field survey was sufficient to characterise the baseline visual characteristics of the site.
- The primary objective of this study was to assess the visual environment.

- The fieldwork relevant to this study was a once-off assessment that was conducted.
- A preliminary layout was available. Detailed dimensions, such as the vertical offset of proposed surface infrastructure above ground level, were however not available and were assigned based on experience from similar infrastructure in previous projects.
- All viewsheds were based on terrain level. As such these viewsheds do not incorporate distractive views in the form of vegetation or land use (infrastructure, buildings, etc.).
- This study did not include an illumination or social assessment.
- The assessment of impacts and recommendation of mitigation measures was informed by the site-specific aspects identified and based on the assessor's working knowledge and experience with similar activities.

4.3 BASELINE VISUAL ENVIRONMENT

The visual baseline assessment was informed by a field visit, assessment of on-site photographs and Google Earth imagery. To determine the visual resource value of the study area, specific attention was given to the following aspects:

- The nature of existing vegetation cover, in terms of its overall appearance, density and height, and level of disturbance.
- The general topographical character of the study area, including prominent or appealing landforms, and their spatial orientation in terms of the project sites.
- The nature and level of human transformation or disturbance of the study area.
- The location, physical extent, and appearance of water bodies within the study area if present; and
- The perceived level of compatibility of existing land uses in terms of the study area and each other.

4.4 DESCRIPTION OF AFFECTED AREA AND ENVIRONMENT

This section provides a brief overview of the visual baseline environment and context in which the proposed project will take place.

The proposed site is located approximately twenty (20) kilometres southeast of Kroonstad, Free State Province, South Africa. The proposed project is accessed by the R76. The areas affected by the proposed Project footprint are rural in nature. The Project's PV Site is vacant and was historically used for agricultural purposes. Grazing is the dominant land use in the Project area. The surrounding area can be characterized by agricultural, commercial and residential activities. According to the SA REEA Database, there are three (3) renewable energy applications have been made for properties located near Kroonstad.

Table 2: Desktop study attributes and descriptions relevant to the study area.

Hydrological Setting (DWS, 2012)	
Water Management Area (WMA)	Middle Vaal
Sub-WMA	Rhenoster/Vals
Quaternary Catchment Area	C60F and C60D
Sub-Quaternary Reach (SQR)	C60F – 2458 (Blomspruit) and C60D – 2473 (Vals) PES: Class C (Moderately modified) and Class D (Largely modified)
Ecoregion (Kleynhans *et al.*, 2005) (bold indicates most dominate attributes)	
ATTRIBUTES	**Highveld (11)**
Terrain Morphology: Broad division (dominant types in bold) (Primary)	**Plains; Low Relief;** **Plains; Moderate Relief;** Lowlands; Hills and Mountains; Moderate and High Relief; Open Hills; Lowlands; Mountains; Moderate to high Relief Closed Hills. Mountains; Moderate and High Relief
Vegetation types (dominant types in bold) (Primary)	Mixed Bushveld (limited); Rocky Highveld Grassland; **Dry Sandy Highveld Grassland;** Dry Clay Highveld Grassland; **Moist Cool Highveld Grassland;** Moist Cold Highveld Grassland; North Eastern Mountain Grassland; Moist Sandy Highveld Grassland; Wet Cold Highveld Grassland (limited); Moist Clay Highveld Grassland; Patches Afromontane Forest (very limited)
Altitude (m a.m.s.l) (secondary)	1100 – 2100, 2100 – 2300 (very limited)
MAP (mm) (modifying)	400 – 1000
Coefficient of Variation (% of annual precipitation)	<20 - 35
Rainfall concentration index	45 - 65
Rainfall seasonality	Early to late summer
Mean annual temp. (°C)	12 - 20
Mean daily max. temp. (°C): February	20 - 32
Mean daily max. temp. (°C): July	14 - 22
Mean daily min. temp. (°C): February	10 - 18
Mean daily min temp. (°C): July	-2 - 4
Median annual simulated runoff (mm) for quaternary catchment	5 -> 250
Landcover within the study area (DEA, 2020)	
Landcover Category (DEA, 2020)	
Desktop Delineation	**Site Conditions**

Herbaceous wetlands Open & Sparse Planted Forest Fallow Land & Old Fields (Grass) Natural Grassland Commercial Crops Artificial dams	The onsite conditions for the most part mimic the presumed desktop landcover classes.
National Wetland Map Version 5 (NWM5), National Freshwater Ecosystem Priority Areas (NFEPA's) (Driver *et al.*, 2011) and Strategic Water Source Areas (SWSA) (Le Maitre *et al.*, 2017)	
NWM5	No wetlands are in the project area.
Fish sanctuary	The project area does not fall within a catchment that has been flagged as a fish sanctuary.
NFEPA Rivers	The Blomspruit borders the southwestern portion of the project area.
NFEPA Wetlands	Fifteen (15) wetlands are in close proximity to the project area.
WetVeg	The project area falls within one (1) (WetVeg) unit namely the Dry Highveld Grassland Group 4.
SWSA	The project area does not fall within a SWSA.
Geology and Soils (Council for Geosciences 2008; Schultze *et al.*, 1992; MacFarlane & Bredin, 2016)	
Geology and Soil	The project area is underlain by Sedimentary mudstones and sandstone mainly of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) as well as those of the Ecca Group (Karoo Supergroup) which results in vertic, melanic and red soils (typical forms are Arcadia, Bonheim, Kroonstad, Valsrivier and Rensburg).
Conservation Attributes (SANBI, 2018; SANBI, 2006-18; DFFE, 2021)	
CBA	CBAs are areas that are important for conserving biodiversity. • The study area does not occur within a CBA at a desktop level.
ESA	ESAs are areas that are important to ensure the long-term persistence of species or functioning of other important ecosystems. • Only a portion of the study area occurs within an ESA.
Threatened Ecosystems	The project area does not fall within a threatened ecosystem.
Protected Areas	These are areas that are considered protected and imperative for conservation purposes: • The main project area borders a protected area, while the grid connection traverses the protected area. The protected area is the Serendipidie Private Nature Reserve.
Vegetation Types	The primary or reference vegetation unit of the study area is the Central Free State Grassland. This vegetation unit is classified as 'Vulnerable' (Skowno *et al*, 2019). During the infield assessment, the general vegetation structure was observed to be transformed by linear activities and agricultural activities.
Key: CBA – Critical Biodiversity Area EI: Ecological Importance ES: Ecological Sensitivity ESA – Ecological Support Area m a m s l: Metres Above Mean Sea Level	

NFEPA: National Freshwater Ecosystem Priority Area
NWM5: National Wetland Map Version 5;
PA – Protected Areas
PES: Present Ecological State
REC: Recommended Ecological Class
SWSA: Strategic Water Source Area

Refer to Section 5.1 for figures that illustrate various views from and of the site from different angles. These provide a visual indication of the current state and possible areas of importance for the determination of the possible impact.

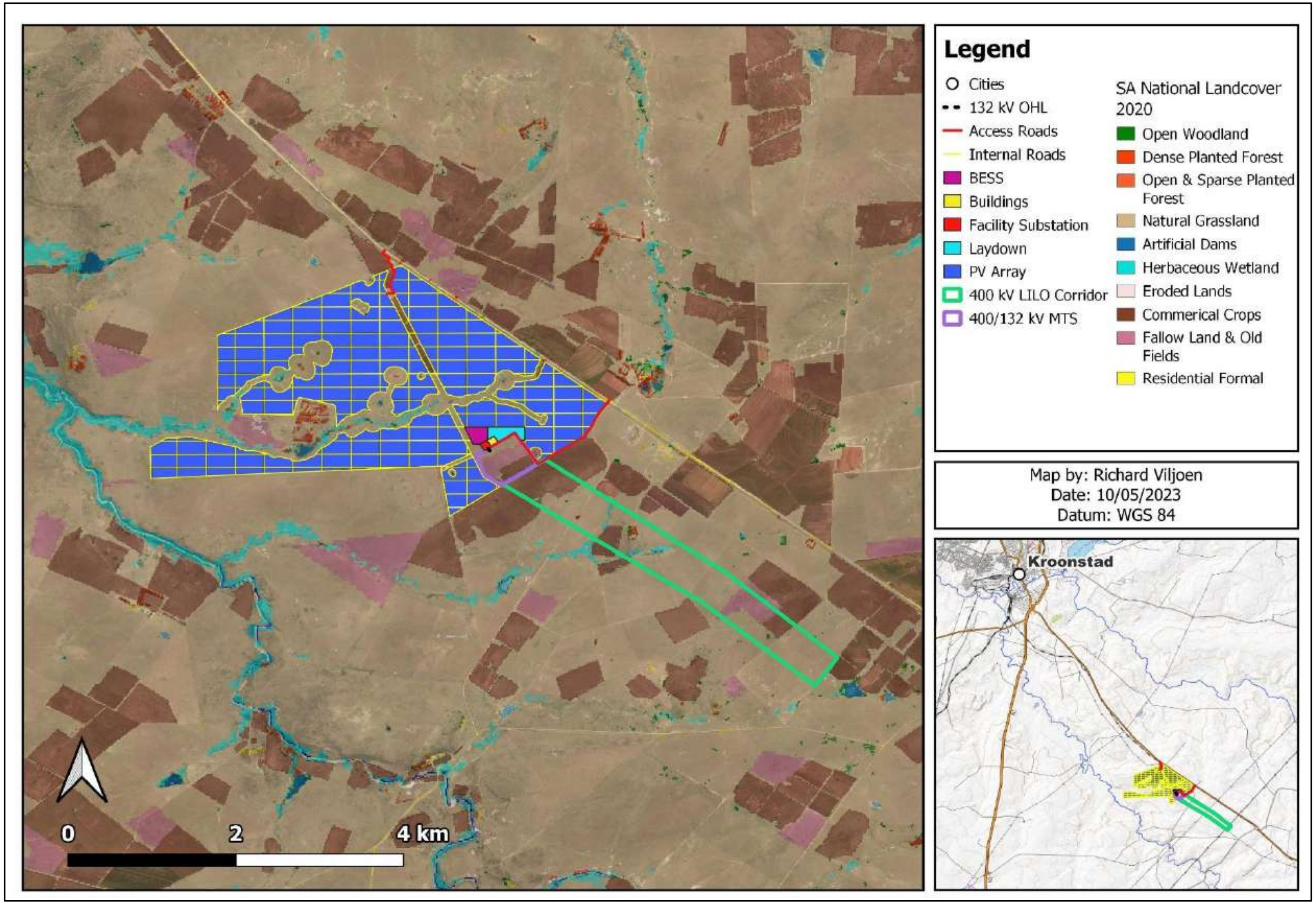

Figure 3: Proposed Oslaagte Solar 3 Landcover

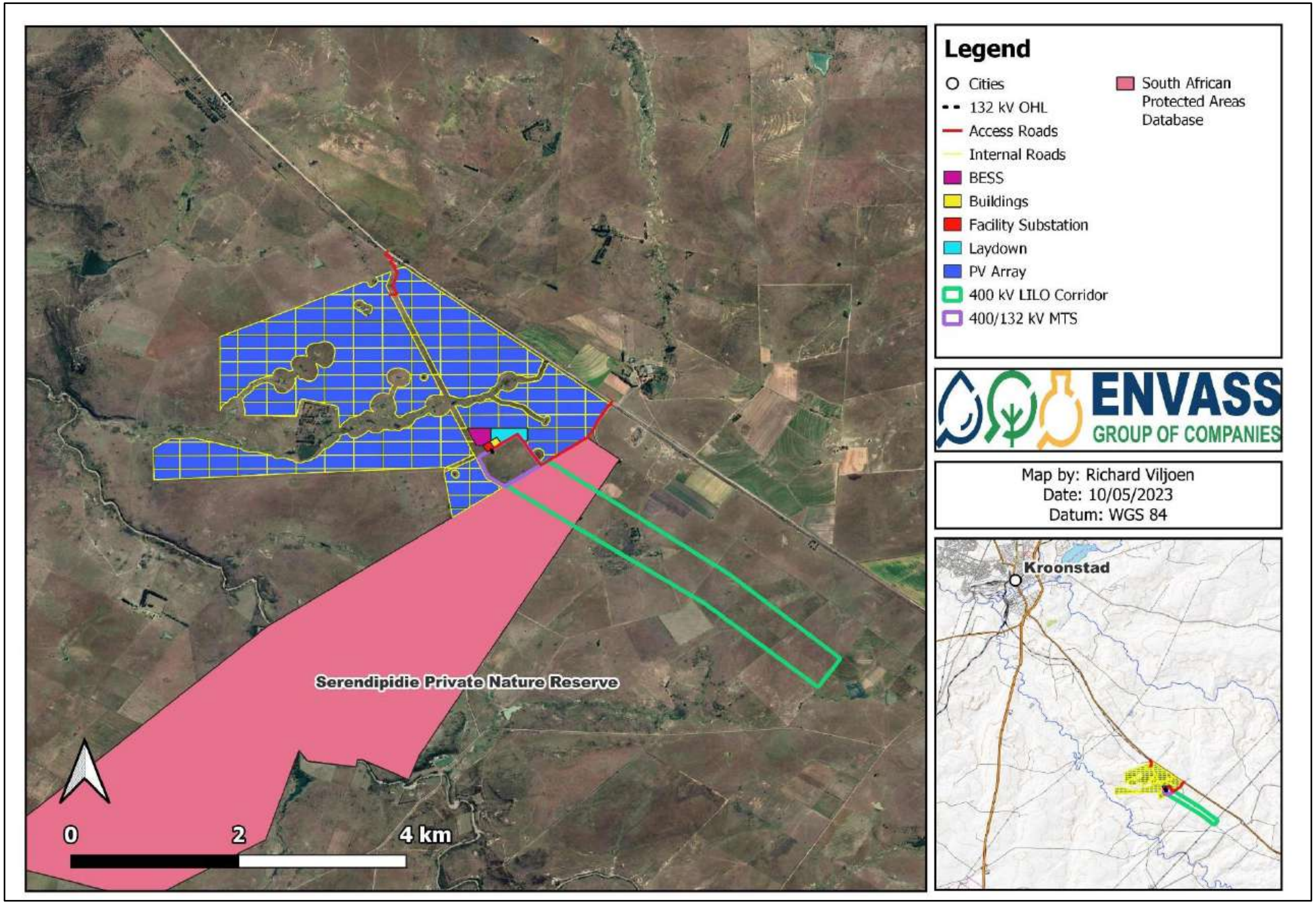

Figure 4: Proposed Oslaagte Solar 3 Protected Areas

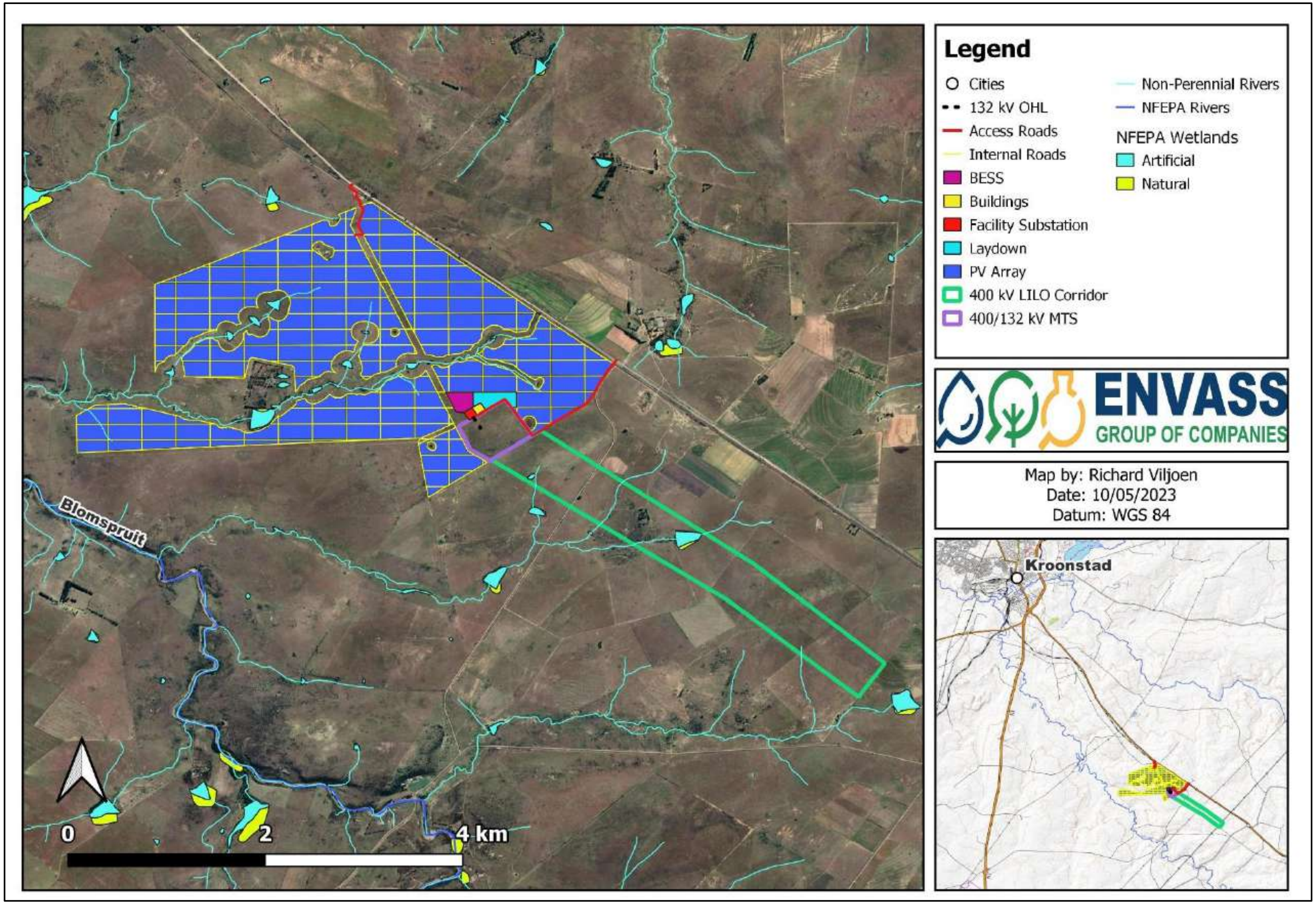

Figure 5: Proposed Oslaagte Solar 3 Watercourses

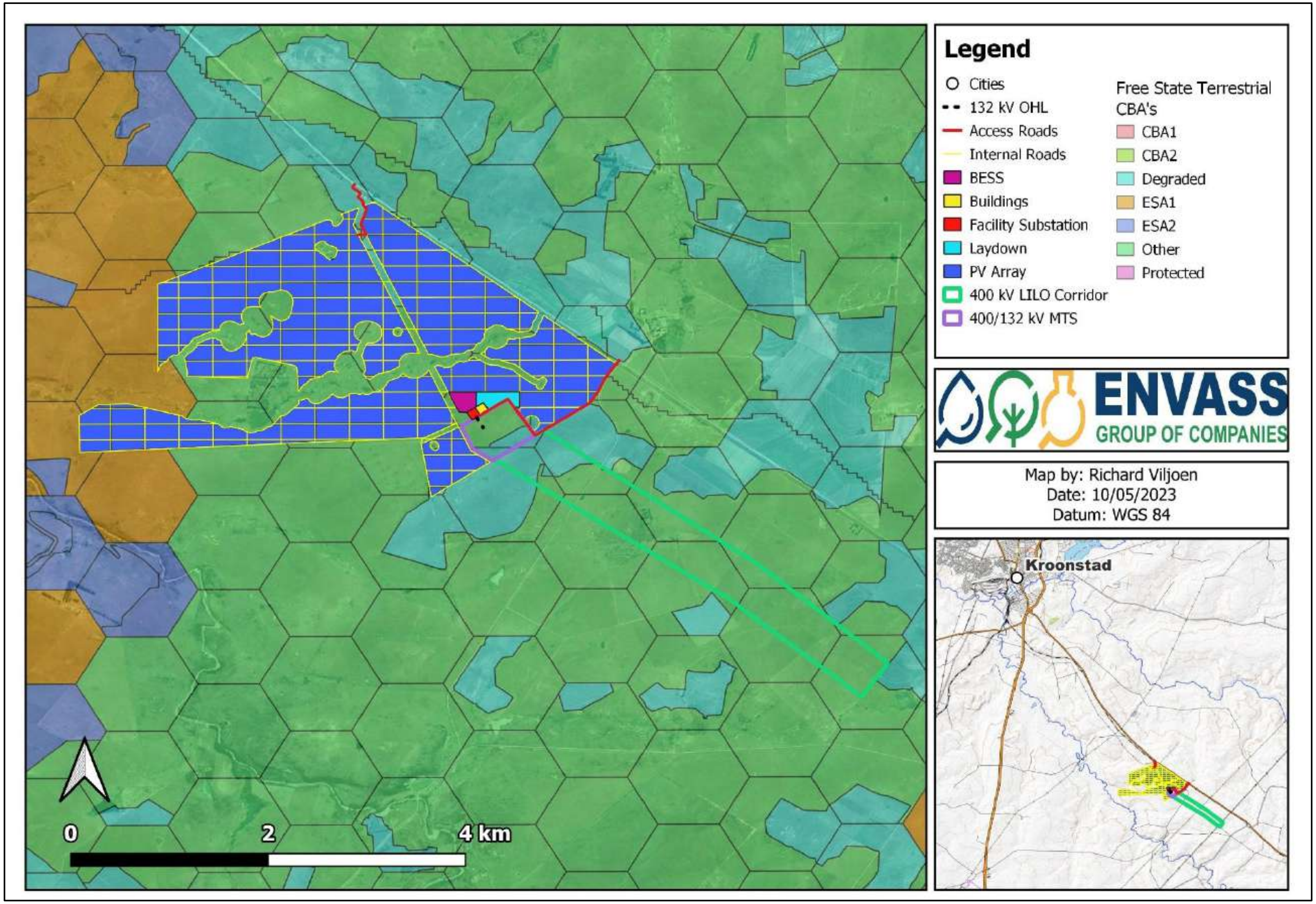

Figure 6: Proposed Oslaagte Solar 3 CBAs and ESAs

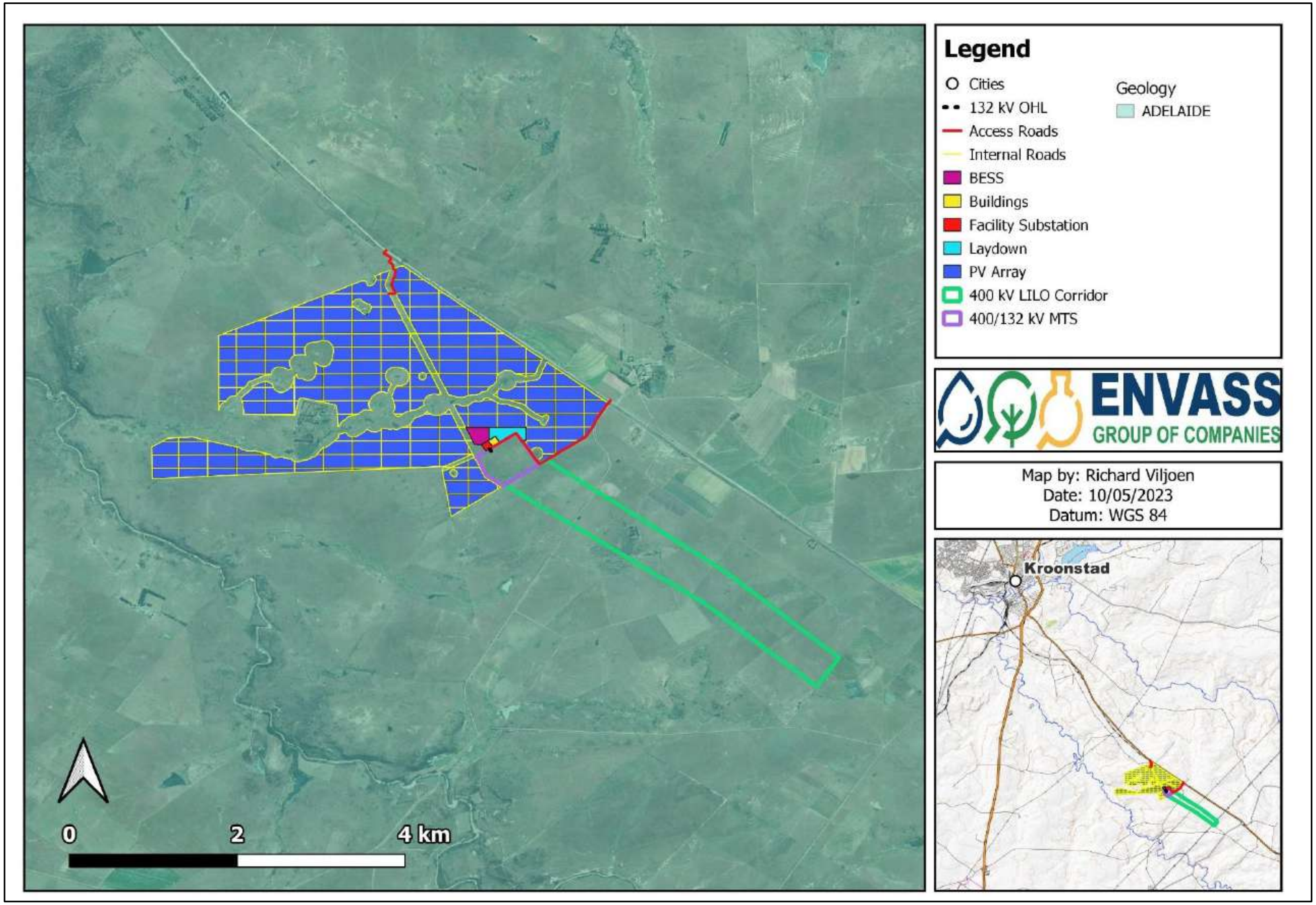

Figure 7: Proposed Oslaagte Solar 3 Geology

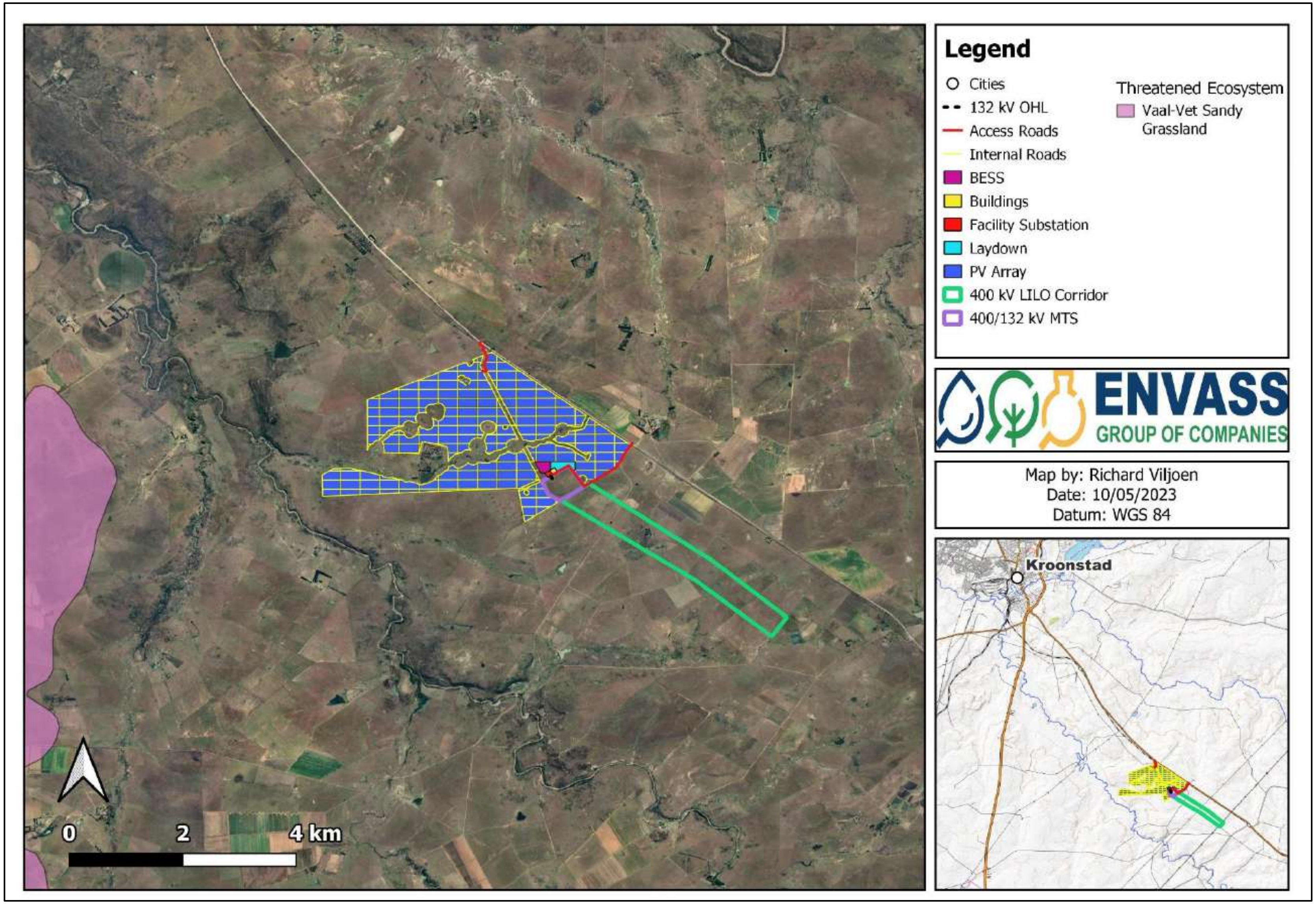

Figure 8: Proposed Oslaagte Solar 3 Threatened Ecosystem

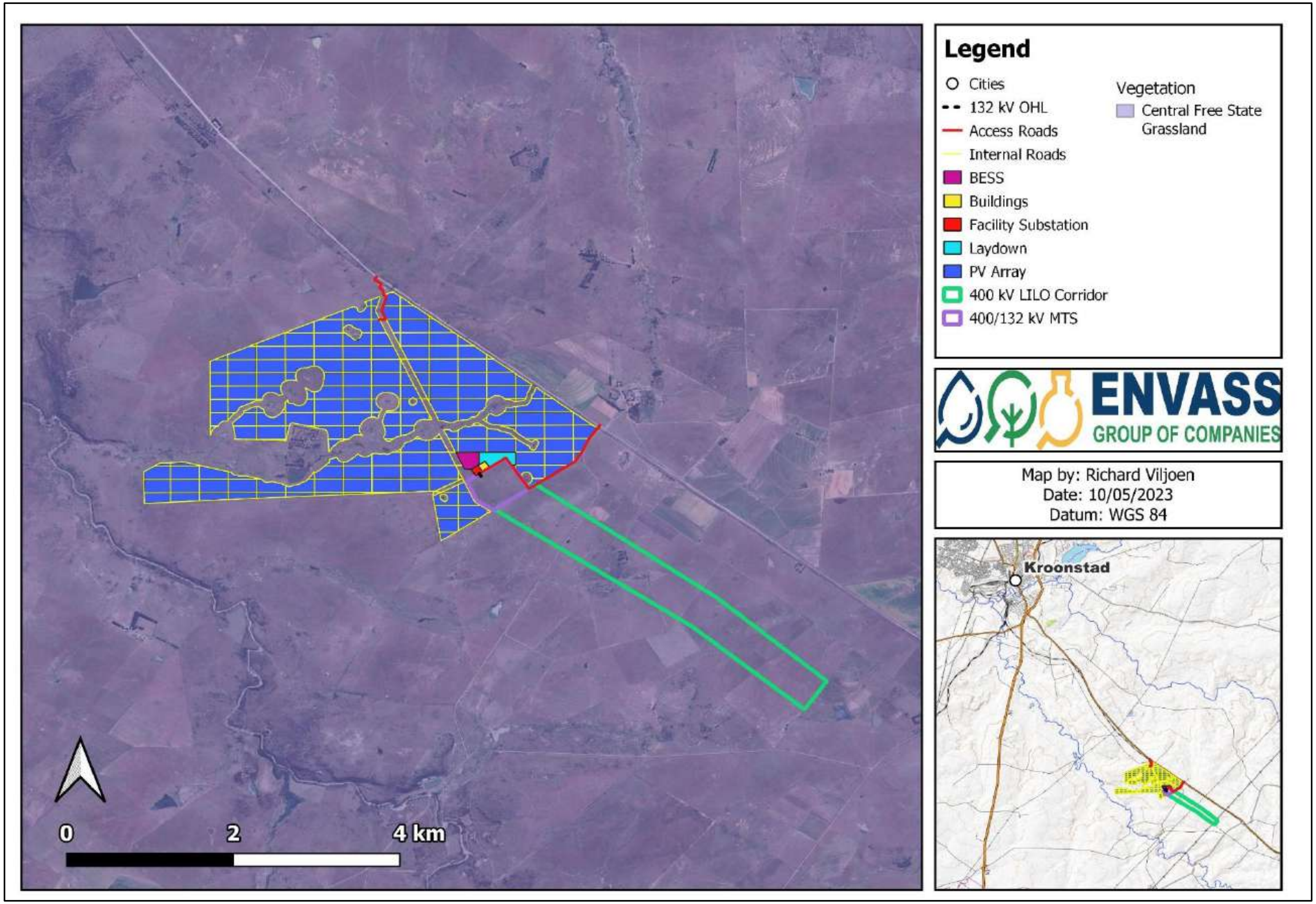

Figure 9: Proposed Oslaagte Solar 3 Vegetation

4.5 SENSE OF PLACE

Sense of place is a unique collection of qualities and characteristics that include visual, cultural, social, and environmental. Sense of place is what makes one city or town different from another and what makes our physical surroundings unique. The proposed site is located near Kroonstad.

Kroonstad is a small city located in the Free State province of South Africa, and it is situated approximately halfway between Johannesburg and Bloemfontein. The sense of place of Kroonstad is shaped by its history, location, culture, and natural surroundings.

History:
Kroonstad has a rich history dating back to the 19th century when it was founded as a Dutch Reformed Church parish. It played a significant role in the South African War (1899-1902), as it was the site of a major battle between the Boer and British armies. Today, there are several historical sites and monuments in Kroonstad that commemorate the city's role in the war, including the Blockhouse and the Anglo-Boer War Museum.

Location:
Kroonstad is situated in the heart of the Free State province, surrounded by fertile farmland and rolling hills. The Vaal River, which runs through the city, is an important source of water and a popular recreational area. The city is also located near several nature reserves and game parks, including the Willem Pretorius Game Reserve and the Vredefort Dome, a UNESCO World Heritage Site.

Culture:
Kroonstad is a predominantly Afrikaans-speaking city, with a rich cultural heritage. The city is home to several festivals and events throughout the year, including the Boertjiefees, a celebration of Afrikaans culture, and the Kroonstad Agricultural Show, which showcases the region's agricultural produce. The city is also known for its hospitality, with several guesthouses and bed and breakfasts offering accommodation to visitors.

Natural Surroundings:
Kroonstad is surrounded by the natural beauty of the Free State province, with its rolling hills, grasslands, and game reserves. The Vaal River, which runs through the city, provides opportunities for fishing, boating, and other water-based activities. The region is also known for its birdlife, with several birdwatching sites located in and around Kroonstad.

In summary, the sense of place of Kroonstad is shaped by its rich history, location in the heart of the Free State province, cultural heritage, and natural surroundings. The city offers visitors a chance to experience the beauty of the South African countryside, as well as a glimpse into its past.

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5. VISUAL CHARACTERISATION

5.1 VIEWPOINTS

Since topography and visual landscape modification has already occurred as a result of various activities in the area, the viewshed is only a theoretical study. For this VIA to be more accurate, viewpoints have been identified and a visual inspection was conducted from these points to identify the current state of the environment and to provide information that can assist in determining the severity of the visual impact of the proposed activity. As indicated in Figure 10, fourteen (14) viewpoints were identified from where characterisation were conducted, and corresponding visual influence and characteristics have been defined.

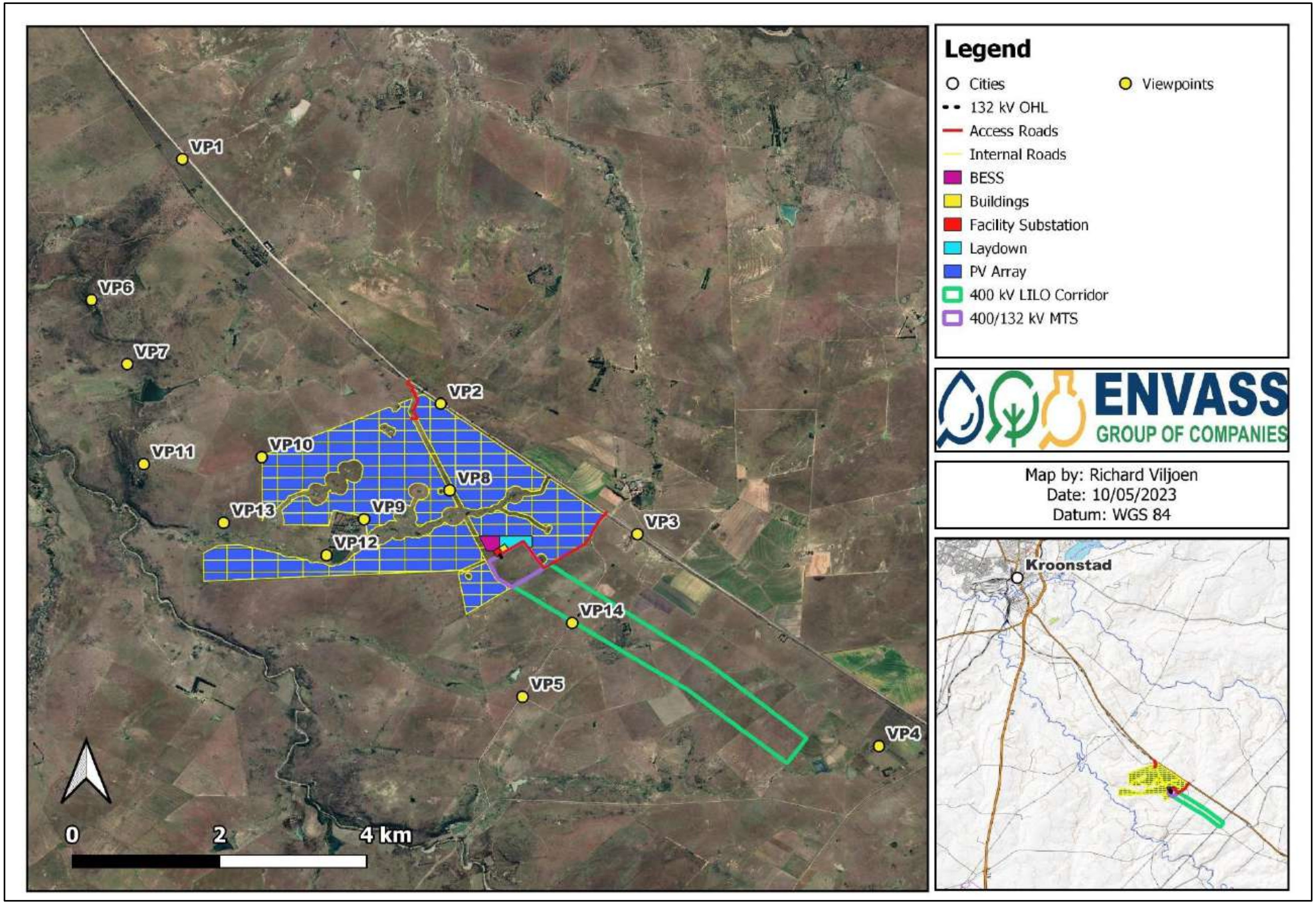

Figure 10: Viewpoints of the proposed Oslaagte Solar 3

5.1.1 Viewpoint 1 (V1):

Viewpoint 1 is located by the R76 approximately 4.7km northwest of the project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and dwarf and larger shrubs. In addition, powerlines, railway lines, shrubs and trees of various heights are visible in the distance.

Figure 11: View 1 (North)

Figure 12: View 2 (East)

Figure 13: View 3 (South)

Figure 14: View 4 (West)

5.1.2 Viewpoint 2 (V2):

Viewpoint 2 is located near the northern portion of the proposed solar array. View 3 (South) has been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and of dwarf and larger shrubs. In addition, powerlines, railway lines, shrubs and trees of various heights are visible in the distance.

Figure 15: View 1 (North)

Figure 16: View 2 (East)

Figure 17: View 3 (South)

Figure 18: View 4 (West)

5.1.3 Viewpoint 3 (V3):

Viewpoint 3 is located along the R76 and is approximately 600m east of the proposed solar array and 1.2km north of the proposed 400 kV LILO Corridor. View 3 and 4 (South and West) have been taken towards the proposed project area and 400 kV LILO Corridor. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and dwarf and larger shrubs. In addition, powerlines, railway lines, shrubs and trees of various heights are visible in the distance.

Figure 19: View 1 (North)

Figure 20: View 2 (East)

Figure 21: View 3 (South)

Figure 22: View 4 (West)

5.1.4 Viewpoint 4 (V4):

Viewpoint 4 near the Wonderkop primary school which is approximately 1km East of the proposed 400 kV LILO Corridor. View 4 (West) has been taken towards the proposed project area and 400 kV LILO Corridor. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation, agricultural crops, and dwarf and larger shrubs. In addition, powerlines, railway lines, shrubs and trees of various heights are visible in the distance.

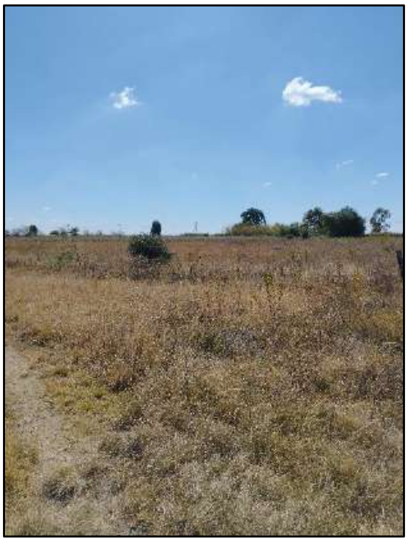

Figure 23: View 1 (North)

Figure 24: View 2 (East)

Figure 25: View 3 (South)

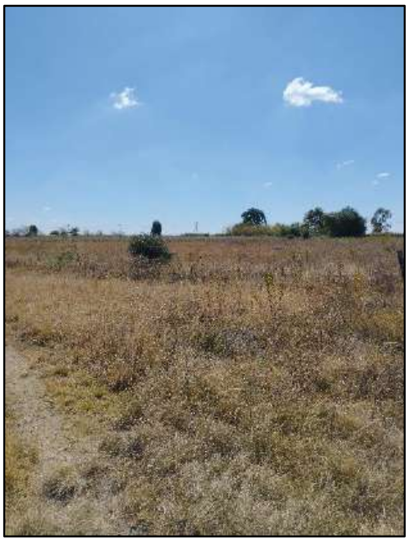

Figure 26: View 4 (West)

5.1.5 Viewpoint 5 (VP5):

Viewpoint 5 is located along the dirt road to the southwest of the proposed 400 kV LILO Corridor. The viewpoint is approximately 1.7km south of the proposed 400/132 kV MTS. View 1 (North) has been taken towards the proposed 400/132 kV MTS. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and dwarf and larger shrubs. In addition, powerlines, shrubs and trees of various heights are visible in the distance.

Figure 27: View 1 (North)

Figure 28: View 2 (East)

Figure 29: View 3 (South)

Figure 30: View 4 (West)

5.1.6 Viewpoint 6 (VP6):

Viewpoint 6 is located approximately 3.4km northwest the proposed solar array near a farm residence. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of a mixture of grass and a dense covering of dwarf and larger shrubs. In addition, powerlines and shrubs of various heights are visible in the distance.

Figure 31: View 1 (North)

Figure 32: View 2 (East)

Figure 33: View 3 (South)

Figure 34: View 4 (West)

5.1.7 Viewpoint 7 (VP7):

Viewpoint 7 is located approximately 2.3km northwest the proposed solar array. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of a mixture of grass and a dense covering of dwarf and larger shrubs. In addition, powerlines and shrubs of various heights are visible in the distance.

Figure 35: View 1 (North)

Figure 36: View 2 (East)

Figure 37: View 3 (South)

Figure 38: View 4 (West)

5.1.8 Viewpoint 8 (VP8):

Viewpoint 8 is located near the centre of the proposed project area. All views have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and dwarf and larger shrubs. In addition, powerlines, shrubs and trees of various heights are visible in the distance.

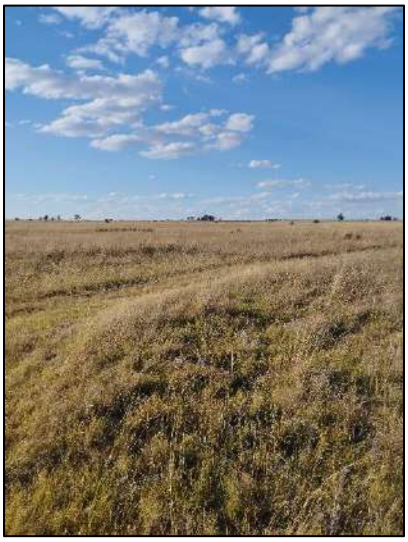

Figure 39: View 1 (North)

Figure 40: View 2 (East)

Figure 41: View 3 (South)

Figure 42: View 4 (West)

5.1.9 Viewpoint 9 (VP9):

Viewpoint 9 is located adjacent to the proposed solar array near a farm residence. All views have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and dwarf and larger shrubs. In addition, powerlines, shrubs and trees of various heights are visible in the distance.

Figure 43: View 1 (North)

Figure 44: View 2 (East)

Figure 45: View 3 (South)

Figure 46: View 4 (West)

5.1.10 Viewpoint 10 (VP10):

Viewpoint 10 is located adjacent to the project area. Views 3 and 4 (South and West) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation. In addition, powerlines, shrubs and trees of various heights are visible in the distance.

Figure 47: View 1 (North)

Figure 48: View 2 (East)

Figure 49: View 3 (South)

Figure 50: View 4 (West)

5.1.11 Viewpoint 11 (VP11):

Viewpoint 11 is located approximately 1.6km to the west of the solar array near a farm residence. View 2 (East) has been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and dwarf and larger shrubs. In addition, powerlines, shrubs and trees of various heights are visible in the distance.

Figure 51: View 1 (North)

Figure 52: View 2 (East)

Figure 53: View 3 (South)

Figure 54: View 4 (West)

5.1.12 Viewpoint 12 (VP12):

Viewpoint 12 is located within the proposed project area. All views have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and dwarf and larger shrubs. In addition, powerlines, shrubs and trees of various heights are visible in the distance.

Figure 55: View 1 (North)

Figure 56: View 2 (East)

Figure 57: View 3 (South)

Figure 58: View 4 (West)

5.1.13 Viewpoint 13 (VP13):

Viewpoint 13 is located 550m to the west of the proposed solar array. View 2 and 3 (East and South) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and dwarf and larger shrubs. In addition, powerlines, shrubs and trees of various heights are visible in the distance.

Figure 59: View 1 (North)

Figure 60: View 2 (East)

Figure 61: View 3 (South)

Figure 62: View 4 (West)

5.1.14 Viewpoint 14 (VP14):

Viewpoint 14 along the dirt road adjacent to the 400 kV LILO Corridor. View 1 and 2 (North and East) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and dwarf and larger shrubs. In addition, powerlines, shrubs and trees of various heights are visible in the distance.

Figure 63: View 1 (North)

Figure 64: View 2 (East)

Figure 65: View 3 (South)

Figure 66: View 4 (West)

5.2 VISUAL RESOURCE VALUE OF THE STUDY AREA

The visual resource value refers to the visual quality of an environment and how the environment appeal to our senses. According to Crawford (1994), landscape quality increases when:

- Prominent topographical features and rugged horizon lines exist.
- Water bodies such as streams or dams are present.
- Untransformed indigenous vegetation cover dominates.
- Limited presence of human activity, or land uses that are not visually intrusive or dominant prevail.

The criteria incorporated for the visual resource assessment is highlighted in the Table 3 below. The landscape is rated either high, moderate or low depending on factors such as sense of place, current views and aesthetic appeal.

Table 3: Visual Resource Value Criteria

Visual Resource Value	Criteria
High (3)	Pristine or near-pristine condition/little to no visible human intervention visible/ characterised by highly scenic or attractive natural features, or cultural heritage sites with high historical or social value and visual appeal/characterised by highly scenic or attractive features/areas that exhibit a strong positive character with valued features that combine to give the experience of unity, richness and harmony. These are landscapes that may be considered to be of particular importance to conserve and which may be sensitive to change.
Moderate (2)	Partially transformed or disturbed landscape/human intervention visible but does not dominate view, or that is characterised by elements that have some socio-cultural or historic interest but that is not considered visually unique/scenic appeal of landscape partially compromised/noticeable presence of incongruous elements/areas that exhibit positive character, but which may have evidence of degradation/erosion of some features resulting in areas of more mixed character. These landscapes are less important to conserve but may include certain areas or features worthy of conservation.
Low (1)	Extensively transformed or disturbed landscape/human intervention is of visually intrusive nature and dominates available views/scenic appeal of landscape greatly compromised/visual prominence of widely disparate or incongruous land uses and activities/areas generally negative in character with few, if any, valued features. Scope for positive enhancement frequently occurs.

- **Topography –** The proposed site elevation ranges from approximately 1397 to 1444 metres above mean sea level (mamsl). predominantly flat, with a few small hills scattered throughout the area. The topography or terrain morphology of the region is broadly described as plains with low to moderate relief. The main topographical feature on the site is a drainage line to the west of the project areas that flows from south to north. Therefore, the topography is considered to have a **moderate** value.
- **Hydrology –** There are three visually prominent water drainage courses near the proposed project area. From a wetland perspective, there are six (6) NFEPA wetlands (artificial and natural) which are located near the

development area and outside of the development boundary, which are visible. Therefore, the aesthetic value of the hydrology is **moderate**.

- **Vegetation cover –** The landscape is primarily characterized by grassy plains and agricultural fields. The vegetation in the area consists mainly of grasses, shrubs, and trees. The visual resource value of the proposed site's vegetation cover is rated **moderate**.
- **Land use –** The main land use is agriculture, while land use activities within the broader area are predominantly described as nature reserve (Serendipidie Nature Reserve) agricultural, residential areas, and commercial areas. The visual resource value of the study area is therefore considered to be **high**.

A resource value is subjectively applied, based on the specialist's expertise and experience in assessing visual impacts. A value is applied to the visual resources with each resource able to receive a maximum score of three (3) and counted to reach a final score out of twelve (12). The **total** is counted, and final score rated as:

- Low, equal to 4 – 6.
- Moderate, equal to 7 – 9, and
- High, equal to 10 - 12.

The values applied to the study area is detailed in Table 4 below.

Table 4: Visual resource value determination

VISUAL BASELINE ATTRIBUTES	TOPOGRAPHY	HYDROLOGY	VEGETATION	LAND USES
Visual resource value score	2	2	2	3
			Total	**9**

Based on the above score ranges, the overall visual resource value of the study area is rated as **moderate** (9).

5.3 VISUAL ABSORPTION CAPACITY

According to Oberholzer (2008), Visual Absorption Capacity (VAC) can be defined as an '*estimation of the capacity of the landscape to absorb development without creating a significant change in visual character or producing a reduction in scenic quality*'. VAC was determined by considering the nature and occurrence of vegetation cover, topographical characteristics, and human structures. A further major factor is the degree of visual contrast between the proposed new project and the existing elements in the landscape.

5.3.1 Visual Absorption Capacity Weighting Factor

To account for the fact that visual impacts are expected to be more intrusive in landscapes with a lower VAC than in those with a higher VAC (regardless of the visual quality of the landscape), a weighting factor is incorporated into the impact magnitude determination, as indicated in Table 5.

Table 5: Visual absorption capacity weighting factor

VISUAL RESOURCE VALUE OF RECEIVING LANDSCAPE	LOW VAC	MODERATE VAC	HIGH VAC
High resource value	High (1.2)	High (1.2)	Moderate (1.0)
Moderate resource value	High (1.2)	Moderate (1.0)	Low (0.8)
Low resource value	Moderate (1.0)	Low (0.8)	Low (0.8)

Most of the vegetation cover is predominately dominated by grasses, shrubs and scattered trees, while the topographical characteristics (flat to gentle) which can conceivably result in a **low** VAC. The visual resource value of the study area has been determined to be **moderate** and the VAC of the study area has been rated as **low**. Therefore, a **high** (1.2) weighting factor in terms of VAC is applied during the impact assessment.

5.4 VISUAL RECEPTOR SENSITIVITY AND INCIDENCES

Receptor sensitivity refers to the degree to which an activity will impact the receptors and depends on how many persons see the project, how frequently they are exposed to it and their perceptions regarding aesthetics. Receptors of the proposed project can be broadly categorised into two (2) main groups, namely:

- People who live or work in the area, and who will be frequently exposed to the project components (resident receptors); and
- People who travel through the area and are only temporarily exposed to the project components (transient receptors).

Resident receptors located outside the proposed site include:

- Resident receptors would include the employees of the agricultural activities, residents and the local farming communities that are present outside the proposed project area.

Transient receptors located outside the proposed site include:

- The R76 is the main road located near the proposed site. The roads situated near the proposed site are predominately used for access to the surrounding areas, tourism attractions, residential areas, commercial areas and agricultural activities. The proposed project area may potentially be visible from the R76 while the visibility may be reduced due to vegetation obstructing the view from the roads at certain points. The visual receptor sensitivity and incidence can be classified as high, moderate or low, as indicated in Table 6.

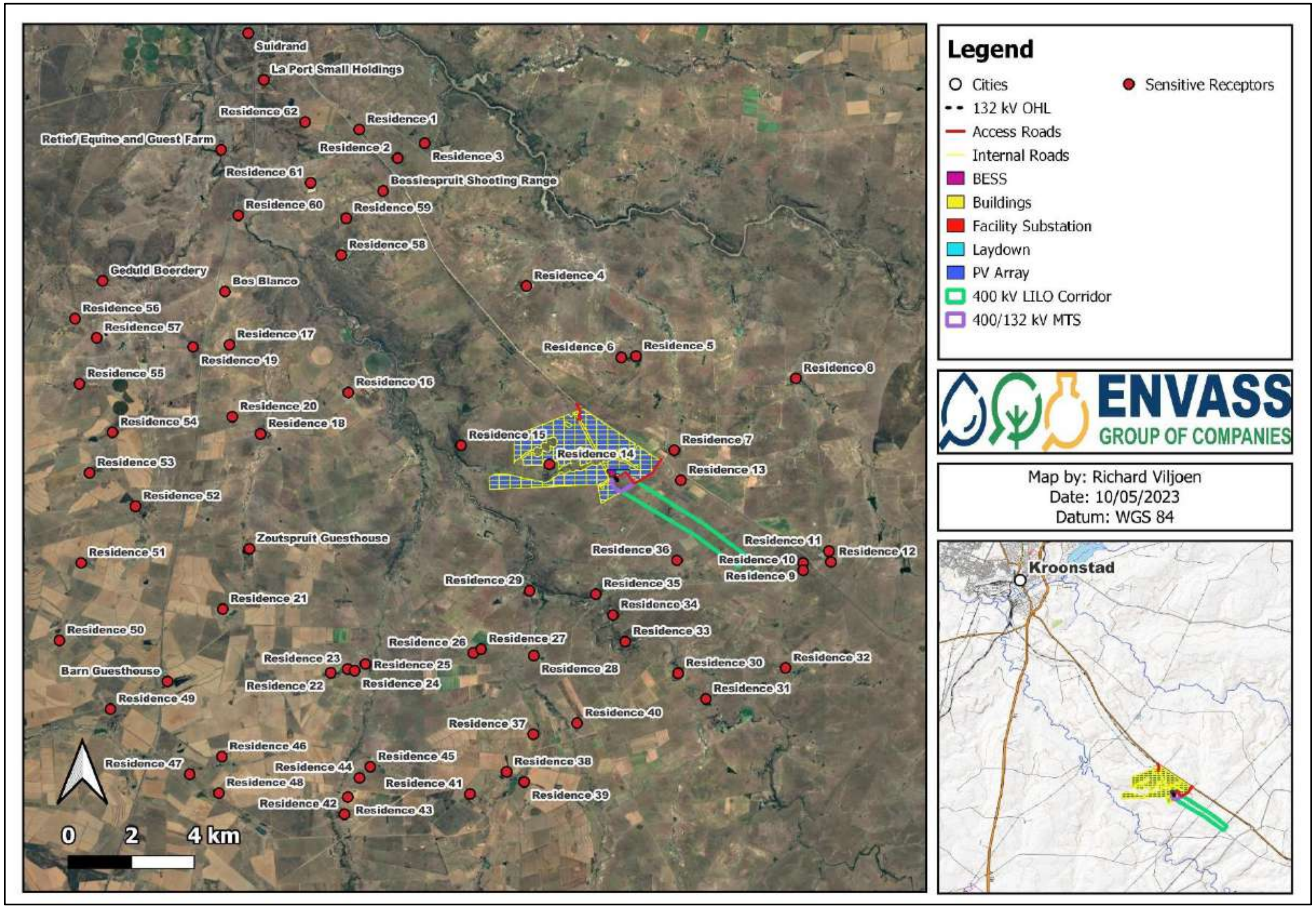

Figure 67: Sensitive Receptors for the proposed Oslaagte Solar 3

Table 6: Visual receptor and sensitivity criteria

NUMBER OF PEOPLE THAT WILL SEE THE PROJECT (INCIDENCE FACTOR)	
High	Towns and cities, along major national roads (e.g., thousands of people).
Moderate	Villages, typically less than 1 000 people.
Low	Less than 100 people (e.g., a few households).
RECEPTOR PERCEIVED LANDSCAPE VALUE (SENSITIVITY FACTOR)	
High	People attach a high value to aesthetics, such as in or around a game reserve or conservation area, and the project is perceived to impact significantly on this value of the landscape.
Moderate	People attach a moderate value to aesthetics, such as smaller towns, where natural character is still plentiful and in close range of residency.
Low	People attach a low value to aesthetics, when compared to employment opportunities, for instance. Environments have already been transformed, such as cities and towns.

The following ratings have therefore been applied to the identified visual receptor groups:

- **Resident Receptors:** Resident receptors comprise a moderate number of people (incidence factor) living around the proposed project area:
    - People living and working in the surrounding areas will rate a moderate value (sensitivity factor) to the project; and

- **Transient Receptors:** People travelling through and near the proposed site will be moderate as the proposed site is located near the R76 (being the main road to access these areas), constituting a moderate number of people (incidence factor). It is expected that travellers will attach a moderate degree of value to the current setting and visual character of the proposed site (sensitivity factor) due to the activities already established in the area. Hence, this receptor group has also been given a moderate sensitivity rating.

To determine the magnitude of a visual impact, a weighting factor that accounts for receptor sensitivity is determined (Table 7), based on the number of people that are likely to be exposed to a visual impact (incidence factor) and their expected perception of the value of the visual landscape and project impact (sensitivity factor).

Table 7: Weighting factor for receptor sensitivity criteria

RECEPTOR SENSITIVITY	HIGH INCIDENCE	MODERATE INCIDENCE	LOW INCIDENCE
High Sensitivity	High (1.2)	High (1.2)	Moderate (1.0)
Moderate Sensitivity	High (1.2)	Moderate (1.0)	Low (0.8)
Low Sensitivity	Moderate (1.0)	Low (0.8)	Low (0.8)

Based on the receptor sensitivity assessment and the above criteria, a **moderate** weighting factor (1.0) in terms of this aspect is applied during the impact magnitude determination.

6. BASELINE VISUAL ASSESSMENT

6.1 IMPACT IDENTIFICATION

Solar PV facilities are considered long-term in nature and long-term structures will be constructed. The primary visual impacts associated with a change from the current state of the site (fallow lands, cultivated fields and grassland vegetation) to a solar PV facility will have the greatest visual impact due to the visibility of the site from sensitive receptors. The visual impacts will be assessed based on a synthesis of criteria (nature of impact, extent, duration, probability, intensity, status, degree of confidence, level of significance and significance after mitigation) as defined by the NEMA Environmental Impact Assessment (EIA) regulations (2014, as amended). The nature of the visual impacts will be the visual effect that the activity would have on the receiving environment. These visual impacts would be:

- The construction and operation of the proposed PV facility and its associated infrastructure may have a visual impact on the study area, especially within (but not restricted to) a 1 - 5km radius of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility.

- Visibility from sensitive receptors. The proposed development will be visible from receptors outside the proposed project area. These include:
  - Site personnel at the operation;
  - People travelling to work and commercial activities in the surrounding areas;
  - People travelling on the surrounding access routes to their place of residence;
  - Surrounding farming communities; and
  - Surrounding residential areas.

6.2 IMPACT MAGNITUDE CRITERIA

The magnitude of a visual impact is determined by considering the visual resource value and VAC of the landscape within which the project will take place, the receptors potentially affected by it, together with the level of visibility of the project components, their degree of visual intrusion and the potential visual exposure of receptors to the project, as further elaborated on in the sections below:

6.2.1 Theoretical Visibility

Theoretical visibility was determined by conducting a Viewshed analysis and using Geographic Information System software with three-dimensional topographical modelling capabilities:

- The Digital Elevation Model (DEM) for the Viewshed analysis was acquired; and
- A 10 km area surrounding the site was used due the topography of the area.

The Viewshed was modelled on the above-mentioned DEM and the layout plan supplied by Nemai Consulting, using Esri ArcGIS for Desktop software, 3D Analyst Extension. A viewshed was modelled to account for the PV facility and its associated infrastructure, that will be constructed.

Table 8: Rating of level of visibility

LEVEL OF THEORETICAL VISIBILITY OF PROJECT ELEMENTS	VISIBILITY RATING
More than half of the study area	High
Between a quarter and half of the study area	Moderate
Less than a quarter of the total project study area	Low

When considering the viewshed analysis, the visibility rating is **moderate.**

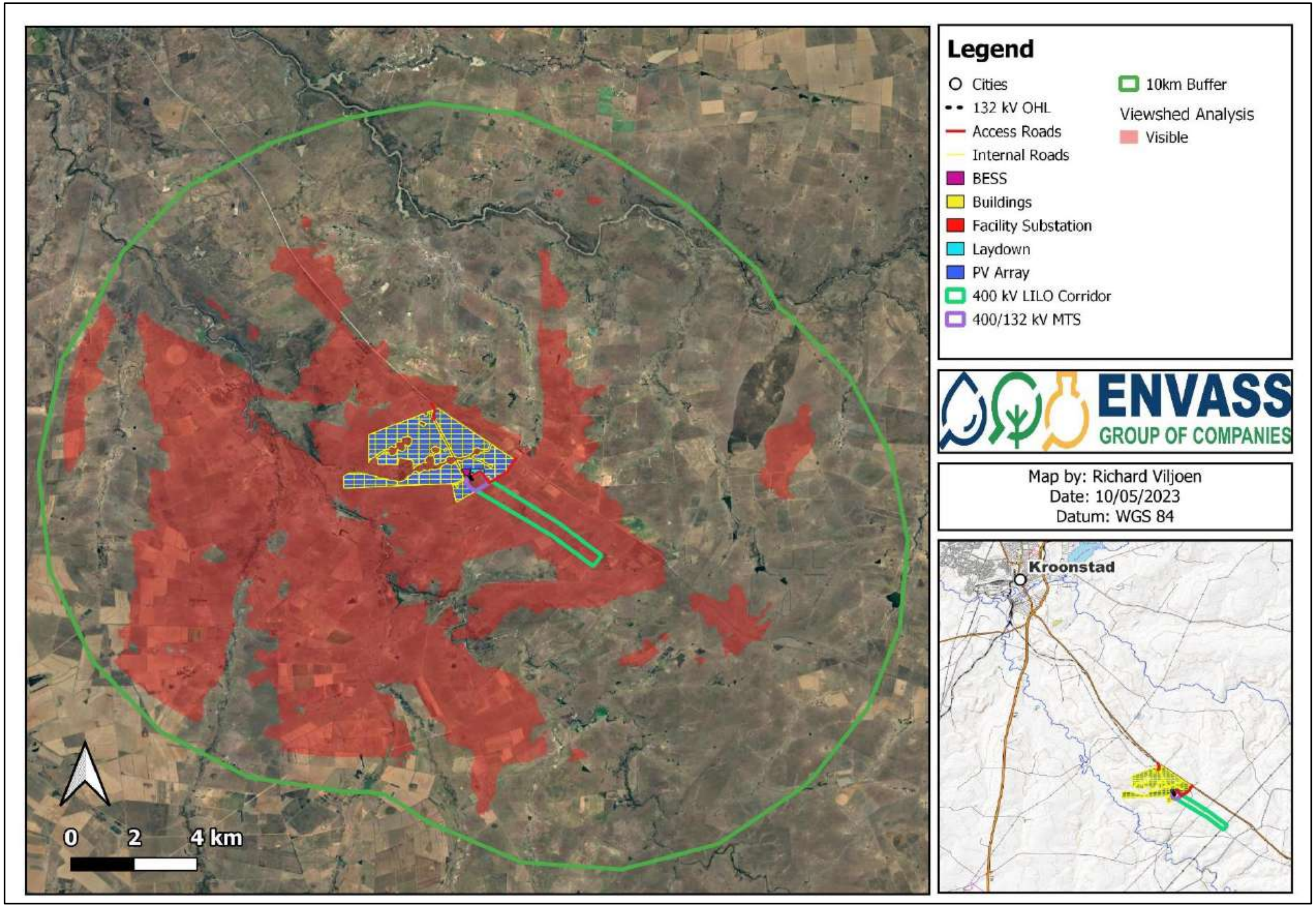

Figure 68: Viewshed analysis for the proposed Oslaagte Solar 3

6.3 VISUAL INTRUSION

Visual intrusion deals with how well the project components fit into the ecological and cultural aesthetic of the landscape. An object will have a greater negative impact on scenes considered to have a high visual quality than on scenes of low quality.

Given that the study area has a **low** VAC (due to vegetation and the flat to gentle landscape) and **moderate** visual resource value, the proposed project will have a **moderate** (without mitigation measures) visual intrusion on surrounding sensitive receptors. Ensuring that vegetation is retained on the periphery of these areas, and wherever possible, lights be directed downwards as to avoid illuminating the sky and limit the reflection from the solar panels, the visual impact on the surrounding environment will be **moderate** depending on the proximity to the sensitive receptors.

The altered visual environment during the construction and operational phases will lead to **moderate** (without mitigation measures) levels of visual intrusion, with **moderate** levels of compatibility with the surrounding land uses as well as moderate visual contrast. The level of visual intrusion because of the proposed project, with specific mention of vegetation clearing, removal of topsoil and solar PV infrastructure, is considered to be **moderate** (without mitigation measures) during the construction and operational phases, in line with the **low** VAC. The perceived visual impacts associated with the construction and operational phases are **moderately** (without mitigation measures) intrusive to the receiving environment.

6.4 VISUAL EXPOSURE

The visual impact of a development diminishes at an exponential rate as the distance between the observer and the object increases. The impact at 1 000 m would be 25% of the impact as viewed from 500 m. At 2 000 m it would be 10 % of the impact at 500 m. The inverse relationship of distance and visual impact has been an important component in visual analysis literature (Hull and Bishop, 1998).

For the purposes of this assessment, close-range views (equating to a high level of visual exposure) are views over a distance of 500 m or less, medium-range views (equating to a moderate level of visual exposure) are views of 500 m to 2 km, and long-range views are over distances greater than 2 km (low levels of visual exposure). Limited sensitive receptors are located within 2 km of the site and are limited to people working in the area, residents and the number of farms surrounding the site.

For the purposes of this assessment, visual exposure in terms of all identified impacts has therefore been rated as **low** as the majority of the high sensitivity, sensitive receptors, are located more than 5 km from the project site.

6.5 IMPACT MAGNITUDE METHODOLOGY

The expected impact magnitude of the proposed project was rated, based on the above assessment of the visual resource value of the site, as well as level of visibility, visual intrusion, visual exposure and receptor sensitivity as visual impact criteria. The process is summarised below:

- *Magnitude = [(Visual quality of the site x VAC factor) x (Visibility + Visual Intrusion + Visual Exposure)] x Receptor sensitivity factor.*

Table 9: Magnitude Criteria

MAGNITUDE SCORE	MAGNITUDE RATING
20.1≤	High
13.1 - 20.0	Moderate
6.1 - 13.0	Low
≤6.0	Negligible

6.5.1 Impact Magnitude Determination

Based on the visual resource, VAC, receptor sensitivity and impact assessment criteria assessed in the preceding sections, the magnitude of the various impacts identified was determined for each phase of the project.

Table 10: Construction Phase – Impact Magnitude (Without Mitigation)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Site establishment • This will involve the vegetation clearance, stripping and stockpiling of soil in areas designated for surface infrastructure. Site Clearing of the project footprint: • Removal of vegetation leading to increased visual contrast and loss of VAC and increase visual intrusion on sensitive receptors. • Alteration of current landscape features impacting on landscape character and sense of place. Construction activities of infrastructure • Construction of the solar PV facility and associated infrastructure. Construction vehicle movement and increased human activity in and around project site. General and hazardous waste management Formation of dust plumes as a result of construction activities. Use of security lighting.	2	1.2	2	2	2	1.0	14.4 (Moderate)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Topographical and vegetation alteration which will lead to increased visual intrusion and potential impact on sense of place.							
Where for: visual resource value, visibility, visual intrusion and visual exposure: high=3; moderate=2; low=1; VAC and receptor sensitivity: high = factor 1.2; moderate = factor 1; low = factor 0.8							

Table 11: Operational Phase – Impact Magnitude (Without Mitigation)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place. Solar PV facility and associated infrastructure being visible. Vehicles and increased human activity in and around the Solar PV facility. Solar glint and glare Night-time illumination due to security lighting and lighting within the solar PV facility and associated infrastructure.	2	1.2	2	2	2	1.0	14.4 (Moderate)
Where for: visual resource value, visibility, visual intrusion and visual exposure: high=3; moderate=2; low=1; VAC and receptor sensitivity: high = factor 1.2; moderate = factor 1; low = factor 0.8							

Table 12: Decommission Phase – Impact Magnitude (Without Mitigation)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Removal of all structures and recycling of the structure and cables. Removal of any foundations and filling of holes created and shaped to appear natural. Rehabilitation and restoration of the footprint.	2	1.2	2	2	2	1.0	14.4 (Moderate)
Where for: visual resource value, visibility, visual intrusion and visual exposure: high=3; moderate=2; low=1; VAC and receptor sensitivity: high = factor 1.2; moderate = factor 1; low = factor 0.8							

6.6 IMPACT ASSESSMENT RATING METHODOLOGY

The significance of the identified impacts will be determined using the approach outlined below (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach incorporates two aspects for assessing the potential significance of impacts, namely occurrence and severity, which are further sub-divided as follows:

Table 13: Ranking scales for assessment of occurrence and severity of factors

INTENSITY (MAGNITUDE)		
The intensity of the impact is determined by examining whether the impact is destructive or benign, whether it has a significant, moderate or insignificant visual impact.		
Insignificant	0	The visual impact of the development will have no effect on the environment.
Minor	2	The visual impact of the development is minor and will not result in an impact on processes.
Low	4	The visual impact of the development is low and will cause a slight impact on processes.
Moderate	6	The visual impact of the development is moderate and will result in processes continuing but in a modified way.
High	8	The visual impact of the development is high, processes are altered to extent that they temporarily cease.
Very high	10	The visual impact of the development is very high and results in complete destruction of patterns and permanent cessation of processes.
DURATION		
The lifetime of the impact that is measured in relation to the lifetime of the proposed development.		
(T)emporary	1	The impact either will disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase. (0-1.5 years).
(S)hort term	2	The impact will be relevant through to the end of a construction phase (2 – 5 years).
(M)edium term	3	The impact will last up to the end of the development phases, where after it will be entirely negated. (5 – 15 years).
(L)ong term	4	The impact will continue or last for the entire operational lifetime i.e. exceed 30 years of the development, but will be mitigated by direct human action or by natural processes thereafter. (>15 years).
(P)ermanent	5	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact is transient.
SPATIAL SCALE (EXTENT)		
Classified of the physical and spatial aspect of the impact		
(F)ootprint	0/1	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
(S)ite	2	The impact could affect the whole, or a significant portion of the site.
(R)egional	3	The impact could affect the area including the neighbouring settlements, the transport routes and the adjoining towns.
(N)ational	4	The impact could have an effect that expands throughout the country (South Africa).

(I)nternational	5	Where the impact has international ramifications that extend beyond the boundaries of South Africa.
PROBABILITY		
This describes the likelihood of the impact occurring. The impact may occur for any length of time during the life cycle of the activity. The classes are rated as follows:		
(I)mprobable	0/1	The possibility of the Visual Impact occurring is none, due to the circumstances, design. The chance of this Visual Impact occurring is zero (0%)
(P)ossible	2	The possibility of the Visual Impact occurring is very low, due either to the circumstances or design. The chance of this Visual Impact occurring is defined as 25% or less
(L)ikely	3	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of the Visual Impact occurring are defined as 50%
(H)ighly Likely	4	It is most likely that the Visual Impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
(D)efinite	5	The Visual impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.

Table 13 below provides the ranking and score, which is used to determine the significance (with equation 1 below) and ranking of the possible impact on the proposed site. The score is then compared to Table 14 where the range of significance rating, with and without mitigation, is provided.

Table 14: Assessment Criteria and Ranking Scale

PROBABILITY (P)		**MAGNITUDE (M)**	
Description Meaning	Score	Description Meaning	Score
Definite / don't know	5	Very High	10
Highly likely	4	High	8
Likely	3	Moderate	6
Possible	2	Low	4
Improbable	1	Minor	2
Never	0	Insignificant	0

DURATION (D)		SPATIAL SCALE (S)	
Description Meaning	Score	Description /Meaning	Score
Permanent	5	International	5
Long Term	4	National	4
Medium	3	Regional	3
Short term	2	Local/Site	2
Temporary	1	Footprint	1/0

Equation 1: Significance Rating

SP (Significant Points) = Consequence (Extent + Duration + Severity) x Likelihood (Probability)

Table 15: Significance Rating Scale without mitigation and with mitigation

SR < 30	**LOW (L)**	Visual Impact with have little real effect and should not have an influence on or require modification of the project design or alternative mitigation. No mitigation is required.
30 > SR < 60	**MEDIUM (M)**	Where Visual Impact could have an influence on the decision unless it is mitigated. An impact or benefit, which is sufficiently important to require management. Of moderate significance - could influence the decisions about the project if left unmanaged.
SR > 60	**HIGH (H)**	Impact is significant, mitigation is critical to reduce impact and visual exposure. Resulting impact could influence the decision depending on the possible mitigation. An impact, which could influence the decision about whether or not to proceed with the project.

6.7 POTENTIAL VISUAL IMPACT OF THE PROPOSED PROJECT

The differences between the two (2) alternatives are negligible from a visual perspective resulting in the impact assessment being similar. Therefore, the impact assessment below is for both alternatives. Using the above criteria, the results of the impact significance assessment before and after mitigation, for the Construction, Operational and Decommissioning Phases are presented below.

Table 16: Impact assessment before and after mitigation

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
Construction	Site establishment • This will involve the vegetation clearance and stripping of soil in areas designated for surface infrastructure.	6	2	3	3	33	**Medium**	6	2	3	2	22	**Low**
	Site Clearing of the project footprint: • Removal of vegetation leading to increased visual contrast and loss of VAC and increase visual intrusion on sensitive receptors. • Alteration of current landscape features impacting on landscape character and sense of place.	6	2	3	4	44	**Medium**	6	2	3	2	22	**Low**
	Construction of Solar PV facility and associated infrastructure.	6	2	3	4	44	**Medium**	6	2	3	2	22	**Low**
	Construction vehicle movement and increased human activity in and around the proposed site.	6	2	3	2	22	**Low**	6	2	3	1	11	**Low**
	General and hazardous waste management.	2	2	2	2	12	**Low**	2	2	2	1	6	**Low**
	Formation of dust plumes because of construction activities.	4	2	3	2	18	**Low**	4	2	3	1	9	**Low**
	Use of security lighting.	4	2	2	2	16	**Low**	4	2	2	1	8	**Low**
	Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place.	6	2	3	4	44	**Medium**	6	2	3	2	22	**Low**

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
Operational	Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place.	6	4	3	4	52	**Medium**	6	4	3	2	26	**Low**
	Increased vehicle and human activity in and around the Solar PV facility and associated infrastructure.	6	4	3	2	26	**Low**	6	4	3	1	13	**Low**
	Night-time illumination due to security lighting and lighting associated with the Solar PV facility and associated infrastructure.	6	4	2	3	36	**Medium**	6	4	2	2	24	**Low**
	Potential visual impact of solar glint and glare as a visual distraction.	6	4	3	3	39	**Medium**	6	4	3	2	26	**Low**

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
Decommissioning	General decommissioning and closure activities leading to visual intrusion on sensitive receptors.	6	1	3	2	20	**Low**	6	1	2	2	14	**Low**
	Dismantling and removal Solar PV facility and associated infrastructure.	6	1	3	1	10	**Low**	6	1	2	1	7	**Low**
	Cleaning, landscaping, and replacement of soils over the disturbed area.	6	1	3	1	10	**Low**	6	1	2	1	7	**Low**
	Waste generation and disposal	4	1	2	2	14	**Low**	4	1	2	1	7	**Low**
	Ineffective rehabilitation leading to landscape scarring, permanent visual contrast and a permanent alteration of the landscape character and sense of place.	6	4	3	3	39	**Medium**	6	1	2	3	21	**Low**

7. RESULTS AND DISCUSSION

Results of the visual impact assessment indicated that from a visual perspective, the proposed project and related activities are the main project components that are expected to result in a visual impact. Receptors located within 2km of the proposed site will have the **moderate** (without mitigation) visual impact. Within a 5 km radius of the proposed project, residential areas and farming communities will have a **low** (without mitigation) visual impact. Beyond the 5 km study area, there are some areas where the development is discernible. However, the visual impacts are generally of **moderate to low** magnitude and impact. Local low and high-level vegetation will provide limited screening; however, the proposed solar PV facility and associated infrastructure can conceivably be visible to the sensitive receptors located near the proposed project boundary. The visual impacts associated with the Project and associated infrastructure will occur once construction has been completed and will be long term in nature.

In terms of the potential cumulative impacts, the proposed site is surrounded by various commercial and agricultural activities. In addition, according to the REEA Database, there are three (3) renewable energy applications have been made for properties located near the project site. The majority of the proposed site currently grassland vegetation and land previously used for agricultural purposes. The clearance and subsequent development of the site will result in the alteration of this space. Consequently, the development of this site will add cumulatively to the loss of sense of place. While the result in a change in the sense of place for those areas that look onto the project site, the magnitude of the impact is likely to be **low** as the majority of the sensitive receptors are located more than 5km from the project site.

Based on the results of the impact assessment, the majority of the potential visual impacts were considered to be **moderate** before mitigation and with the successful implementation this can be reduced to low. With regards to the proposed activities, due to the terrain of the proposed boundary, vegetation, VAC, and current land uses, the proposed activities are expected to result in a **moderate** visual impact on the receiving environment. The proposed activities will have a long-term temporal visual impact, due to the very nature of the Project and associated infrastructure. The activity will have a localised visual impact over a long-term duration. The activity will be able to continue with the implementation of appropriate mitigation strategies during the construction, operational and decommissioning phases.

7.1 ALTERNATIVES

The alternative 2 layout is preferred for site design as it results in reduced visual impacts compared to alternative 1 layout. This is primarily due to the decreased size of the infrastructure in alternative 2 layout. The reduced size of the infrastructure reduces its visibility and minimizes its impact on the surrounding landscape, however, only by a negligible amount. Therefore, the impact assessment resulted in the same impact ratings for both alternatives. Overall, alternative 2 layout is a favourable option for site design due to its marginally reduced visual impacts.

8. FINDINGS

From the impact assessment results obtained, potential visual impacts may be present within the construction, operational and decommissioning phases. From the assessment, the proposed activities can conceivably have a **moderate** (without mitigation) visual impact on the surroundings and the natural and topographical environment.

Impacts are likely to be largely localised and within 5 km of the proposed project boundary, while significant visual impacts with regards to the proposed activities are expected at the sensitive receptors located within 2km of the proposed project boundary. It should be mentioned that an estimation of the impact distance is difficult to determine in terms of the visual impact assessment as it does not incorporate distractive views in the form of vegetation or land use (infrastructure, buildings, etc.), however, with successful mitigating implementation the significance can be reduced.

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative visual impacts resulting from landscape modifications as a result of the proposed activities in conjunction with other activities are likely to be of moderate significance, however, it can be reduced with the successful implementation of the proposed mitigation measures.

9. MITIGATION MEASURES

As there are certain visual impacts from the proposed solar development project, mitigation measures have been developed and are provided within this section.

Visual mitigation can be divided into two (2) options. Typically using a combination of the two (2) options is most effective. The first option is an attempt to "hide" the source of the visual impact from view, by placing visually appealing elements between the viewer and the source of the visual impact. The second option aims to minimise the severity of the visual impact itself. This can be achieved in numerous ways for example limiting heights or by blending the infrastructure to match the surrounding environment.

During the construction phase, the following mitigation measures should be implemented to minimise the visual impact.

- General site management:
  - Maintain the construction site in a neat and orderly condition at all times;
  - Plan the placement of lay-down areas and any potential temporary construction camps in order to minimise vegetation clearing;
  - Ensure that rubble, litter, and disused construction materials are managed and removed regularly; and
  - Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way.

- Height and Orientation:

- The height and orientation of the solar panels should be considered during the design phase. Panels should be oriented to minimize glare and reflection, and their height should be kept as low as possible to reduce their visual impact.

- Infrastructure:
  - All constructed facilities and buildings should cause minimum visual disturbance by reducing the contrast and blending in with the surrounding vegetated natural area. This could be achieved by painting rooftops and walls of buildings in the hues and tones of the surrounding vegetation and/or by adding matt paints to highly reflective surfaces, as well as sharp protruding features on the structures. All of these solutions are subject to the technical design of individual buildings and facilities and should be pursued by the technical design and/or construction team, taking into consideration added value from reduced visibility, engineering feasibility and cost.
- Dust Management:
  - Implement dust suppression using a water cart to minimise airborne dust;
  - Enforce a 50 km/h speed limit on-site for Light-Duty Vehicles and a 40 km/h speed limit for large construction vehicles and machinery.

During the operational phase the following mitigation measures should be implemented to minimise the visual impact.

- Light pollution management:
  - Plan the lighting requirements of the facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination.
  - Avoid up-lighting of structures by rather directing lighting downwards and focusing on the area to be illuminated.
  - Reduce the height and angle of illumination from which floodlights are fixed as much as possible while still maintaining the required levels of illumination.
  - Lighting should be shielded in areas where specific objects are to be illuminated.
  - Minimise the use of lighting, where possible.
  - Lighting should exclude the blue-rich wavelengths and be closer to the red-rich wavelength spectrum. Globes used in lighting outside areas should be warm white. This also applies to light spilling out from within buildings. A colour temperature of no more than 3000 Kelvins is recommended for lighting.
  - Light intensity of illuminating lights should be limited as far as possible, i.e., to limit lighting to areas required to serve operational functionality.
  - Illumination where not permanently required should be fitted with timers, motion-activated sensors or be dimmable to reduce total light emitted.

- Site management:
  - Shape any slopes and embankments to a maximum gradient of 1:4 and vegetate, to prevent erosion and improve their appearance.

- Utilise vegetation screens where possible as visual screening devices around the proposed project, specifically buildings.
- Plant indigenous trees near the boundary of the site where possible.
- Eradicate invasive alien plant species.

During decommissioning and closure phase, the following mitigation measures should be implemented to minimise the visual impact.

- Eradicate invasive alien plant species;
- Remove all built infrastructure; and
- Re-shape all footprint areas to be as natural in appearance as possible and revegetate using locally occurring vegetation.

10. CONCLUSION AND RECOMMENDATIONS

The project site and surrounding area can be characterized by residential, commercial, tourism, and agricultural activities. According to the REEA Database, there are three (3) renewable energy applications have been made for properties located near the project site. The proposed site ranges from approximately 1397 to 1444 metres above mean sea level (mamsl). predominantly flat, with a few small hills and rocky outcrops scattered throughout the area. The landscape is characterized by open grasslands, and scattered trees, typical of the Highveld region of South Africa. The surrounding areas comprises with a mix of residential activities, agricultural, tourism and commercial activities. The vegetation in the area consists mainly of grasses, shrubs, and scattered trees.

Several potential risks to the receiving aesthetic and visual environment as a result of the proposed activities have been identified, relating to impacts on the visual character and sense of place, visual intrusion and visual exposure and visibility. The significance of these impacts may be reduced should appropriate and effective mitigation measures be implemented. The proposed Project and associated infrastructure can conceivably have a **moderate impact** on the visual environment, while secondary impacts, such as dust emission, solar glint and glare and lighting at night, will also manifest as visual disturbances from project initiation. The study area comprises of residential activities, agricultural and commercial activities which have had a visual impact on the natural environment. Therefore, the proposed project has been predicted to have a **moderate** impact before mitigation on the visual environment. After appropriate and effective mitigation measures the impact is rated as **moderate to low**.

The proposed activities should therefore have a **moderate to low** visual impact on the receiving environment and is thus not fatally flawed from a visual impact perspective. The alternative 2 layout is preferred for site design as it results in reduced visual impacts compared to alternative 1 layout. This is primarily due to the decreased size of the infrastructure in alternative 2 layout. Considering the project, it is the specialist's opinion that the proposed activities be allowed, provided that the findings within this report are considered along with the recommendations made towards the management of the proposed activity. All recommendations should be included in the Environmental Management Programme (EMPr) relevant to the proposed project.

11. REFERENCES

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APPENDIX A – SPECIALISTS CURRICULUM VITAES

CARL SCHOEMAN

SENIOR MANAGER AND ENVIRONMENTAL CONSULTANT
Environmental Assurance
Environmental consulting

ENVIRONMENTAL ASSURANCE (PTY) LTD
394 Tram Street, New Muckleneuk, Pretoria, 0181
T : 012 460 9768 ; M : 071 371 1178; F : 012 460 3071 ; E mail : carl@envass.co.za
Date of Birth : 3 November 1989; Place of Birth : South Africa
Ethnic Group and Gender : White Male ; Disabilities : None

AREAS OF EXPERTISE

- Legislative Compliance
- Compliance Auditing
- Environmental Control Officer
- WUL, EA, EMPr, WML, ROD, S24G Compliance assessments and Audits
- Specialist Works in Air, Water, Soil, Visual, Odour, Noise, etc.
- Ambient Air Quality and noise baselines
- Regulation 34 Compliance assessments
- Customer Relationships and marketing;
- SACNASP Registered (Pr.Sci.Nat - 114848).
- ISO 14001: Maintenance & Lead Auditor

CAREER HISTORY

Employer — **ENVIRONMENTAL ASSURANCE (PTY) LTD**
Period — July 2013 – Current
Position — **Senior Manager and Environmental Consultant (Pr.Sci.Nat)**
Responsibilities — Develop and maintain environmental compliance monitoring programmes in conjunction with site audits (WUL and Legal) and assessments. Create and update site and area maps (GIS). Maintain data and results from monitoring programmes in databases. Assess sites, determine EMP compliance ratings and report on current conditions. Compile reports on water-, noise-, soil-, air-quality and site findings and observations, with interpretation of results and possible recommendations. Maintain and build customer relationships with guidance on environmental matters and updates on environmental legislation. Market to potential clients with site specific marketing material.

WORK EXPERIENCE AND SKILLS

Specialist studies: Noise & Dust Baselines, EMP Performance Reviews, Air Emission Licenses (AEL), WUL Audits, Legal Compliance Audits, ECO Work, Internal and External Legal Compliance Site Audits, Alien Vegetation Identification, Management Plans, EMP-Performance Assessments.

Day to day: Compliance assessments, Reporting, data capturing, data interpretation and recommendations. Site assessments and inspections. GIS map making. Report writing with recommendations. Client interaction. Environmental legislation interpretation and implementation.

EDUCATION AND QUALIFICATIONS

North-West University; Masters M.Env.Man Environmental Water Requirements – (In progress)
North-West University; Honours BSc. Environmental Science and Management - 2013
North-West University; Degree BSc. Environmental Science Geology and Geography - 2012

PROFESSIONAL STATUS

Registered as a Professional Natural Scientist with the South African Council of Natural Scientific Professions (SACNASP) - 2016

CONTINUED PROFESSIONAL DEVELOPMENT

COURSE	INSTITUTION	COMPLETED
ISO14001: Lead Auditor	BSI	2021
Environmental Law	WITS	2021
ISO14001: Requirements	BSI	2018
ISO14001: Implementation	BSI	2018
SHE Representative	NOSA	2017
Environmental Law	MacRobert Attorneys	2017
Environmental Law for Environmental Managers (NQF 7)	Centre for Environmental Management (CEM)	2016
Invasive Species Training: Alien Management Plans	South African Green Industries Council (SAGIC)	2016
GRI Course on Sustainability Reporting	Environmental Sustainability Solutions CC (ESS)	2015
Invasive Species Certification Training	South African Green Industries Council (SAGIC)	2015
Essential Air Quality Management	Centre for Environmental Management (CEM)	2014
Water Law in South Africa – Workshop	IMBEWU Sustainability Legal Specialists	2013
Mining Law in South Africa - Workshop	IMBEWU Sustainability Legal Specialists	2013

PROJECT EXPERIENCE

Recent Project Environmental consulting services:

PROJECT DESCRIPTION	CLIENT
Environmental Control Officer	• DWS – Vlakfontein • Lynca Meats • Everite Building Products • Samancor Elkem • Rosema Delmas • Victoria Bricks
Auditor and Independent Environmental Consultant	• Gautrain Operations
Lead Auditor – Compliance Audits	• Glencore Alloys • Sephaku Cement • Samancor Chrome • Umlabu Colliery • Geocycle

	• Blyvoor Gold • Kudumane Manganese Resources • Eskom Grootvlei • Mortimer Smelter • Ivanplats Platinum • Zululand Anthracite Colliery • Siyanda Bakgatla Platinum Mine • Tronox Namakwa Sands
AEL Applications	• Nigel Brick and Clay • Hercules Bricks • Makoya Blinkpan Siding • New Energy – Pyrolysis Plant
Basic Assessment	• Rustenburg Base Metals Refiner
EMP Update	• PPC Cement – Slurry, De Hoek, Riebeeck, Vanrhynsdorp • Siyanda Bakgatla Platinum Mine
ISO 14001 – Maintenance	• Geocycle • Barnes Reinforcing Industries
Water and Air Quality Monitoring and Site Inspections	• NuCoal Mining -Woestalleen Colliery • Coal of Africa – Mooiplaats Colliery • Canyon Coal – Ukufisa, Singani and Phalanndwa Collieries • SACMH – Umlabu Colliery
Water Quality Monitoring, Site inspection and EMP Performance Review	• Umlabu Colliery – Coal mining and processing
Soil Sampling and Analysis	• Assmang – Black Rock Mine Operations – Manganese Mining • Canyon Coal – Coal Mining • Group Five – Everite
Air, Noise and Visual Assessments	• Samancor ECM • MOJ Petroleum • Mamatwan Manganese • Jindal Mining • Locksand Mining • Ivanplats Platinum • Canyon Coal • Zilkaats Nek • Kranskop Tebogony

REFERENCES

CONTACT NAME	COMPANY	RELATIONSHIP	CONTACT NR
Karen van Niekerk	ENVASS	Business Process Manager	013 460 9768
Louise Thuynsma	ENVASS	Senior Operations Manager	012 460 9768

RICHARD VILJOEN

Business Unit Head /
Environmental Consultnt

ENVIRONMENTAL ASSURANCE (PTY) LTD

394 Tram Street, New Muckleneuk, Pretoria, 0181

T : 012 460 9768 ; M : 071 122 1443; F : 012 460 3071 ; E mail : richard@envass.co.za

Date of Birth : 8 July 1991; Place of Birth : South Africa

Ethnic Group and Gender : White Male ; Disabilities : None

AREAS OF EXPERTISE

- Report Writing
- Site Investigation
- Air Quality
- Data Analysis
- Field Sampling
- Compliance Auditing
- GIS
- Water Quality
- Visual Impact Assessments

CAREER HISTORY

Employer	**FOUNTAIN CIVIL ENGINEERING**
Period	March 2018 – December 2018
Position	**ENVIRONMENTAL OFFICER**
Responsibilities	Daily site inspections for environmental compliance. Weekly water quality testing. Inspection report writing. Incident reporting and investigation. Internal compliance auditing.

Employer	**ENVIRONMENTAL ASSURANCE (PTY) LTD**
Period	June 2019 – Current
Position	**BUSINESS UNIT HEAD / ENVIRONMENTAL CONSULTANT**
Responsibilities	**Environmental Consultant and Auditor** Develop and maintain environmental compliance monitoring programmes in conjunction with site audits and assessments. Specialist and auditing co-ordination and planning of all relevant projects. Maintaining data and results from monitoring programmes and databases. Conduct compliance audits, determine compliance ratings and report on conditions. Compile reports on water-, soil-, air-quality and site findings, with interpretation of results and recommendations. Conduct and report on specialist assessments. Maintain and build customer relationships with guidance on environmental matters and updates on environmental legislation. Market to potential clients with site specific marketing material.

WORK EXPERIENCE AND SKILLS

Site inspections, environmental compliance auditing, noise assessments, visual assessments, ambient air quality monitoring, surface water quality testing, data capture and analysis, and report writing

EDUCATION AND QUALIFICATIONS

UKZN; M.Sc. Environmental Science (GIS and Remote Sensing) – 2018
UKZN; B.Sc (Hons). Geography and Environmental Management – 2016
UKZN; B.Ss Degree. Geography and Environmental Management – 2015

CONTINUED PROFESSIONAL DEVELOPMENT

In-house Training – Legal update	Environmental Assurance	2019
ISO 14001:2015 Environmental Management Systems: Requirements	BSI	2021
In-house Training – Legal update	Environmental Assurance	2021
Environmental legal compliance & auditing	Janice Tooley Attorneys	2021
Environmental Law Update	inlexso	2022
HSE Representative Course	NOSA College Centurion	2022
Defensive Driving	NOSA College Centurion	2022
Environmental Management and Regulation	University of Pretoria	2022

PROJECT EXPERIENCE

Environmental consulting services for:

CURRENT PROJECT DESCRIPTION	CLIENT
Environmental Monitoring – Dust Fallout, Noise, Soil and Water Quality	Canyon Coal
Environmental Monitoring – Dust Fallout and Water Quality	Infrabuild Cement
Environmental Monitoring – Dust Fallout	Federale Stene
Environmental Monitoring – Dust Fallout, Noise and Water Quality	Sitatunga Manganese
Environmental Monitoring – Water Quality	Bright Alloys
Environmental Monitoring – Noise Assessment	Envirocycle
Environmental Monitoring – Noise Assessment	Phalanndwa Colliery
Environmental Monitoring – Noise Assessment	SA Brix
Environmental Monitoring – Noise Assessment	Rustenburg Base Mineral Refinery
Visual Impact Assessment	Mawedza Consulting
Visual Impact Assessment	Nigel Brick and Clay
Visual Impact Assessment	SA Brix
Visual Impact Assessment	Boshoek Smelter
Visual Impact Assessment	Anglo American
Visual Impact Assessment	Glubay Coal
Visual Impact Assessment	Mainstream Renewable Power
Visual Impact Assessment	Anglo American Platinum
Visual Impact Assessment	Zonglin Resources
Technical Environmental Audits (AEL, WUL and WML)	Glencore (Wonderkop Smelter)
Technical Environmental Audits (WUL and WML)	Glencore (Helena, Magareng and Thorncliffe)
Technical Environmental Audits (AEL, WUL and WML)	Glencore (Lion Smelter)

WUL Audit	Ocon Bricks
WUL and GNR 704 Audits	Mortimer Smelter
WUL and WML Audits	Boshoek Smelter
WUL and WML Audits	Sephaku Cement
WUL Audits	Kangra Coal
WUL and WML Audits	Bright Alloys
EMPr PAR Audit	Zululand Anthracite Colliery
EMPr Audit	Lynca Meats
EMPr, AEL, WUL Audits	Mokoya - Blinkpan
AEL Technical Audit	Wonderkop Smelter
WUL Audits	Kangra Coal
WUL Audit	Anglo American Platinum – Rustenburg Operations
Soil Assessment	Exxaro - Leeuwpan
Soil Assessment	Zululand Anthracite Colliery
Soil Assessment	Miniandante

REFERENCES

CONTACT NAME	COMPANY	RELATIONSHIP	CONTACT NR
Andre Buys	ENVASS	Divisional Manager Specialist Studies	083 555 4354
Carl Schoeman	ENVASS	Senior Divisional Manager	071 371 1178
Elaine Govender	Fountain Civil Engineering	Manager	083 232 8861
Paul Olivier	SMEC	Resident Engineer	082 376 8198

CERTIFICATION

I, **RICHARD VILJOEN**

Declare that, to the best of my knowledge, all the information contained herein is true.

Signature: RViljoen

On the 11 day of May 2023.

APPENDIX E9: Traffic Impact Assessment

PROPOSED OSLAAGTE SOLAR 3 SOLAR PHOTOVOLTAIC FACILITY, FREE STATE PROVINCE

TRANSPORT IMPACT ASSESSMENT

MAY 2023
First Issue

Prepared by:

JG AFRIKA (PTY) LTD

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VERIFICATION PAGE	Qual-frm-026
	Rev 14

TITLE:
PROPOSED OSLAAGTE SOLAR 3 SOLAR PHOTOVOLTAIC FACILITY, FREE STATE PROVINCE
TRANSPORT IMPACT ASSESSMENT

JGA REF. NO.	**DATE:**	**REPORT STATUS**
5928	24/05/2023	First Issue

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AUTHOR	**CLIENT CONTACT PERSON**
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SYNOPSIS

Preparation of a Transport Impact Assessment report for the Proposed Oslaagte Solar 3 solar photovoltaic facility in the Free State Province, pertaining to all relevant traffic and transportation engineering aspects.

KEY WORDS:

Transport Impact Assessment, Environmental Impact Assessment, Solar Energy, Photovoltaic, PV

QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO 9001: 2015 which has been independently certified by DEKRA Certification.

Verification	Capacity	Name	Signature	Date
By Author:	Technologist	S Patandin		24/05/2023
Checked by:	Associate	A Johnson		24/05/2023
Authorised by:	Director	D Petersen		24/05/2023
Filename:	https://jgafrika.sharepoint.com/sites/Job5928-team-100-WIP-Internal-Eng/Shared Documents/100-WIP-Internal-Eng/104-Studies/Oslaagte 1_2_3/5928_Oslaagte Solar 3 Kroonstad TIA EIA_24052023.docx			

Report template version: 2017-10-30

PROPOSED OSLAAGTE SOLAR 3,
FREE STATE PROVINCE
TRANSPORT IMPACT ASSESSMENT

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PROPOSED OSLAAGTE SOLAR 3,
FREE STATE PROVINCE
TRANSPORT IMPACT ASSESSMENT

1 INTRODUCTION AND METHODOLOGY

1.1 Scope and Objectives

The Applicant, Oslaagte Solar 3 (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Oslaagte Solar 3) located on the Farm Oslaagte No. 2564 and associated grid infrastructure on Farm Klein Geluk No. 2088, Farm Fraaiuitzicht No. 576, Farm Zonderweg No. 1699, Farm Damspruit No. 1584 and Farm Welbedatch No. 1913, approximately 20 km south east of Kroonstad in the Free State Province, as shown in **Figure 1-1.**

The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 480 MW.

Figure 1-1: Proposed Oslaagte Solar 3 Solar PV Facility

Four additional PV facilities are concurrently being considered on the surrounding properties and are assessed through separate Environmental Impact Assessment (EIA) processes.

As part of the Environmental Impact Assessment (EIA) process undertaken, the services of a Transportation Specialist are required to conduct a Transport Impact Assessment.

The following two main transportation activities will be investigated:

- Abnormal load vehicles transporting components to the site.
- The transportation of construction materials, equipment and people to and from the site/facility.

The transport study will aim to provide the following objectives:

- Assess activities related to traffic movement for the construction and operation (maintenance) phases of the facility.
- Recommend a preliminary route for the transportation of the components to the proposed site.
- Recommend a preliminary transportation route for the transportation of materials, equipment and people to site.
- Recommend alternative or secondary routes where possible.

1.2 Terms of Reference

General:

A specialist report prepared in terms of the Regulations must contain the following:

(a) details of-
  (i) the specialist who prepared the report; and
  (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
(c) an indication of the scope of, and the purpose for which, the report was prepared;
  (cA) an indication of the quality and age of base data used for the specialist report
  (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
(d) the duration date and season of the site investigation and the relevance of the season to the outcome of the assessment;
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
(g) an identification of any areas to be avoided, including buffers;
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
(k) any mitigation measures for inclusion in the EMPr;
(l) any conditions for inclusion in the environmental authorisation;

(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;

(n) a reasoned opinion-

  (i) whether the proposed activity, activities or portions thereof should be authorised; and (considering impacts and expected cumulative impacts).

  (iA) regarding the acceptability of the proposed activity or activities, and

  (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;

(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and

(q) any other information requested by the competent authority.

Specific:

- Extent of the transport study and study area;
- The proposed development;
- Trip generation for the facility during construction and operation;
- Traffic impact on external road network;
- Accessibility and turning requirements;
- National and local haulage routes;
- Assessment of internal roads and site access;
- Assessment of freight requirements and permitting needed for abnormal loads; and
- Traffic accommodation during construction.

1.3 Approach and Methodology

The report deals with the traffic impact on the surrounding road network in the vicinity of the site:

- during the construction of the access roads;
- construction of the facility; and
- operation and maintenance during the operational phase.

This transport study was informed by the following:

<u>Site Visit and Project Assessment</u>

- Overview of project background information including location maps, component specs and any possible resulting abnormal loads to be transported.
- Research of all available documentation and information relevant to the proposed facility; and
- Site visit to gain sound understanding of the project.

The transport study considered and assessed the following:

<u>Traffic and Haul Route Assessment</u>

- Estimation of trip generation;
- Discussion on potential traffic impacts;
- Assessment of possible haul routes; and
- Construction and operational (maintenance) vehicle trips.

<u>Site layout, Access Points and Internal Roads Assessment per Site</u>

- Description of the surrounding road network;
- Description of site layout;
- Assessment of the proposed access points; and
- Assessment of the proposed internal roads on site.

1.4 Assumptions and Limitations

The following assumptions and limitations apply:

- This study is based on the project information provided by the Client.
- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000mm, total maximum width 4 300 mm and total maximum length 10 500 mm.
- Maximum vertical height clearances along the haulage route is 5.2 m for abnormal loads.
- Imported elements will be transported from the most feasible port of entry, which is deemed to be Richards Bay Port.
- If any elements are manufactured within South Africa, these will be transported from their respective manufacturing centres, which would be either in the greater Johannesburg area, Pinetown/Durban or Cape Town.
- All haulage trips will occur on either surfaced national and provincial roads or existing gravel roads.
- Construction materials will be sourced locally as far as possible.

1.5 Source of Information

Information used in a transport study includes:

- Project Information provided by the Client;
- Google Earth.kmz provided by the Client;
- Google Earth Satellite Imagery;
- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads
- Information gathered during the site visit; and
- Project research of all available information.

2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE TRANSPORT STUDY

2.1 Port of Entry

It is assumed that if components are imported to South Africa, it will be via the Port of Richards Bay, which is located in KwaZulu Natal. Components imported to South Africa will be via the Richards Bay Port. A deep-sea water port and boasting 13 berths, the terminal handles dry bulk ores, minerals and break-bulk consignments with a draft that easily accommodates Cape size and Panamax vessels. The terminal exports over 30 varied commodities from magnetite to ferrochrome, woodchips to aluminium and steel. A large percentage of dry bulk commodities are handled via a computer-controlled network of conveyor belts extending 40 km to seven harbour bound industries. These belts transport cargo between the quayside and the respective manufacturers. Break bulk cargo on the other hand, is a skip-loading operation that due to the density of the commodities, chiefly relies on road motor transport (RMT) to and from the point of trade. The Port is operated by Transnet Port Terminals.

2.2 Transportation requirements

It is anticipated that the following vehicles will access the site during construction:

- Conventional trucks within the freight limitations to transport building material to the site;
- 40ft container trucks transporting solar panels, frames and the inverter, which are within freight limitations;
- Flatbed trucks transporting the solar panels and frames, which are within the freight limitations;
- Light Differential Vehicle (LDV) type vehicles transporting workers from surrounding areas to site;
- Drilling machines and other required construction machinery being transported by conventional trucks or via self-drive to site; and
- The transformers will be transported as abnormal loads.

2.3 Abnormal Load Considerations

It is expected that the transformers will be transported with an abnormal load vehicle. Abnormal permits are required for vehicles exceeding the following permissible maximum dimensions on road freight transport in terms of the Road Traffic Act (Act No. 93 of 1996) and the National Road Traffic Regulations, 2000:

- Length: 22m for an interlink, 18.5m for truck and trailer and 13.5m for a single unit truck
- Width: 2.6m
- Height: 4.3m measured from the ground. Possible height of load – 2.7m.
- Weight: Gross vehicle mass of 56t resulting in a payload of approximately 30t
- Axle unit limitations: 18t for dual and 24t for triple-axle units
- Axle load limitation: 7.7t on the front axle and 9t on the single or rear axles

Any dimension / mass outside the above will be classified as an Abnormal Load and will necessitate an application to the Department of Transport and Public Works for a permit that will give authorisation for the conveyance of said load. A permit is required for each Province that the haulage route traverses.

2.4 Further Guideline Documentation

The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outlines the rules and conditions that apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges and culverts.

The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power / mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the Road Traffic Act and the relevant regulations.

2.5 Permitting – General Rules

The limits recommended in TRH 11 are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

a) A permit is issued at the sole discretion of the Issuing Authority. The permit may be refused because of the condition of the road, the culverts and bridges, the nature of other traffic on the road, abnormally heavy traffic during certain periods or for any other reason.
b) A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.
c) During certain periods, such as school holidays or long weekends an embargo may be placed on the issuing or permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities.

2.6 Load Limitations

The maximum load that a road vehicle or combination of vehicles will be allowed to carry legally under permit on a public road is limited by:

- the capacity of the vehicles as rated by the manufacturer;
- the load which may be carried by the tyres;
- the damaging effect on pavements;
- the structural capacity on bridges and culverts;
- the power of the prime mover(s);
- the load imposed by the driving axles; and
- the load imposed by the steering axles.

2.7 Dimensional Limitations

A load of abnormal dimensions may cause an obstruction and danger to other traffic. For this reason, all loads must, as far as possible, conform to the legal dimensions. Permits will only be considered for indivisible loads, i.e. loads that cannot, without disproportionate effort, expense or risk of damage, be divided into two or more loads for the purpose of transport on public roads. For each of the characteristics below there is a legally permissible limit and what is allowed under permit:

- Width;
- Height;
- Length;
- Front Overhang;
- Rear Overhang;
- Front Load Projection;
- Rear Load Projection;
- Wheelbase;
- Turning Radius; and
- Stability of Loaded Vehicles.

2.8 Transporting Other Plant, Material and Equipment

In addition to transporting the specialised equipment, the normal Civil Engineering construction materials, plant and equipment will need to be transported to the site (e.g. sand, stone, cement, gravel, water, compaction equipment, concrete mixers, etc.). Other components, such as electrical cables, pylons and substation transformers, will also be transported to site during construction. The transport of these items will generally be conducted with normal heavy loads vehicles, except for the transformers which require an abnormal load vehicle.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Description of the site

The proposed Oslaagte Solar 3 Solar PV facility will be located approximately 16,5 km south east of Kroonstad in the Free State Province, as shown in **Figure 3-1**. The development area is situated within the Moqhaka Local Municipality within the Fezile Dabi District Municipality. The site is accessible via the R76, located adjacent to the development area.

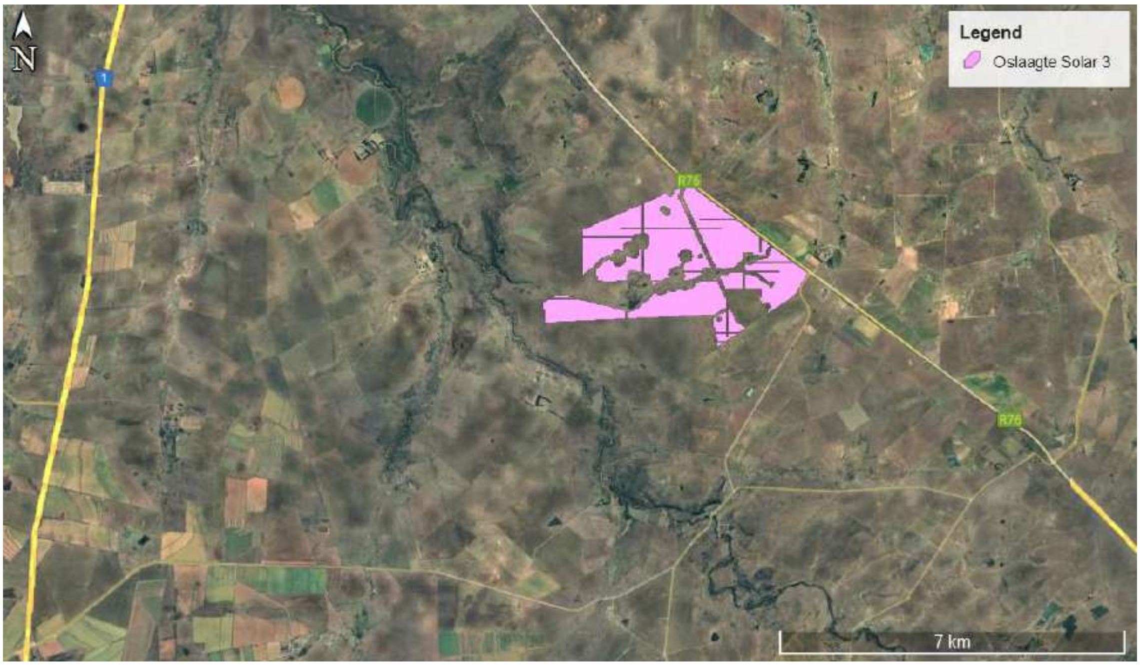

Figure 3-1: Aerial View of the Proposed Oslaagte Solar 3 Facility

The proposed Oslaagte Solar 3 will cover approximately 810 ha and will include the following infrastructure:

- PV modules and mounting structures
- Inverters and transformers
- Battery Energy Storage System (BESS)
- Site access roads up to 8m wide
- Internal access roads up to 6m wide
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance
- Temporary and permanent laydown area
- Facility grid connection infrastructure, including:
    - 33kV cabling between the project components and the facility substation
    - A 132kV facility substation
    - 33kV or 132kV cabling or powerline between the facility substation and the Eskom collector switching station/Main Transmission Sustation (MTS) or the Kroonstad Switching Station

3.2 National Route to Site for Imported Components

There are two viable options for the port of entry for imported components - the Richards Bay Port in KwaZulu Natal and the Port of Ngqura in the Eastern Cape.

The Richards Bay Port is located approximately 669km travel distance from the proposed site whilst the Port of Ngqura is located approximately 853km travel distance from the proposed site. The Richards Bay Port is the preferred port of entry, however, the Port of Ngqura can be used as an alternative should the Richards Bay Port not be available.

The preferred route from the Richards Bay Port is shown in green in **Figure 3-2** below. The route follows the N2 to Durban, where vehicles will access the N3 to Harrismith and the N5 to Bethlehem. From Bethlehem, vehicle will travel on the R76 to access point the proposed site.

The alternative route from the Port of Ngqura, shown in orange in **Figure 3-2**, will follow the N10 north to Cradock, where vehicles will take the R390 north, before turning west onto the R58 at Venterstad. Vehicles will access the N1 via the R701 to Bloemfontein and will continue on the N1 to Kroonstad. Vehicles will access the proposed site via the R76.

Figure 3-2: Preferred and Alternative Routes from Ports

It is critical to ensure that the abnormal load vehicle will be able to move safely and without obstruction along the preferred route. The preferred route should be surveyed prior to construction to identify any problem areas, e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification. After the road modifications have been implemented, it is recommended to undertake a “dry-run” with the largest abnormal load vehicle, prior to the transportation of any components, to ensure that the delivery will occur without disruptions.

It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.

3.3 Route for Components manufactured locally

As mentioned in Section 1.4 (Assumptions and Limitations), it is anticipated that elements manufactured within South Africa will be transported to the site from the Cape Town, Johannesburg and Pinetown/Durban areas. It is also assumed that the transformer, which will be transported with an abnormal load vehicle, will be transported from the Johannesburg area and therefore it needs to be verified that the route from the manufacturer to the site does not have any load limitations for abnormal vehicles. At this stage, only a high-level assessment can be undertaken as no information of the exact location of the manufacturer is known and all road structures (such as bridges and culverts) need to be confirmed for their load bearing by SANRAL or the respective Roads Authority.

3.4 Route from Cape Town to Proposed Site

Components, such as PV panels, manufactured in Cape Town will be transported to site via road as shown in **Figure 3-3**. Haulage vehicles will mainly travel on the national highway and the total distance to the proposed site is approximately 1 224km.

Figure 3-3: Route from Cape Town to Proposed Site

3.5 Route from Johannesburg to Proposed Site

It is assumed that the inverter and support structure will be manufactured in the Johannesburg area and transported to site. The travel distance is around 207km, and no road limitations are expected on this route for normal loads vehicles as it will mainly follow national and provincial roads. The route is shown in **Figure 3-4**.

Figure 3-4: Route from Johannesburg to Proposed Site

3.6 Route from Pinetown / Durban to Proposed Site

If the PV panels are manufactured in South Africa, they could possibly be manufactured in the Pinetown area, close to Durban and transported to site via road. These elements are normal loads and no road limitations are expected along the routes, which is shown in **Figure 3-5**. Haulage vehicles will mainly travel on national and provincial roads and the total distance to the proposed site is approximately 507km.

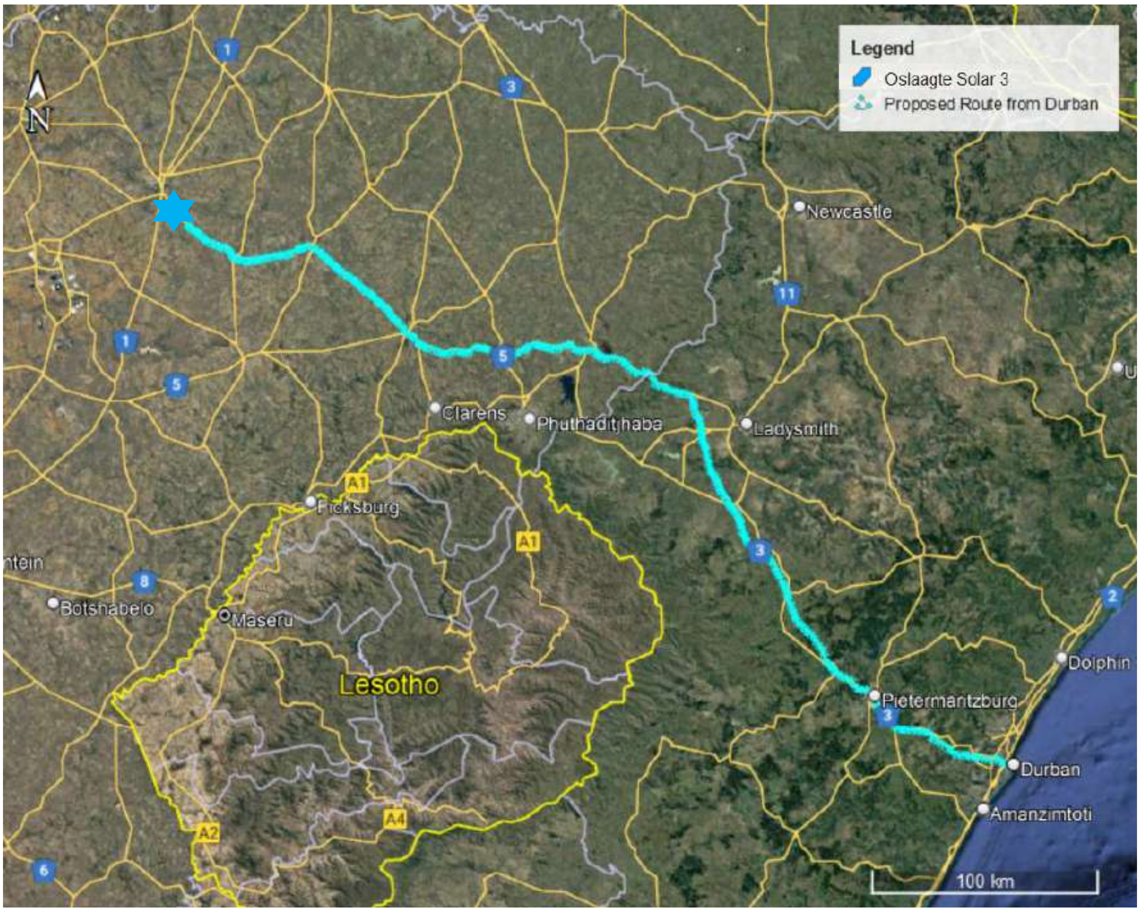

Figure 3-5: Route from Durban to Proposed Site

3.7 Route from Johannesburg Area to Site – Abnormal Load

It is assumed that the transformer will be manufactured locally in South Africa and be transported from the Johannesburg area to site. As the transformer will be transported with an abnormal load vehicle, the route planning needs a more detailed investigation of the feasible routes considering any limitations due to existing road features. Furthermore, a load of abnormal dimensions may cause an obstruction and danger to other traffic and therefore the transformer needs to be transported as far as possible on roads that are wide enough for general traffic to pass. It is expected that the transformer can be transported to site via the same route used for normal loads.

There are several bridges and culverts along this route, which need to be confirmed for load bearing and height clearances. There are several turns along the way and small towns to pass through. According to the desktop study, all turning movements along the route are manageable for the abnormal vehicle.

However, there are many alternative routes which can be investigated if the above route or sections of the route should not be feasible.

3.8 Proposed Access Points and Access Roads to the Proposed Development

The proposed main access points and access roads to the site will be located off the R76, as shown in **Figure 3-6**.

The proposed access roads, shown in red, will link to the internal road network of the facility.

A railway line runs parallel to the R76 and connects Kroonstad in the north to Bethlehem in the southeast. The Client should note that application for wayleaves and permits should be made to the railway authority well in advance of construction commencing. Special safety measures e.g. access booms might be required to protect drivers of vehicles from oncoming railway traffic, especially in instances of poor visibility and increased traffic flow. Height clearances, of overhead power supply at the railway crossing need to physically be verified.

The **proposed access point 1 is deemed the preferred access point as proposed access point 2 is located on a public road**

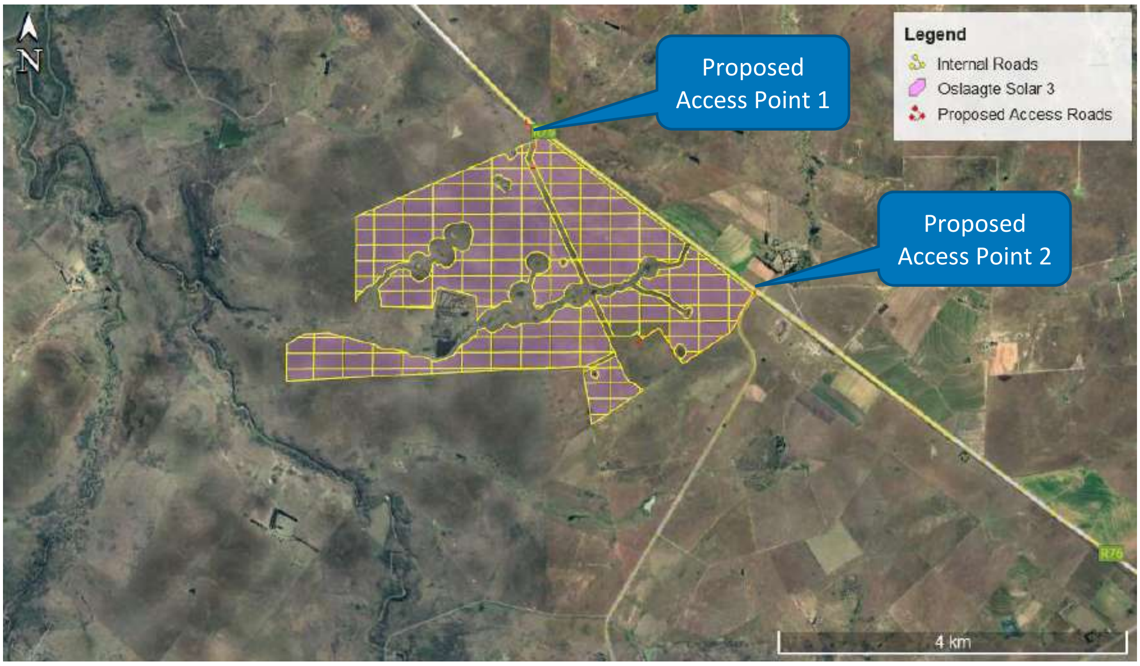

Figure 3-6: Proposed Access Point

Figure 3-7: Proposed Access Point 1

Figure 3-8: Proposed Access Point 2

A minimum required road width of 4 m needs to be maintained and all turning radii must conform with the specifications needed for the abnormal load vehicles and haulage vehicles. It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will hence need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed. The gravel roads will require grading with a grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage.

3.9 Main Route for the Transportation of Materials, Plant and People to the proposed site

The nearest towns in relation to the proposed development site are Kroonstad and Welkom. It is envisaged that most materials, water, plant, services and people will be procured within a 100km radius of the proposed facility.

Concrete batch plants and quarries in the vicinity could be contracted to supply materials and concrete during the construction phase, which would reduce the impact on traffic on the surrounding road network. Alternatively, mobile concrete batch plants and temporary construction material stockpile yards could be commissioned on vacant land near the proposed site. Delivery of materials to the mobile batch plant and the stockpile yard could be staggered to minimise traffic disruptions.

4 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the transport requirements for the proposed development are:

- Abnormal load permits, (Section 81 of the National Road Traffic Act)
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005), and
- Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.

5 IDENTIFICATION OF KEY ISSUES

5.1 Identification of Potential Impacts

The potential transport related impacts are described below.

5.1.1 Construction Phase

Potential impact

- Construction related traffic
- The construction traffic would also lead to noise and dust pollution.
- This phase also includes the construction of roads, excavations, trenching for electrical cables and other ancillary construction works that will temporarily generate the most traffic.

5.1.2 Operational Phase

Potential impact

- During operation, it is expected that staff and security will visit the facility.
- Maintenance vehicles are expected on site at times.

- Should municipal water not be available, water will have to be transported to the site.

5.1.3 Cumulative Impacts

Potential impact

- Traffic congestion/delays on the surrounding road network.
- Noise and dust pollution

6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

6.1 Potential Impact (Construction Phase)

6.1.1 Nature of the impact

- Potential traffic congestion and delays on the surrounding road network and associated noise and dust pollution.

6.1.2 Significance of impact without mitigation measures

- Traffic generated by the construction of the facility will have a significant impact on the surrounding road network. The exact number of trips generated during construction will be determined by the contractor, the haulage company transporting the components to site, the staff requirements and where equipment is sourced from.

6.1.3 Trip Generation – Construction Phase

From experience on other projects of similar nature, the number of heavy vehicles per 7MW installation is estimated to range between 200 and 300 trips depending on the site conditions and requirements. For the 480MW, the total trips can therefore be estimated to be between 13 715 and 20 5712 heavy vehicle trips, which will generally be made over a 12-month construction period. Choosing the worst-case scenario of 10 286 heavy vehicles over a 12-month period travelling on an average of 22 working days per month, the resulting daily number of vehicle trips is 78. Considering that the number of vehicle trips during peak hour traffic in a rural environment can roughly be estimated at around 20-40% of the average daily traffic, the resulting peak hour vehicle trips for the construction phase are approximately 16 - 32 trips.

If the panels are imported instead of manufactured within South Africa, the respective shipping company will be able to indicate how the panels can be packed (for example using 2MW packages and 40ft containers). These can then be stored at the port and repacked onto flatbed trucks.

It is assumed that during the peak of the construction period, 300 employees will be active on site. Staff trips are assumed to be:

Table 6-1: Estimation of daily staff trips

Vehicle Type	Number of vehicles	Number of Employees
Car	10	10 (assuming single occupant)
Bakkie	20	30 (assuming 1.5 occupants)
Taxi – 15 seats	12	180
Bus – 80 seats	1	80
Total	**43**	**300**

It is difficult to accurately estimate the construction traffic for the transportation of materials as it depends on the type of vehicles, tempo of the construction, source/location of construction material etc. However, it is assumed that at the peak of construction, approximately 250 construction vehicle trips will access the site per day.

The total estimated daily site trips, at the peak of construction, are shown in the table below.

Table 6-2: Estimation of daily site trips

Activity	Number of trips
Component Delivery	39
Staff Trips	43
Construction Trips	250
Total	**332**

The impact on the surrounding road network and the general traffic is therefore deemed nominal, with mitigation, as the 332 trips will be distributed across a 9-hour working day. The majority of the trips will occur outside the peak hours.

The significance of the transport impact without mitigation measures during the construction phase can be rated as medium. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level.

6.1.4 Trip Generation – Operational Phase

During operation, it is assumed that approximately ten (10) full-time employees will be stationed on site and hence vehicle trips generated are low and will have a negligible impact on the external road network.

The solar modules would need to be cleaned twice a year. The Developer is investigating the availability of service and as such a worst-case scenario of transporting water to site has been assessed. The following assumptions have been made to estimate the resulting trips generated from transporting water to the site:

- 5 000 litre water bowsers to be used for transporting the water
- Approximately 5 litres of water needed per panel
- Assuming that a maximum of 600 000 solar modules are used, this would amount to approximately 600 vehicle trips
- Solar modules will be cleaned twice a year.

It is expected that these trips will not have a significant impact on external traffic. However, to limit the impact, it is recommended to schedule these trips outside of peak traffic periods and to clean the solar modules over the course of a few days i.e., spread the trips over a few days. Additionally, the provision of rainwater tanks on site would decrease the number of trips.

6.1.5 Proposed general mitigation measures

The following are general mitigation measures to reduce the impact that the additional traffic will have on the road network and the environment.

- The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.

- Dust suppression of gravel roads located within the site boundary, including the main access road to the site and the site access road, during the construction phase, if required.
- Regular maintenance of gravel roads located within the site boundary, including the access road to the site, by the Contractor during the construction phase and by the Owner/Facility Manager during the operation phase, if required.
- The use of mobile batch plants and quarries near the site would decrease the traffic impact on the surrounding road network, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- The Contractor is to ensure that all drivers entering the site adhere to the traffic laws.
- Vehicular movements within the site boundary are the responsibility of the respective Contractor and the Contractor must ensure that all construction road traffic signs and road markings (where applicable) are in place. It should be noted that traffic violations on public roads is the responsibility of Law Enforcement, and the public should report all transgressions to Law Enforcement and the Contractor.
- If required, low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by haulage company) to accommodate the abnormal load vehicles. The Contractor and the Developer is to ensure that the haulage company is aware of this requirement. The haulage company is to provide evidence to the Contractor and the Developer that any affected overhead lines have been moved or raised.
- The preferred route should be surveyed to identify problem areas (e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification). After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any components, to ensure that delivery will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. The "dry-run" should be undertaken within the same month components are expected to arrive. The haulage company is to provide evidence that the route has been surveyed and deemed acceptable for the transportation of the abnormal load.
- The Contractor needs to ensure that the gravel sections of the haulage routes (i.e., the site access road and the main access road to the site) remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.
- Design and maintenance of internal roads. The internal gravel roads will require grading with a grader to obtain a camber of between 3% and 4% (to facilitate drainage) and regular maintenance blading will also be required. The geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional.

6.1.6 Significance of impact with mitigation measures

It should be noted that the construction phase is temporary and short term in nature and the associated impacts can be mitigated to an acceptable level. The proposed mitigation measures for the construction traffic will result in a reduction of the impact on the surrounding road network and the impact on the local traffic will be very low as the existing traffic volumes are deemed to be low. The dust suppression will result in significantly reducing the impact.

7 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed Oslaagte Solar 3 facility does not proceed. This would mean that there will be no negative environmental impacts and no traffic impact on the surrounding network. However, this would also mean that there would be no socio-economic benefits to the surrounding communities, and it will not assist government in meeting the targets for renewable energy. **Hence, the no-go alternative is not a preferred alternative.**

8 POTENTIAL IMPACT ASSESSMENT SUMMARY

The assessment of potential impacts discussed above are collated in the tables below.

8.1 Construction Phase

Table 8-1: Impact Rating - Construction Phase – Traffic Congestion

TRAFFIC CONGESTION CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Traffic congestion during the construction phase	• Stagger component delivery to site • Reduce the construction period, where possible • Source mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods as much as possible • Conduct regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Short-term	Almost certain	2
With Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

Table 8-2: Impact Rating - Construction Phase – Air Quality

AIR QUALITY CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Air quality will be affected by dust pollution	• Dust suppression of gravel roads during the construction phase, as required. • Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Short-term	Almost certain	2
With Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

Table 8-3: Impact Rating - Construction Phase – Noise Pollution

NOISE POLLUTION CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Noise pollution due to the increase in traffic	• Stagger component delivery to site • Reduce the construction period, where possible • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Short-term	Almost certain	2
With Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

8.2 Operational Phase

Table 8-4: Impact Rating – Operational Phase

IMPACT TABLE – OPERATIONAL PHASE
The traffic generated during this phase will be minimal and will have not have any impact on the surrounding road network. However, the Client/Facility Manager is to ensure that regular maintenance of gravel roads occurs during operation phase to minimize/mitigate dust pollution.

8.3 Decommissioning Phase

Table 8-5: Potential Impact - Decommissioning Phase

IMPACT TABLE – DECOMMISSIONING PHASE
This phase will have a similar impact as the Construction Phase i.e. traffic congestion, air pollution and noise pollution, as similar trips/movements are expected.

9 CUMULATIVE IMPACTS

The cumulative impact assumes that all proposed and authorized renewable energy projects within 50 km be constructed at the same time. This is a precautionary approach, as in reality these projects would be subject to a highly competitive bidding process. Only a handful of projects would be selected to enter into a power purchase agreement with Eskom, and construction is likely to be staggered depending on project-specific issues.

The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

10 ENVIRONMENTAL MANAGEMENT PROGRAM INPUTS

It is recommended that dust suppression and maintenance of gravel roads form part of the EMPr. This would be required during the Construction phase where an increase in vehicle trips can be expected. No traffic related mitigation measures are envisaged during the operational phase due to the negligible traffic volume generated during this phase.

Project component/s	Construction Phase traffic
Potential Impact	Dust and noise pollution due to increase in traffic volume
Activity/risk source	Transportation of material, components, equipment and staff to site
Mitigation: Target/Objective	Minimize impacts on road network and surrounding communities

Mitigation: Action/control	**Responsibility**	**Timeframe**
• Stagger component delivery to site • The use of mobile batch plants and quarries near the site would decrease the impact on the surrounding road network • Dust suppression • Reduce the construction period as far as possible • Maintenance of gravel roads • Apply for abnormal load permits prior to commencement of delivery via abnormal loads • Assess the preferred route and undertake a 'dry run' • Staff and general trips should occur outside of peak traffic periods as far as possible. • Any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles, if required	• Holder of the EA	• Before construction commences and regularly during construction phase

Performance Indicator	Staggering or reducing the construction trips will reduce the impact of dust and noise pollution.
Monitoring	• Regular monitoring of road surface quality. • Monitoring congestion levels (increase in vehicle trips) • Apply for required permits prior to commencement of construction

11 CONCLUSION AND RECOMMENDATIONS

This report addressed key issues to be considered for the proposed Oslaagte Solar 3 facility.

- The preferred Port of Entry for imported components is Richards Bay.
- The proposed access point deemed the preferred access point as proposed access point 2 is located on a public road.
- Applications for wayleaves and permits for crossing the railway line, which runs parallel to the R76, should be made to the railway authority well in advance of construction commencing. Special safety measures e.g. access booms might be required to protect drivers of vehicles from oncoming railway traffic, especially in instances of poor visibility and increased traffic flow. Height clearances, of overhead power supply at the railway crossing need to physically be verified.
- It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will hence need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed. The gravel roads will require grading with a grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage.
- The construction phase traffic, although significant, will be temporary and can be mitigated to an acceptable level.
- During operation, it is expected that staff and security will periodically visit the facility. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.
- The construction and decommissioning phases of a development is the only significant traffic generator and therefore noise and dust pollution will be higher during this phase. The duration of this phase is short term i.e., the impact of the traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network.

The potential mitigation measures mentioned in the construction phase are:

- Dust suppression
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of mobile batch plants and quarries near the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods.
- A “dry run” of the preferred route.
- Design and maintenance of internal roads.
- If required, any low hanging overhead lines (lower than 5.1m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.

The potential mitigation measures mentioned in the operational phase are:

- Staff and general (maintenance) trips should occur outside of peak traffic periods as far as possible.
- The provision of water storage tanks and/or boreholes.

- Water bowsers trips should occur outside of peak traffic periods as far as possible.
- Spread the cleaning of the panels over a week.
- Using a larger water bowser.

The construction and decommissioning phases of a development is the only significant traffic generator and therefore noise and dust pollution will be higher during this phase. The duration of this phase is short term i.e., the impact of the traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network.

The development is supported from a transport perspective provided that the recommendations and mitigations contained in this report are adhered to.

The impacts associated with the facility are acceptable with the implementation of the recommended mitigation measures and can therefore be authorised.

12 REFERENCES

- Google Earth Pro
- National Road Traffic Act (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- The Technical Recommendations for Highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads
- The Technical Recommendations for Highways (TRH 17): Geometric Design of Rural Roads

13 ANNEXURES

Annexure A – SPECIALIST EXPERTISE

ADRIAN JOHNSON

Position in Firm	*Associate and Manager – Traffic and Transportation*
Area of Specialisation	*Traffic & Transportation Engineering*
Qualifications	*PrTechEng, Master of Transport Studies,* *BSc (Hons) (Applied Science: Transport Planning),* *BTech Civil Engineering*
Years of Experience	*18 Years*
Years with Firm	*6 Years*

SUMMARY OF EXPERIENCE

Adrian Johnson is a Professional Technologist registered with ECSA (201570274). He joined JG Afrika (Pty)Ltd. in January 2017. Adrian holds a BSc (Hons) (Applied Sciences: Transportation Planning) degree from the University of Pretoria, a BTech degree in Civil Engineering from the Cape Peninsula University of Technology and completed a Masters' degree in Transport Studies at the University of Cape Town in 2020. He has more than 18 years of experience in a wide range of engineering projects.

He has technical and professional skills in traffic impact studies, transport impact assessments, public transport planning, non-motorised transport planning & design, data analysis of public transport systems, access management plans, quality control, project planning and implementation, geometric design, site supervision, transport assessments for renewable energy projects, speed limit reviews and road safety audits.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

PrTechEng - Engineering Council of South Africa, Registration No 201570274
SAICE - South African Institute of Civil Engineering. No 201700129
SARF WR South African Road Federation Western Region Administrator and Committee Member

EDUCATION

2004 - National Diploma (Civil) – Peninsula Technikon
2006 - BTech (Civil) – Cape Peninsula University of Technology
2011 - BSc (Hon) (Applied Sciences: Transportation Planning) – University of Pretoria
2020 – Master of Transport Studies – University of Cape Town

SPECIFIC EXPERIENCE (Selection)

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)
September 2022 – Date
Position – Associate and Manager – Traffic and Transportation

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)
2017 – June 2022
Position – Senior Technologist (Traffic and Transportation Engineering)
Various Transport Impact Statements (TIA) and Traffic Impact Statements (TIS) for private clients including:

- Weltevreden Clinic TIS for Edifice Consulting Engineers
- Oakhurst Primary TIS for BVZ Plan
- Sinai Academy TIS for Bettesworth Scott Planners
- Rustlamere TIA for Bettesworth Scott Planners
- Joostenbergvlakte Farms 732 and 728 TIA for Asla
- Garden Emporium TIA for Rory Cameron Smith Architects
- Strandfontein Sandmine TIS for Chand Environmental Consultants
- Proposed development of Erf 538 Grassy Park TIA for First Plan
- Riebeek West: Proposed Function/Wedding Venue TIS for Elco Property Developers

Limpopo Road Asset Management System Undertake network level road safety assessments and analysis of accident statistics of the Limpopo road network (5 000km). – Client: Roads Agency Limpopo SOC Ltd

Kampies Housing Development Proposed upgrade of the informal settlement on Cape Farm 616 Philipi and Erf 63 Spring Field, providing 275 units. Client: Ian Rout & Associates

Highlands Housing Project Traffic calming plans for three proposed sites in Mitchells Plain, Cape Town – Client: City of Cape Town

Richards Bay Gas to Power Facility Transport study for the proposed renewable energy facility in Richards Bay, KwaZulu Natal – Client: Private Client

Solid Waste Management Sector Plan – Collections Work Brief Information Analyst assisting with the assessments and detailed analysis of the collections and drop-off facilities operating model of the City of Cape Town – Client: City of Cape Town

Nooiensfontein Housing Project Transport Study for the Nooiensfontein Housing Development in Bluedowns (2500 units) – Client: Ian Rout & Associates

Bardale Housing Development Transport Impact Assessment and Signal timing plan, Western Cape – Client: Integrated Housing Development

Enkanini Housing Transport Impact Assessment for the development of the Enkanini Informal Settlement, Kayamandi - Client: Stellenbosch Municipality

Sutherland and Rietrug Access Road Transport study for the upgrading and widening of the access road to the proposed Sutherland Windfarm, Northern Cape Client: Nala Environmental Consulting

Pienaarspoort Windfarm Transport study for the proposed Pienaarspoort Windfarm, Western Cape Client: Savannah Environmental (Pty) Ltd

Speed Limit Review Main Road 546, Main Road 552 and Divisional Road 2220, Lutzville, Western Cape – Client: Western Cape Government

Gromis and Komis Wind Energy Facility Transport study for the proposed Windfarm, Northern Cape. Client: CSIR

Geelkop Solar Facility Transport study for the proposed Geelkop Solar PV Facility near Upington, Northern Cape – Client: AEP (Pty) Ltd

Khunab Solar Facility Transport study for the proposed Khunab Solar PV Facility near Upington, Northern Cape – Client: AEP (Pty) Ltd

Bloemsmond Solar Facility Transport study for the proposed Bloemsmond Solar PV Facility near Upington, Northern Cape – Client: AEP (Pty) Ltd

NMT Study for the Upgrading of DR1285, Elgin – Client: Western Cape Government

Traffic Study for the Kudusberg and Rondekop Wind Energy Facilities, Northern Cape. Client: G7

Speed Limit Review Main Road 540, Elandsbay, Western Cape – Client: Western Cape Government

Road Safety Audit for N1 Section 16 Winburg to Ventersburg – Client: Aurecon on behalf of SANRAL

Road Safety Audit for the for the N4 at Bapong, Client: Bakwena

Road Safety Audit for N2 Wild Coast Toll Road Projects, Eastern Cape & Natal, Client: Aurecon/Knight Piesold on behalf of SANRAL

Kuruman Wind Energy Facility Transport study for the proposed Kuruman Windfarm, Northern Cape. Client: CSIR

Coega West Windfarm Transportation and Traffic Management Plan for the proposed Coega Windfarm in Coega, Port Elizabeth – Client: Electrawinds Coega

Parking Audit of the Groenvallei area in Bellville – Client: City of Cape Town

Road Safety Appraisals for the Mpumalanga Province – Client: Mpumalanga Provincial Government

Transportation and Traffic Management Plan for the proposed Coega West Wind Energy Facility in Port Elizabeth – Client: Electrawinds Coega (Pty) Ltd

Road Safety Appraisals for North Region of Cape Town – Client: Aurecon on behalf of City of Cape Town

Speed Limit Reviews for North Region of Cape Town – Client: Aurecon on behalf of City of Cape Town

Road Safety Audit for the Upgrade of N1 Section 4 Monument River – Client: Aurecon on behalf of SANRAL

Road Safety Audit for the Upgrade of N2 Section 8 Knysna to Wittedrift – Client: SMEC on behalf of SANRAL

Road Safety Audit for the Upgrade of N1 Section 16 Zandkraal to Winburg South – Client: SMEC on behalf of SANRAL

Traffic and Road Safety Studies for the Improvement of N7 Section 2 and Section 3 (Rooidraai and Piekenierskloofpass) – Client: SANRAL

Traffic Engineer for the Upgrade of a 150km Section of the National Route N2 from Kangela to Pongola in KwaZulu-Natal, Client: SANRAL

Annexure B – IMPACT ASSESSMENT METHODOLOGY

<u>**Nature (/Status)**</u> The project could have a positive, negative or neutral impact on the environment.
<u>**Extent**</u> • 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.
<u>**Magnitude**</u> 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.
<u>**Duration**</u> • 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.
<u>**Probability**</u> • 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.
<u>**Significance**</u> 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.

FLORA CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Proliferation of alien invasive species.	• To prevent unnecessary alien plant infestations, an alien plant monitoring and eradication programme needs to be in place, at least until the disturbed areas have recovered and properly stabilised. • The construction area and immediate surroundings should be monitored regularly for emergent invasive vegetation. • Promote awareness of all personnel. • Larger exotic species that are not included in the Category 1b list of invasive species could also be allowed to remain for aesthetic purposes					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1

APPENDIX E10: Specialist Declarations

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

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

PROJECT TITLE

Kroonstad South / Oslaagte Solar PV Cluster – Social Impact Assessment

Kindly note the following:

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Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	Nemai Consulting (PTY) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	1	Percentage Procurement recognition	135%
Specialist name:	Ciaran Chidley			
Specialist Qualifications:	B.Sc (Eng), BA (Econ), MBA			
Professional affiliation/registration:	ECSA, Pr. Eng.			
Physical address:	147 Bram Fischer Drive, Ferndale, 2194			
Postal address:	PO Box 1673, Sunninghill, 2157			
Postal code:	2157	Cell:		
Telephone:	011 781 1730	Fax:		
E-mail:	CiaranC@nemai.co.za			

2. DECLARATION BY THE SPECIALIST

I, ______Ciaran Chidley____________________, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Nemai Consulting (PTY) Ltd

Name of Company:

2022/06/02

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, ____Ciaran Chidley____________________, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Nemai Consulting (PTY) Ltd

Name of Company

2023/06/02

Date

80369511
SUTIMAIANGANSE

Signature of the Commissioner of Oaths

2023.06.02

Date

SOUTH AFRICAN POLICE SERVICE
COMMUNITY SERVICE CENTRE
2023 -06- 02
LINDEN
SUID-AFRIKAANSE POLISIEDIENS

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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Date Received:	

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

PROJECT TITLE

Palaeontological Impact Assessment to assess the proposed Oslaagte Solar 3 Photovoltaic Project south east of Kroonstad, Free State Province

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Arcadia

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Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	Banzai Environmental (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	Level Four	Percentage Procurement recognition	51%
Specialist name:	Elize Butler			
Specialist Qualifications:	MSc			
Professional affiliation/registration:				
Physical address:	14 Eddie de Beer, Dan Pienaar, Bloemfontein			
Postal address:	14 Eddie de Beer, Dan Pienaar, Bloemfontein			
Postal code:	9301	Cell:	0844478759	
Telephone:		Fax:		
E-mail:	info@banzai-group.com			

2. DECLARATION BY THE SPECIALIST

I, Elize Butler, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Banzai Environmental

Name of Company:

23 May 2023

Date

2. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Elize Butler, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Banzai Environmental Pty Ltd

Name of Company

22 May 2023

Date

7187052 SG7
7SOAEH

Signature of the Commissioner of Oaths

2023-05-22

Date

S AFRIK POLISIE ENS
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2023 -05- 22
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SC CE S

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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NEAS Reference Number:	DEA/EIA/
Date Received:	

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

PROJECT TITLE

KROONSTAD SOUTH SOLAR PV PROJECT, FREE STATE PROVINCE.

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Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	NITAI CONSULTING (PTY) LTD.			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	1	Percentage Procurement recognition	
Specialist name:	DIVAN VAN ROOYEN			
Specialist Qualifications:	Ph. D. ENVIRONMENTAL SCIENCE (AQUATIC HEALTH)			
Professional affiliation/registration:	SACNASP (CAN. NAT. SCI. AQUATIC SCIENCE: 151272)			
Physical address:	147 BRAM FISCHER DR. FERNDALE, RANDBURG.			
Postal address:	P.O. BOX 1673, SUNNINGHILL			
Postal code:	2157	Cell:	083 265 8776	
Telephone:	011 781 1730	Fax:		
E-mail:	divan VR @ nitaiconsulting.co.za			

2. DECLARATION BY THE SPECIALIST

I, DIVAN VAN ROOYEN, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

____
Signature of the Specialist

Nitai CONSULTING ~~[illegible]~~ (PTY) LTD.
Name of Company:

28/05/2023
Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Divan van Rooyen, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Nitai Consulting (Pty) Ltd.

Name of Company

28/05/2023

Date

7086002 SQ

Signature of the Commissioner of Oaths

2023-05-28

Date

SOUTH AFRICAN POLICE SERVICE
CSC COMMANDER
2023 -05- 28
DOUGLASDALE
SOUTH AFRICAN POLICE SERVICE

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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

PROJECT TITLE

Oslaagte Solar PV 3

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473 Steve Biko Road
Arcadia

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Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	The Biodiversity Company			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Dr Lindi Steyn			
Specialist Qualifications:	PhD Biodiversity and Conservation			
Professional affiliation/registration:	SACNASP Pr Sci Nat 119992			
Physical address:	777 Peridot Street Jukskei Park			
Postal address:				
Postal code:	2188	Cell:	0721293759	
Telephone:		Fax:		
E-mail:	lindi@thebiodiversitycompany.com			

2. DECLARATION BY THE SPECIALIST

I, Lindi Steyn, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

The Biodiversity Company

Name of Company:

15/05/2023

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Lindi Steyn, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

The Biodiversity Company

Name of Company

15/05/2023

Date

Signature of the Commissioner of Oaths

15/05/2023

Date

Certified as a true copy of original

Farai Shadreck Mbirimi BD52805
Minister of Religion / Commissioner of Oaths
391 11th Road, Erand, Midrand 1685

Date 15/05/2023

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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PROJECT TITLE

Proposed 480MW Oslaagte Solar 3 Photovoltaic Project South East of Kroonstad, Free State Province

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1. SPECIALIST INFORMATION

Specialist Company Name:	Environmental Assurance (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	2	Percentage Procurement recognition	
Specialist name:	Richard Viljoen			
Specialist Qualifications:	MSc. Environmental Science			
Professional affiliation/registration:				
Physical address:	394 Tram Street, Brooklyn, Gauteng			
Postal address:	394 Tram Street, Brooklyn, Gauteng			
Postal code:	0181	Cell:	071 122 1443	
Telephone:	012 460 9768	Fax:	NA	
E-mail:	richard@envass.co.za			

2. DECLARATION BY THE SPECIALIST

I, Richard Geoffrey Viljoen, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
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- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

RViljoen

Signature of the Specialist

Environmental Assurance (Pty) Ltd

Name of Company:

2023-05-12

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Richard Viljoen**, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Environmental Assurance (Pty) Ltd

Name of Company

2023-05-12

Date

MV 12/05/2023

Signature of the Commissioner of Oaths

Date:

Commisioner of Oaths Ref No: 9/1/8/2 Pretoria
Mandy Lynn Meiring
Manager Postnet Brooklyn Mall

Date

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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

PROJECT TITLE

Oslaagte Solar PV Project, near Kroonstad, Free State Province

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Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	Nitai Consulting (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	1	Percentage Procurement recognition	
Specialist name:	Jennifer Kitto			
Specialist Qualifications:	BA Hons			
Professional affiliation/registration:	Association Southern African Professional Archaeologists (ASAPA) International Association for Impact Assessment (South Africa) IAIAsa			
Physical address:	147 Bram Fischer Drive, Randburg 2194,South Africa			
Postal address:	PO Box 1673, Sunninghill, South Africa			
Postal code:	2157	Cell:	+27 63 331 6606	
Telephone:	+27 11 781 1730	Fax:	+27 11 781 1731	
E-mail:	jenniferk@nitaiconsulting.co.za			

2. DECLARATION BY THE SPECIALIST

I, JENNIFER KITTO, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Kitto

Signature of the Specialist

NITAI CONSULTING

Name of Company:

19/05/2023

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, JENNIFER KITTO, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

NITAI CONSULTING

Name of Company

19/05/2023

Date

Signature of the Commissioner of Oaths

19/05/2023

Date