MOOI PLAATS SOLAR POWER (PTY) LTD

Proposed Development of the Mooi Plaats On-site Eskom Substation, Eskom Collector Substation and associated 132kV Power Line near Noupoort in the Northern Cape Province

Draft Basic Assessment Report (DBAR)

DEFF Reference Number: To be Allocated

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KEY PROJECT INFORMATION

FARM DESCRIPTION	21-DIGIT SURVEYOR GENERAL (SG) CODE
Remainder of the Farm Mooi Plaats No. 121	C03000000000012100000
Portion 1 of the Farm Leuwe Kop No. 120	C03000000000012000001
Portion 6 of the Farm Uitzicht No. 3	C04800000000000300006
Portion 7 of the Farm Uitzicht No. 3	C04800000000000300007
Portion 8 of the Farm Uitzicht No. 3	C04800000000000300008

*Grid connection infrastructure alternatives (which include on-site and collector substation sites and 132kV power line corridors) have been identified and comparatively assessed by the respective specialists. These alternatives essentially provide for different power line route alignments with associated substations (on-site and collector) contained within an assessment corridor. It should be noted that the substation sites are intrinsically linked to the grid connection infrastructure alternatives (has been explained in **section 8** of this report). The grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists have therefore informed the location of the on-site and collector substation sites being proposed as part of this Basic Assessment (BA) application. Grid Connection Option 1a has been selected as the preferred grid connection infrastructure alternative and thus Substation 1a (Northern Collector) and Substation 2 (On-site) are being proposed, as these are intrinsically linked to this grid connection infrastructure alternative. The proposed On-site Eskom Substation (namely Substation 2) will be located on Remainder of the Farm Mooi Plaats No. 121, while the proposed Eskom Northern Collector Substation (namely Substation 1a) will be located on Portion 1 of the Farm Leuwe Kop No. 120. It should be noted that only the farms / properties which will be traversed and/or affected by the power line associated with Grid Connection Option 1a (namely the 'preferred' grid connection infrastructure alternative) have been provided in the table above. All grid connection infrastructure alternatives were however extensively investigated and comparatively assessed (refer to **section 8**).*

MOOI PLAATS GRID: PREFERRED 132kV POWER LINE CORRIDOR ALTERNATIVE				
CENTRE LINE COORDINATES (DD MM SS.sss)				
CORRIDOR ALTERNATIVE	START POINT	MIDDLE POINT	END POINT (HYDRA D MTS)	APPROX LENGTH (KM)
Option 1a	S31° 17' 39.289"	S31° 20' 5.021"	S31° 21' 20.482"	13.34
	E24° 43' 51.440"	E24° 46' 36.932"	S31° 21' 20.482"	

For the purpose of this BA, corridors between approximately 400m and 900m wide were assessed for the proposed grid connection infrastructure alternatives. This is to allow for flexibility to route the power line on either side of the existing high voltage Eskom power lines. However, the final servitude width of the proposed 132kV power line will only be 36m. As such, the selected preferred power line will be routed within the assessed corridor.

MOOI PLAATS GRID: PREFERRED ON-SITE AND COLLECTOR SUBSTATION SITE ALTERNATIVE COORDINATES		
ALTERNATIVE		CENTRE POINT COORDINATES

	AREA (HECTARES)	SOUTH	EAST
Substation 1a (Eskom Northern Collector Substation)	4	S31° 18' 47.922"	E24° 46' 6.243"
Substation 2 (On-site Eskom Substation)	4	S31° 17' 39.289"	E24° 43' 51.440"

*As mentioned, the substation sites are intrinsically linked to the grid connection infrastructure alternatives (has been explained in **section 8** of this report). The locations for the on-site and collector substation sites being proposed as part of this BA application have therefore been informed by the grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists. Grid Connection Option 1a has been selected as the preferred grid connection infrastructure alternative and thus Substation 1a (Northern Collector) and Substation 2 (On-site) are being proposed, as these are intrinsically linked to this grid connection infrastructure alternative. In addition, the proposed substations include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substations have been included in the solar PV energy facility EIA (part of a separate on-going EIA process with **DEFF Ref No.:**: 14/12/16/3/3/2/1134) and in the grid infrastructure BA to allow for handover to Eskom.*

Refer to **Appendix 9A** for the list of coordinates. A full list of coordinates (including all the bending points of the proposed power line corridor alternatives, from the starting point to the finishing point) will be provided as part of the Final Basic Assessment Report (FBAR).

PHOTOGRAPHS OF SITE:

Figure i: General characteristics of the study area

The entire study area is largely in a natural state but used for animal production. There is well-established farm infrastructure on each landholding, including homesteads, farm buildings, camps, dams, small areas of cultivated lands, and some stands of exotic trees used as shade and windscreens. There are also access roads, narrow gravel roads, jeep tracks and fences. The vegetation in the study area is used primarily for livestock grazing and is affected to some degree by this usage, but not to the extent that any severe degradation was noted on-site. Except for this infrastructure, the vegetation and habitats in the study area appear to be largely in a natural state and reflecting what would be expected according to the natural relationship between the physical environment and the vegetation. This natural pattern extends beyond the study area in all directions and gives the general area a sense of being relatively untransformed and largely natural.

The northern section of the corridor for Grid Connection Option 1 has generally mildly undulating topography with a few isolated ridges. The southern portion of the corridor traverses a number of drainage features as it moves into a hilly / mountainous region in the south. The northern and southern sections of the corridor for Grid Connection Option 2 overlap or runs parallel to a large extent to sections of Option 1.

Therefore, in the north, the topography is generally mildly undulating topography with a few isolated ridges. In the south the corridor traverses several drainage features as it moves into a hilly / mountainous region in the south. The topography is mildly undulating, except for a ridge roughly in the middle of the section.

STRUCTURE HEIGHT: At this stage, the type of towers being considered for the proposed power line include both lattice and monopole towers. It is assumed that the proposed towers will be located approximately 200m to 250m apart. The towers will be up to approximately 25m in height, depending on the terrain, but will ensure minimum overhead line clearances from buildings and surrounding infrastructure. The exact height and location of the towers will however be confirmed during the final design stages of the power line design process. The exact height will however also be confirmed during the final design stages of the respective substations.

SURFACE AREA TO BE COVERED: The proposed on-site and collector substations will each occupy an area of up to approximately 4 hectares (ha). The surface area which is to be covered by the proposed power line towers has however not been determined yet. It should be noted that the final design details are yet to be confirmed and will become available during the detailed design phase of the proposed development. The surface area which is to be covered by the proposed development will thus be confirmed during the detailed design phase of the project, when the final design details have been confirmed and become available.

SUBSTATION AND POWER LINE DESIGN: The proposed substations consist of on-site and collector substations with voltages of 33/132kV. The proposed substations will contain transformers for voltage step-up from medium voltage to high voltage. Direct Current (DC) power from the panels will be converted into Alternating Current (AC) power in the inverters and the voltage will be stepped up to medium voltage in the inverter transformers. The proposed substations will be shared substations connecting the proposed Mooi Plaats Solar Photovoltaic (PV) Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) to the Hydra D Main Transmission Substation (MTS) (part of a separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[1]), which will still be constructed (**Figure i**). As mentioned, the proposed on-site and collector substations will each occupy an area of up to approximately 4ha.

An overhead power line of up to 132kV is proposed. Based on the option chosen as 'preferred' for the grid connection infrastructure alternatives, the power line will run from the proposed Mooi Plaats On-site Eskom Substation (namely Substation 2, to the proposed Mooi Plaats Eskom Northern Collector Substation (namely Substation 1a) and finally to the Hydra D MTS[1], which will still be constructed.

At this stage, the type of power line towers being considered for the proposed 132kV overhead power line include both lattice and monopole towers. It is assumed that the proposed towers will be located

[1] Originally formed part of Umsobomvu WEF (14/12/16/3/3/2/730) which was issued with an EA on 17 February 2017. EA however split into three (3) separate EAs, namely Umsobomvu I WEF (14/12/16/3/3/2/730/AM2), Coleskop WEF (14/12/16/3/3/2/730/1/AM2) and Eskom Infrastructure MTS (14/12/16/3/3/2/730/2) (which includes Eskom Hydra D MTS)

approximately 200m to 250m apart. The towers will be up to approximately 25m in height, depending on the terrain, but will ensure minimum overhead line clearances from buildings and surrounding infrastructure. The exact height and servitude width of the power line towers will however be confirmed during the final design stages of the power line design process. Access roads to the Mooi Plaats On-site Eskom Substation and Eskom Collector Substation will form part of the associated infrastructure.

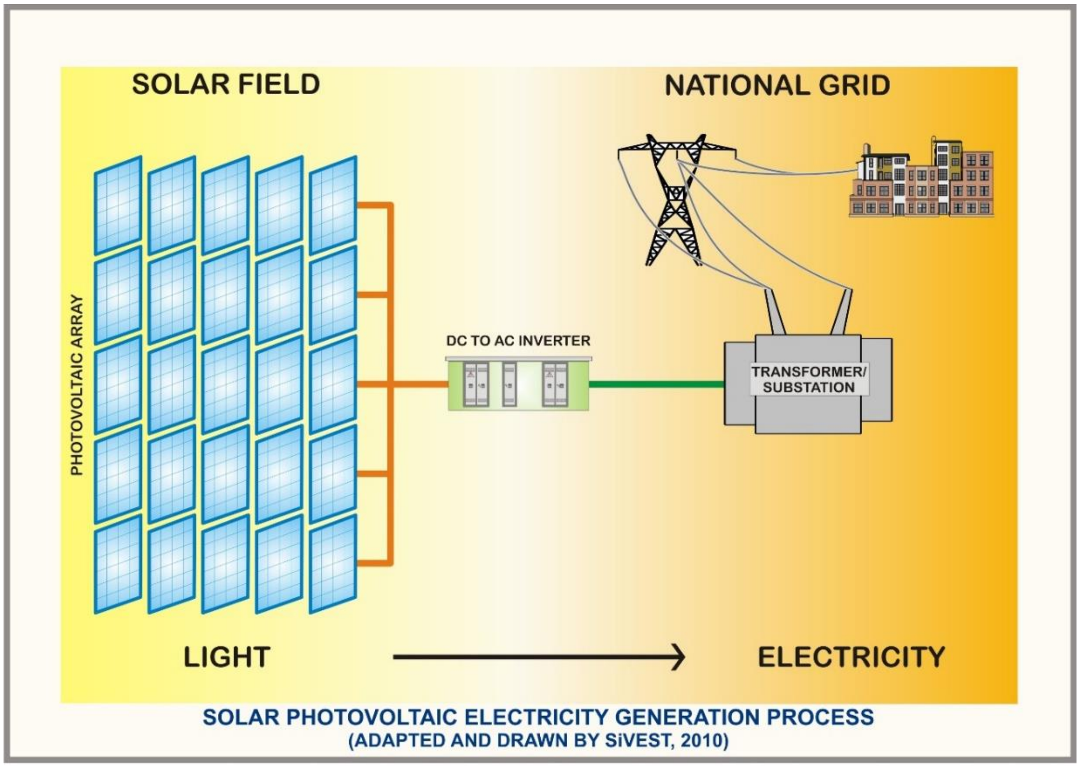

Figure i: Conceptual PV electricity generation process showing electrical connections

GENERATION CAPACITY: The proposed Mooi Plaats On-site Eskom Substation and Eskom Collector Substation will have voltages of 33/132kV respectively. The associated overhead power line will have a voltage of up to approximately 132kV.

As mentioned, the final design details of the proposed development will become available during the detailed design phase of the project, after the proposed development has been selected as a Preferred Bidder project under the Department of Energy's (DoE's) Renewable Energy Independent Power Producers Procurement Programme (REIPPPP).

A3 Maps of all maps included in the report are included in **Appendix 5**.

EXECUTIVE SUMMARY

Mooi Plaats Solar Power (Pty) Ltd (hereafter referred to as Mooi Plaats Solar Power) is proposing to construct one (1) 33/132kV on-site Eskom substation, one (1) 33/132kV Eskom collector substation and an associated 132kV overhead power line near Noupoort in the Northern Cape Province (hereafter referred to as the 'proposed development'). The overall objective of the proposed development is to feed the electricity generated by the proposed Mooi Plaats Solar Photovoltaic (PV) Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) into the national grid.

The proposed development forms one (1) of three (3) electrical infrastructure developments (substations and overhead power lines) that are being proposed as part of the greater Umsobomvu PV project. In addition, three (3) solar PV energy facilities are also being proposed as part of the greater Umsobomvu PV project. The other proposed developments (solar PV and grid) which form part of the greater Umsobomvu PV project include the following:

- Mooi Plaats Solar PV – **DEFF Reference Number:** 14/12/16/3/3/2/1134 (part of separate on-going EIA process);
- Wonderheuvel Solar PV - **DEFF Reference Number:** 14/12/16/3/3/2/1135 (part of separate on-going EIA process);
- Wonderheuvel Grid – **DEFF Reference Number:** To be Allocated (part of separate on-going BA process);
- Paarde Valley Solar PV - **DEFF Reference Number:** 14/12/16/3/3/2/1136 (part of separate on-going EIA process); and
- Paarde Valley Grid – **DEFF Reference Number:** To be Allocated (part of separate on-going BA process).

As mentioned, the proposed development is being proposed to feed the electricity generated by the Mooi Plaats Solar PV Energy Facility into the national grid. The proposed solar PV energy facility will however, require a separate Environmental Authorisation (EA) and is subject to a separate on-going Environmental Impact Assessment (EIA) process (**DEFF Ref No.:** 14/12/16/3/3/2/1134). It should be noted that the proposed electrical infrastructure development (substations and overhead 132kV power line) will be handed over to Eskom once constructed. The on-site and collector substations will include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substations have been included in the solar PV energy facility EIA (**DEFF Ref No.:** 14/12/16/3/3/2/1134) and in this associated electrical infrastructure Basic Assessment (BA) to allow for handover to Eskom. Although the solar PV energy facility and associated electrical infrastructure (132kV overhead power line, on-site substation and collector substation) will be assessed separately, a single public participation process is being undertaken to consider all of the proposed projects [i.e. three (3) solar PV energy facility EIAs and three (3) grid connection BAs]. The potential environmental impacts associated with all of the developments will be assessed as part of the cumulative impact assessment.

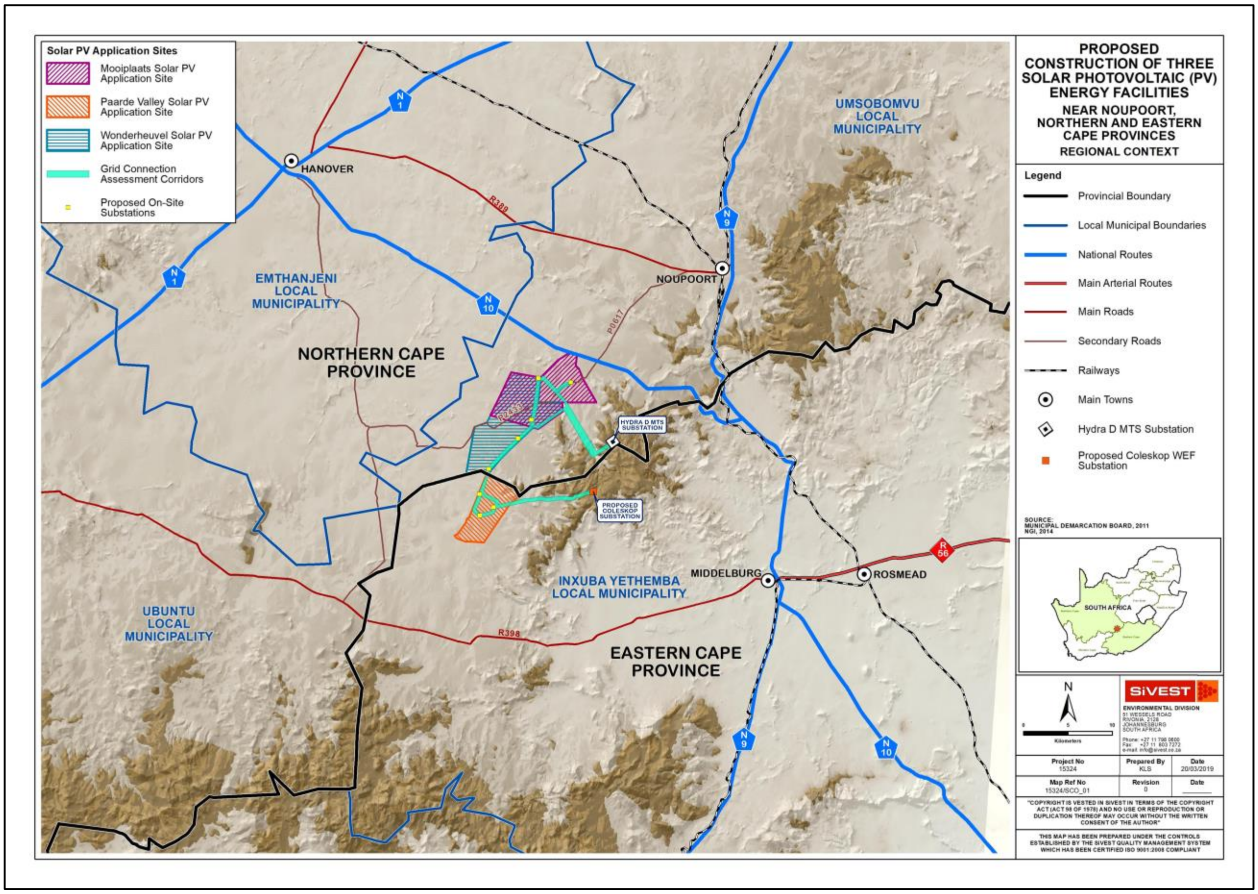

Figure ii: Regional context of greater Umsobomvu PV project

In terms of the EIA Regulations, which were published on 4 December 2014 and amended on 7 April 2017, various aspects of the proposed development are considered listed activities which may have an impact on the environment and therefore require authorisation from the National Department of Environment, Forestry and Fisheries (DEFF) prior to the commencement of such activities. However, the relevant provincial authority will also be consulted (i.e. the Northern Cape Department of Environment and Nature Conservation - NC DENC).

SiVEST SA (Pty) Ltd Environmental Division has been appointed by Mooi Plaats Solar Power as the independent Environmental Assessment Practitioner (EAP) to undertake the BA process for the proposed construction and operation of the Mooi Plaats 33/132kV On-site Eskom Substation, 33/132kV Eskom Collector Substation and 132kV overhead power line.

Due to the fact that the proposed development is not located within any of the Central Strategic Transmission Corridors as defined and in terms of the procedures laid out in Government Notice No. 113[2], the proposed development will be subject to a full BA process in terms of the National Environmental

[2] Formally gazetted on 16 February 2018 (Government Notice No. 113)

Management Act (Act No. 107 of 1998) (NEMA), as amended, and the EIA Regulations, 2014 (as amended).

All relevant legislation and guidelines (including Equator Principles) will be consulted during the BA process and will be complied with at all times.

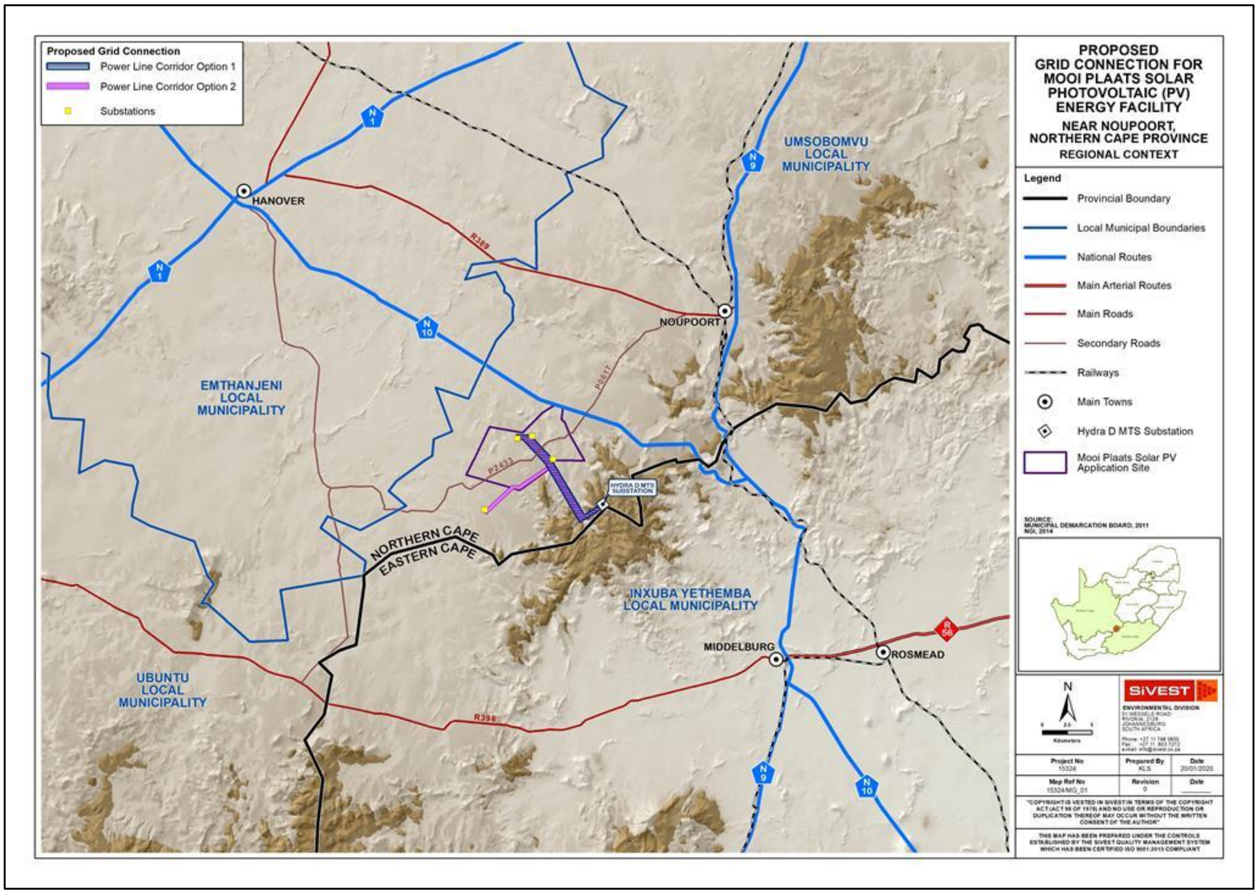

Figure iii: Mooi Plaats On-site Eskom Substation, Eskom Collector Substation and 132kV overhead power line in the regional context

Grid connection infrastructure alternatives (which include on-site and collector substation sites and 132kV power line corridors) have been comparatively assessed by the respective specialists. These alternatives essentially provide for different power line route alignments with associated substations (on-site and collector) contained within an assessment corridor.

MOOI PLAATS GRID: PREFERRED 132kV POWER LINE CORRIDOR ALTERNATIVE				
CENTRE LINE COORDINATES (DD MM SS.sss)				
CORRIDOR ALTERNATIVE	START POINT	MIDDLE POINT	END POINT (HYDRA D MTS)	APPROX LENGTH (KM)

Option 1a	S31° 17' 39.289"	S31° 20' 5.021"	S31° 21' 20.482"	13.34
	E24° 43' 51.440"	E24° 46' 36.932"	S31° 21' 20.482"	

For the purpose of this BA, corridors between approximately 400m and 900m wide were assessed for the proposed grid connection infrastructure alternatives. This is to allow for flexibility to route the power line on either side of the existing high voltage Eskom power lines. However, the final servitude width of the proposed 132kV power line will only be 36m. As such, the selected preferred power line will be routed within the assessed corridor.

MOOI PLAATS GRID: PREFERRED ON-SITE AND COLLECTOR SUBSTATION SITE ALTERNATIVE COORDINATES			
ALTERNATIVE	**AREA (HECTARES)**	**CENTRE POINT COORDINATES**	
		SOUTH	**EAST**
Substation 1a (Eskom Northern Collector Substation)	4	S31° 18' 47.922"	E24° 46' 6.243"
Substation 2 (On-site Eskom Substation)	4	S31° 17' 39.289"	E24° 43' 51.440"

As mentioned, the substation sites are intrinsically linked to the grid connection infrastructure alternatives (This has been explained in **section 8** of this report). The locations for the on-site and collector substation sites being proposed as part of this BA application have therefore been informed by the grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists. Grid Connection Option 1a has been selected as the preferred grid connection infrastructure alternative and thus Substation 1a (Northern Collector) and Substation 2 (On-site) are being proposed, as these are intrinsically linked to this grid connection infrastructure alternative. In addition, the proposed substations include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substations have been included in the solar PV energy facility EIA (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) and in this grid infrastructure BA to allow for handover to Eskom.

Refer to **Appendix 9A** for the list of project coordinates. A full list of coordinates (including all the bending points of the proposed preferred power line corridor alternative, from the starting point to the finishing point) will be provided as part of the Final Basic Assessment Report (FBAR).

The proposed development is located approximately 23km south-west of the town of Noupoort, in the Northern Cape Province. The development area assessed by the specialists incorporated six (6) farm portions within the Umsobomvu Local Municipality, in the Pixley ka Seme District Municipality. However, only five (5) farm portions are affected by the power line corridor route associated with the 'preferred' grid connection infrastructure alternative (namely Grid Connection Option 1a). These include the following:

- Remainder of the Farm Mooi Plaats No. 121;
- Portion 1 of the Farm Leuwe Kop No. 120;

- Portion 6 of the Farm Uitzicht No. 3;
- Portion 7 of the Farm Uitzicht No. 3; and
- Portion 8 of the Farm Uitzicht No. 3.

At this stage, it is anticipated that the proposed development will include the following components:

- One (1) new on-site substation (namely Substation 2) and one (1) new collector substation (namely Substation 1a – Northern Collector) to serve the Mooi Plaats Solar PV Energy Facility (part of separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134), each occupying an area of up to approximately 4 hectares (ha). The proposed substations will be step-up substations and will include an Eskom portion and an IPP portion, hence the substations have been included in the solar PV energy facility EIA and in the grid infrastructure BA to allow for handover to Eskom; and
- A new 132kV overhead power line connecting the on-site and collector substations to either the Hydra D Main Transmission Substation (MTS) (part of separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[3]) or the proposed Coleskop Wind Energy Facility (WEF) substation (part of separate BA process with **DEFF Ref No.:** 14/12/16/3/3/1/2039[4]), depending on which grid connection infrastructure alternative is chosen as preferred, from where the electricity will be fed into the national grid. The type of power line towers being considered at this stage include both lattice and monopole towers, which will be up to approximately 25m in height.

The following assessments were conducted to identify and assess the issues associated with the proposed development:

- Terrestrial Ecology Impact Assessment;
- Avifauna Impact Assessment (incl. pre-construction monitoring);
- Surface Water Impact Assessment;
- Desktop Agricultural and Soils Impact Assessment;
- Desktop Geotechnical Impact Assessment;
- Visual Impact Assessment;
- Heritage Impact Assessment;
- Palaeontology Impact Assessment; and
- Desktop Social Impact Assessment.

The above-mentioned specialist studies were also undertaken to inform the impact assessment of the proposed development. Based on the specialist assessments which were conducted, a few potentially sensitive areas have been identified within the study area. These sensitive areas were subsequently used to inform the area for the potential erection of the substations (on-site and collector) and 132kV overhead

[3] Originally formed part of Umsobomvu WEF (14/12/16/3/3/2/730) which was issued with an EA on 17 February 2017. EA however split into three (3) separate EAs, namely Umsobomvu I WEF (14/12/16/3/3/2/730/AM2), Coleskop WEF (14/12/16/3/3/2/730/1/AM2) and Eskom Infrastructure MTS (14/12/16/3/3/2/730/2) (which includes Eskom Hydra D MTS)

[4] Part of separate BA process for supporting infrastructure for Coleskop WEF (14/12/16/3/3/2/730/1/AM2). Was not part of original Umsobomvu WEF application (14/12/16/3/3/2/730)

power line. In addition, the proposed layout was further refined to avoid environmental sensitivities and was subsequently investigated by the respective specialists. It should be noted that prior to submission of the DBAR, preliminary power line corridor routes and substation sites were considered by the applicant. However, in order to ensure that the proposed development avoids the sensitive and 'no-go' areas identified by the specialists, the preliminary power line corridor routes and substation sites were subsequently amended.

The sensitive areas also informed the assessment of grid connection infrastructure alternatives (which include on-site and collector substation sites and 132kV power line corridors) (detailed in **section 8**), which have been comparatively assessed by the respective specialists during the BA process[5]. These alternatives essentially provide for two (2) different route alignments with associated substations (on-site and collector) contained within an assessment corridor between approximately 400m and 900m wide. This is to allow for flexibility to route the power line on either side of the existing high voltage Eskom power lines. It should be noted that the substation sites are intrinsically linked to the grid connection infrastructure alternatives. As such, the grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists have informed the location of the on-site and collector substation sites being proposed as part of this BA application. All alternatives were assessed against the 'no-go' alternative (i.e. *status quo*).

The proposed grid connection infrastructure alternatives which were investigated and comparatively assessed in relation to the identified environmental sensitive areas are presented in **Figure iv** below.

[5] Based on the pre-application meeting held with the DEFF on 19 February 2019, it was confirmed that the specialists could compile one (1) combined report covering all three (3) of the proposed Umsobomvu PV projects as well as the three (3) assocaited grid infrastructure developments (substations and 132kV power lines), provided the findings and impact assessment sections are project specific. A copy of the pre-application meeting minutes is provided in **Appendix 9B**

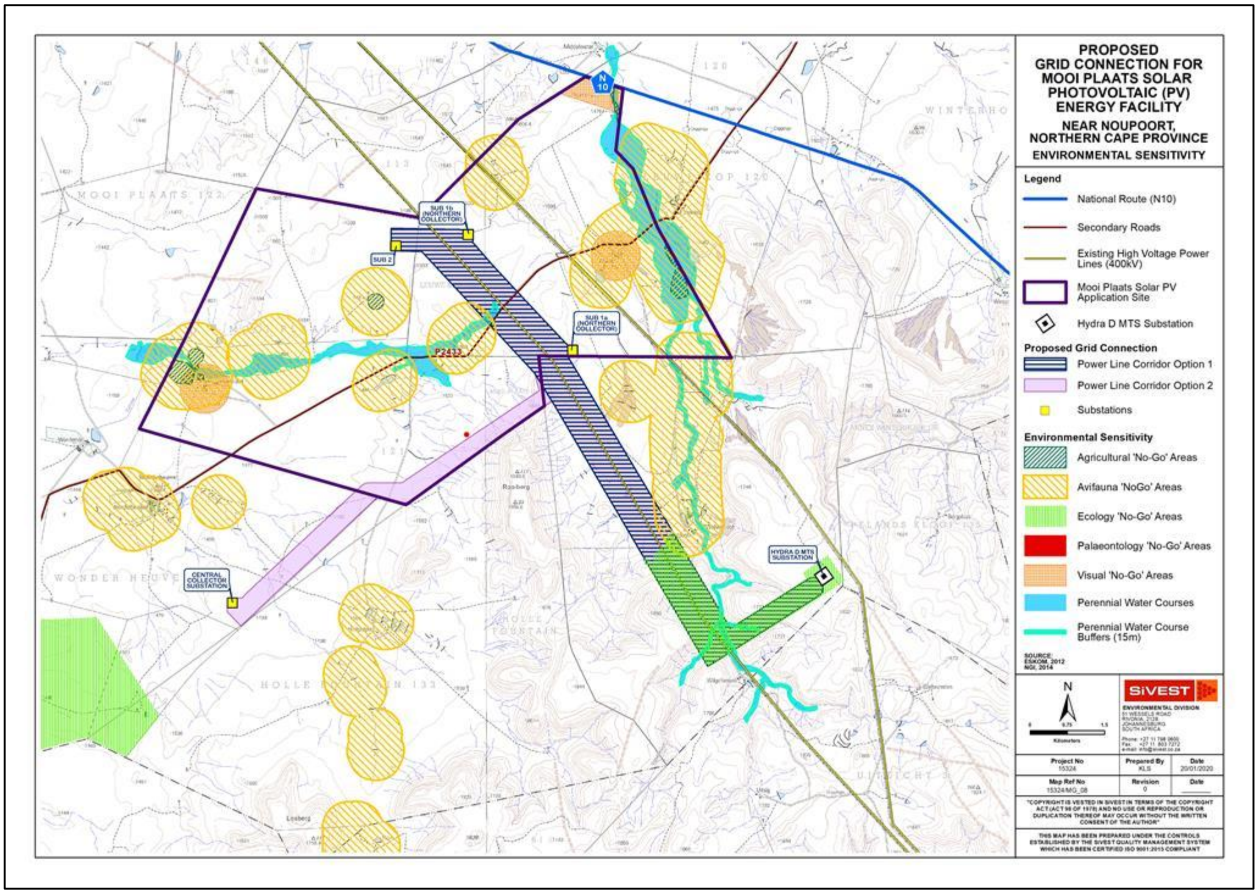

Figure iv: Proposed grid connection infrastructure alternatives in relation to environmental sensitive areas

The results of the comparative assessment of grid connection infrastructure alternatives from the specialist assessments are summarised in **Table i** below and are also presented in **section 8** of this Draft Basic Assessment Report (DBAR).

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Table i: Summary of comparative assessment of grid connection infrastructure alternatives

ALTERNATIVE	**ENVIRONMENTAL ASPECT**									**FATAL FLAW (YES / NO)**	**PREFERRED (YES /NO)**
	Terrestrial Ecology	**Surface Water**	**Visual**	**Geotechnical**	**Avifauna**	**Social**	**Palaeontology**	**Agricultural and Soils**	**Heritage**		
GRID CONNECTION INFRASTRUCTURE (132kV POWER LINE AND ON-SITE AND COLLECTOR SUBSTATIONS) ALTERNATIVES											
Grid Connection Option 1a (Substation 1a and 2)	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	No Preference	No Preference	No Preference	NO	**YES**
Grid Connection Option 1b (Substation 1b and 2)	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	No Preference	No Preference	No Preference	NO	**YES**
Grid Connection Option 2a (Substation 1a and 2)	Favourable	Favourable	Favourable	Favourable	Not Preferred	Favourable	No Preference	No Preference	No Preference	NO	NO
Grid Connection Option 2b (Substation 1b and 2)	Favourable	Favourable	Favourable	Favourable	Not Preferred	Favourable	No Preference	No Preference	No Preference	NO	NO

In terms of the grid connection infrastructure alternatives, **Grid Connection Option 1a** and **Option 1b** were found to be the most preferred alternatives from an environmental perspective. This is due to the fact that majority of the specialists (namely Terrestrial Ecology, Surface Water, Visual, Geotechnical, Avifauna and Social) found Option 1a and Option 1b to be 'Preferred', while the remainder of the specialists found there to be 'No Preference' between these two (2) alternatives. In addition, Grid Connection Option 2a and 2b were found to be 'Not Preferred' from an Avifauna perspective and are thus not deemed to be acceptable grid connection infrastructure alternatives from an environmental perspective. As mentioned, the substation site alternatives are intrinsically linked to the grid connection infrastructure alternatives. As such, the grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists have informed the location of the on-site and collector substation sites. In light of the above, **Substation 1a (Northern Collector)** and **Substation 2 (on-site)** are being proposed, as these are intrinsically linked to **Grid Connection Option 1a** which is preferred from an environmental perspective.

Based on the results of the comparative assessment of alternatives, the following alternatives are preferred:

- **Grid Connection Option 1a (132kV overhead power line corridor route);**
- **Substation 1a (Northern Collector Substation); and**
- **Substation 2 (On-site Substation).**

It is requested that the above-mentioned alternatives be authorised by the DEFF. The substation site alternatives being proposed as part of this BA application also align with the preferences for the substation sites associated with the proposed Mooi Plaats Solar PV Energy Facility EIA (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134). It must be noted that the specialist sensitivities and 'no-go' areas informed the location of all alternatives and have been incorporated into the layout design of the preferred site layout (**Figure v**). In addition, no fatal flaws were identified and therefore all of the alternatives mentioned above are considered to be acceptable, although not necessarily preferable from an environmental perspective.

The preferred site layout in relation to the sensitive areas identified by the specialists is indicated in **Figure v** below.

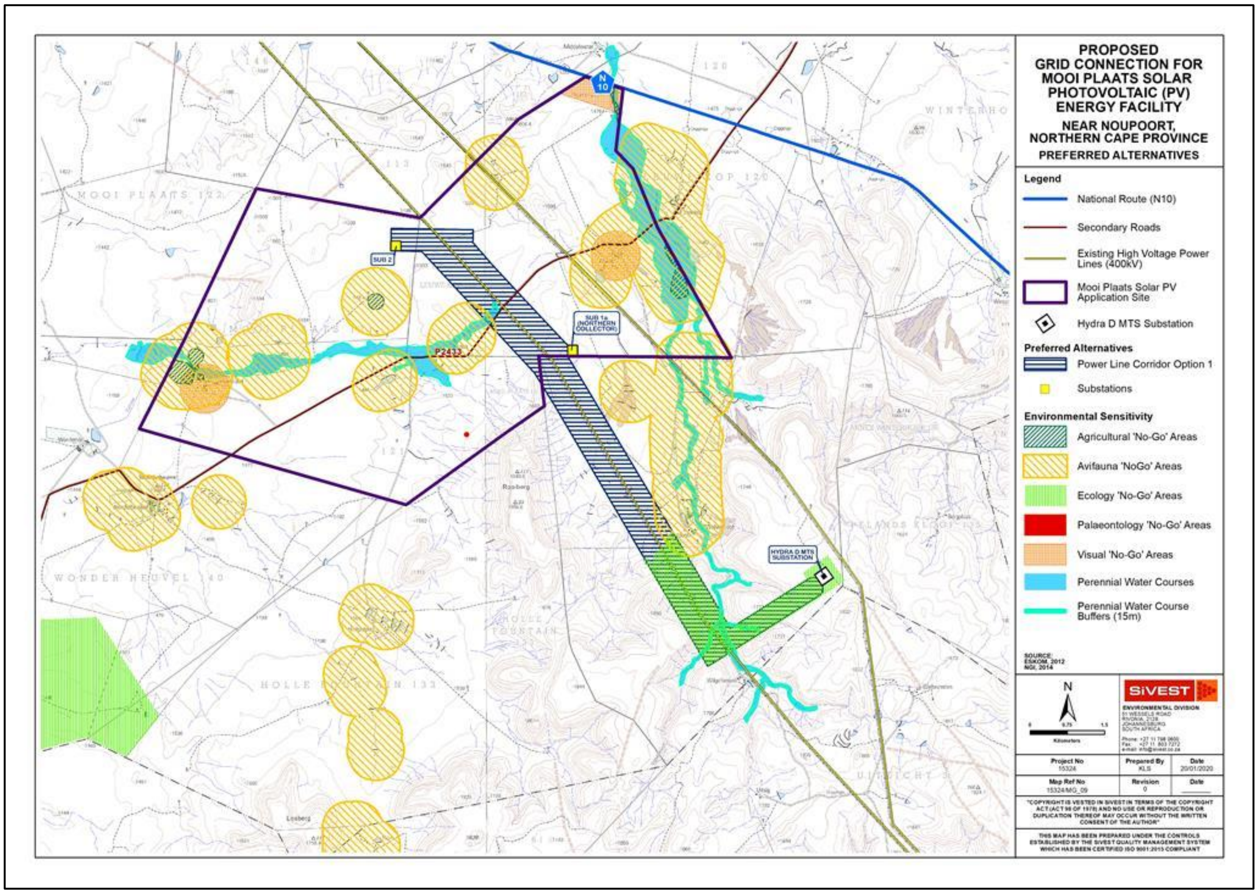

Figure v: Preferred site layout in relation to identified environmental sensitive areas

It is important to note that the preferred layout provided above is not the final layout for the proposed development. A final layout will be submitted to the DEFF for review and approval, along with a Final Environmental Management Programme (EMPr), prior to construction commencing.

The table below summarises the specialist findings for the entire proposed development. It should be noted that based on the pre-application meeting held with the DEFF on 19 February 2019, it was confirmed that the specialists could compile one (1) combined report covering all three (3) of the proposed Umsobomvu PV projects as well as the three (3) associated grid infrastructure developments (substations and 132kV power lines), provided the findings and impact assessment sections are project specific. A copy of the pre-application meeting minutes is provided in **Appendix 9B**.

Terrestrial Ecology	There are various Acts that limit development or require permits before development can proceed. The most important of these are permits required in terms of protected species that could potentially occur on-site, including the National Environmental Management: Biodiversity Act, the Northern Cape Nature Conservation Act and the National Forests Act.

	Details of the description of the ecological receiving environment are summarised as follows: 1. The study area is situated in an area that is on the boundary between relatively flat plains and a low mountain range with moderately to steeply sloping topography. Habitat on-site is in a largely natural state and is in a rural environment. There is very little transformation or serious degradation on-site. 2. There are two (2) regional vegetation types occurring in the project study area, Eastern Upper Karoo (most of the area), and Besemkaree Koppies Shrubland (mountain areas). There are three (3) other national vegetation types in the vicinity, namely Southern Karoo Riviere, Tarkastad Montane Shrubland and Karoo Escarpment Grassland. Floristic components of all five (5) of these units occur in the study area, even though they are not all mapped as occurring within the study area. All these vegetation types are listed in the scientific literature as Least Threatened and none are listed in the National List of Ecosystems that are Threatened and need of protection (GN 1002 of 2011). 3. All habitat is mapped as 'Critical Biodiversity Area 2' (CBA2) or 'Critical Biodiversity Area 1' (CBA1) in the Provincial Conservation Plan and there are also patches mapped as 'Ecological Support Area' (ESA). The remaining natural vegetation on-site, therefore has high value for conservation of vegetation in the Province according to the broadscale CBA maps. 4. Habitats on-site were divided into five (5) units, namely 'Mountain Vegetation', 'Lowland Plains Vegetation', 'Low Ridges and Koppies', 'Broad Drainage Areas' and 'Mountain Stream'. The vegetation on the plains on-site was found to be a karroid dwarf shrubland that resembles the description for Eastern Upper Karoo, but the mountain vegetation was a mixed grassy shrubland that appears to be a floristic mix of Besemkaree Koppies Shrubland and Karoo Escarpment Grassland. The mountain vegetation has the highest local diversity and greatest variation in species composition. A map of natural habitats of the study area was produced by mapping from aerial imagery, based on information collected in the field. 5. There are no plant species occurring on-site or likely to occur on-site that are protected according to the National Environmental Management: Biodiversity Act (Act No. 10. of 2004) (NEM:BA). 6. There are a number of plant species occurring on-site that are protected according to the Northern Cape Nature Conservation Act (Act 9 of 2009). It is likely that additional protected species occur there that were not observed during the field survey. None of these are of conservation concern, but a permit is required from the Provincial authorities to destroy them. These are listed in the text in the body of this report. 7. There are no protected tree species that are likely to occur in the study area. 8. A total of 79 mammal species have a geographical distribution that includes the general study area in which the sites are found. Of the species currently

	listed as threatened or protected (see Appendix 5 of Terrestrial Ecology Impact Assessment Report for list of protected species), the following are considered to have a very high, high or medium probability of occurring on-site, based on habitat suitability and evidence collected in the field: the Black-footed Cat (Vulnerable), the Cape Clawless Otter (Near Threatened), the South African Hedgehog (Near Threatened), Grey Rhebok (Near Threatened), White-tailed Rat (Vulnerable), and the Spectacled Dormouse (Near Threatened). There is strong evidence to suggest that the Black-footed Cat and the Cape Clawless Otter both definitely occur on-site. 9. The study area contains habitat that is suitable for a small number of frog species. One (1) protected frog species, the Giant Bullfrog, could potentially occur on-site. 10. A total of 55 reptile species have a geographical distribution that includes the general study area in which the sites are found. No reptile species of conservation concern could potentially occur in the study area. 11. A preliminary sensitivity map of the study area was produced that identifies areas of higher sensitivity that should be taken into account during activities on-site. This includes drainage areas and associated wetland-related habitat, low ridges, parts of the mountain area, and CBA1 and CBA2 areas. The preliminary assessment of impacts indicates that all impacts are of low significance or can be reduced to low significance with mitigation, with the exception of loss of natural vegetation, for which the impact remains of medium significance after mitigation. Proposed mitigation measures include the following: ▪ shifting infrastructure positions to avoid sensitive habitats; ▪ select infrastructure options that cause the least amount of damage to natural habitats; ▪ cross watercourses at right angles; ▪ install appropriate structures at watercourse crossings to minimise impacts on these systems; ▪ minimise vegetation clearing and disturbance; ▪ formalise a rehabilitation programme; ▪ undertaking a pre-construction botanical walk-through survey of the footprint of the selected options; ▪ obtaining permits for any protected species that may be affected; ▪ undertaking a search and rescue of plants for which it is appropriate to rescue; and ▪ compile an alien plant management plan and undertaking regular monitoring.

	The report concludes that there are some sensitivities in the study area related to natural habitat and to individual species, but that these can be minimised or avoided with the application of appropriate mitigation or management measures. There will be residual impacts, primarily on natural habitat, but the amount of habitat that will be lost to the proposed development is insignificant compared to the area in hectares of the regional vegetation type that occurs on-site and therefore the residual impacts are considered acceptable, on condition local sensitivities of biodiversity importance are avoided. On this basis, it is recommended that the proposed development be authorised.
Avifauna	The proposed development will have some pre-mitigation impacts on avifauna at a site and local level which will range from Medium to Low. The impact of displacement due to disturbance associated with the construction of the proposed 132kV grid connection and substations, is assessed to be Medium and can be mitigated to a Low level. The potential for displacement due to habitat destruction associated with the construction of the substations is rated as Low and could be further reduced with appropriate mitigation. The impact of bird collisions with the 132kV grid connection is rated as High and could be reduced to Medium with the application of mitigation measures. The potential impact of electrocutions is assessed to be Medium, but it can be reduced to Low with appropriate mitigation. The impact of displacement due to disturbance associated with the decommissioning of the proposed 132kV grid connection and substations, is assessed to be Medium and can be mitigated to a Low level. The cumulative impact of the proposed grid connections within a 35km radius is rated as Medium, but it can be reduced to Low with the application of appropriate mitigation. **IMPACT STATEMENT** From an avifaunal impact perspective, there is no objection to the proposed development of the grid connections, provided the proposed mitigation measures are strictly implemented. No further monitoring will be required during the operational phase.
Surface Water	Findings were based on the method for delineating wetlands and riparian habitats as per the DWAF (2005 & 2008) guidelines. At a broad level, the study site is located within the Orange Catchment. More specifically, the study area is situated within the quaternary catchments D32B & D32C. The fieldwork assessment found that there are no wetlands on the study site. However, a number of watercourses, both perennial and non-perennial, were identified throughout the entire study area. In terms of the Ecological Condition of the non-perennial, and perennial watercourses, Ecological Condition was assessed to be a class C – Moderately Modified systems.

	The Environmental Importance and Sensitivity Class (EISC) for the watercourses was determined. The results showed that the EISC for the watercourses were categorised as a Class B (High). The classification of high EISC was primarily due to the condition of the watercourses assessed, as well as the presence of endangered species. The buffer zone determination for the watercourses took into account the type of the proposed development, potential impacts, condition of the habitat as well as other characteristics of the watercourse. As a result, the following buffer zones were assessed and are to be implemented as far as possible: ▪ Construction Phase Buffer: 15m ▪ Operation Phase Buffer: 15m Foreseen potential negative impacts related to the proposed development were identified and assessed. The potential construction-related impacts included impacts to watercourses (-20 low pre- and -8 low post-mitigation impact rating), hydrology of the watercourses (-20 low pre- and -9 low post-mitigation impact rating) and water quality impacts (-39 medium pre- and -9 low post-mitigation impact rating). The operational impacts identified included impacts to the hydrology of the watercourse (-36 medium pre- and -18 low post-mitigation impact rating). Overall, all impacts were assessed to be low, post-implementation of mitigation measures. In terms of potentially applicable environmental and water-related legislation, listed activities were identified to be triggered in terms of NEMA (1998) and the EIA Regulations (2014, as amended) from a surface water perspective. With respect to the National Water Act (NWA) (1998), water uses (c) and (i) were identified as being potentially applicable. However, the application of the risk assessment matrix protocol as per Government Notice 509 of 2016 (No. 40229) was undertaken, the findings show that the risk of potential impacts on the watercourse was assessed to be in the LOW-risk class. Where risks were identified, a number of control measures have been stipulated which will assist in decreasing the level of risk to an even lower level. In accordance with the implementation of control measures, all potential risks are classed as LOW. Therefore, registration for General Authorisation (GA) can be undertaken where required and agreed upon with the Department of Water and Sanitation (DWS). The decision on whether the proposed development is to proceed will rest on environmental and water governmental departments whom will need to make a trade-off between meeting the conservation targets of the province or meeting the energy demands of the country. However, it is the opinion of the specialist that the

	proposed development may proceed where the relevant control measures and mitigation measures stipulated are implemented. There are a number of recommendations to be implemented for the proposed development. These include the following: ▪ A stormwater management plan for all phases of the proposed development is required to be compiled and implemented which accounts for control of increased run-off, erosion and sedimentation; and ▪ An Alien Eradication and Removal Programme is to be compiled and implemented for the duration of the proposed development. Based on the findings above, with the implementation of the control and mitigation measures stipulated, it is the opinion of the specialist that the proposed development may proceed.
Agricultural and Soils (Desktop)	It should be noted that a field investigation was not considered necessary. The assessment was based on a desktop analysis of existing soil and agricultural potential data and other data for the site, which is considered entirely adequate for a thorough assessment of all the agricultural impacts of the proposed development (see section 4.1 of the Agricultural and Soils Impact Assessment Report). The key findings of the Agricultural and Soils Impact Assessment are provided below: ▪ The proposed project area is dominated by shallow, loamy sands on underlying rock or less commonly clay. Dominant soil forms are Swartland, Hutton, Mispah, and Valsrivier. ▪ The major limitations to agriculture are the limited climatic moisture availability (low rainfall), the rugged terrain and the shallow, rocky soils. ▪ As a result of these limitations, the agricultural use of the study area is limited to low-intensity grazing only, except for some isolated patches of irrigation land. ▪ The proposed project area is classified with land capability evaluation values between 1 (very low) and 7 (low to moderate), with 6 being most predominant. ▪ The significance of all agricultural impacts is kept low by the limited agricultural potential of the land. ▪ The only parts of the study area that do not have low sensitivity are the small patches of irrigation. These are considered no-go areas for any footprint of development that will exclude cultivation. ▪ Two (2) potential negative impacts of the development on agricultural resources and productivity were identified. These are: o Loss of agricultural land use; and

	o Soil erosion and degradation. ▪ One (1) potential positive impact of the development on agricultural resources and productivity was identified as: o Increased financial security of farming operations through rental income ▪ Soil erosion and degradation was assessed as having medium significance before and after mitigation. The other two (2) impacts were assessed as having low significance before and after mitigation. ▪ The recommended mitigation measures are for implementation of an effective system of stormwater run-off control; maintenance of vegetation cover; and to strip, stockpile and re-spread topsoil. ▪ There is no material difference between the significance of impacts of any of the proposed project alternatives. All proposed alternatives have an equal impact. ▪ Due to the low agricultural potential of the site, and the consequent low to medium negative agricultural impact, there are no restrictions relating to agriculture which preclude authorisation of the proposed development (including all alternatives) and therefore, from an agricultural impact point of view, the development should be authorised.
Visual	Overall, sparse human habitation and the predominance of natural vegetation cover across much of the study area would give the viewer the general impression of a largely natural setting with some pastoral elements. As such, solar PV developments and their associated grid connections would alter the visual character and contrast significantly with the typical land use and/or pattern and form of human elements present across the broader study area. The level of contrast will however be reduced by the presence of the N10 national route and existing high voltage power lines in the northern sector of the study area. The area is not typically valued for its tourism significance and there is limited human habitation resulting in relatively few potentially sensitive receptors in the area. A total of twenty-six (26) potentially sensitive receptors were identified in the combined study area, three (3) of which are considered to be sensitive receptors as they are linked to leisure/nature-based tourism activities in the area. None of the receptors are however expected to experience high levels of visual impact from the proposed grid connection infrastructure. Although the N10 receptor road traverses the study area, motorists travelling along this route are only expected to experience moderate impacts from the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134).

	An overall impact rating was also conducted in order to allow the visual impact to be assessed alongside other environmental parameters. The assessment revealed that impacts associated with the proposed grid connection infrastructure would be of low significance during both construction and decommissioning phases. Visual impacts associated with the grid connection infrastructure during operation would be of low significance. Although other renewable energy developments and infrastructure projects, either proposed or in operation, were identified within a 35km radius of the proposed development, it was determined that only one (1) of these would have any significant impact on the landscape within the visual assessment zone, namely the Umsobomvu WEF. This proposed WEF, in conjunction with the proposed associated grid connection infrastructure, will alter the inherent sense of place and introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures stipulated for each of these developments by the visual specialists. In light of this and the relatively low level of human habitation in the study area however, cumulative impacts have been rated as medium. No fatal flaws were identified for any of the grid connection infrastructure alternatives and a summary of the preference rating is provided below: ▪ <u>Mooi Plaats grid connection infrastructure</u>: No preference was determined for any of the substation sites. The Option 1 alternatives were rated as preferred due to the fact that the route is shorter and most almost entirely aligned with the existing power lines. It is the specialist's opinion that the visual impacts associated with the proposed grid connection infrastructure are of moderate significance. Given the low level of human habitation and the relative absence of sensitive receptors, the project is deemed acceptable from a visual impact perspective and the EA should be granted for the relevant BA application. The specialist is of the opinion that the impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.
Heritage	The Heritage Impact Assessment (HIA) consisted of a scoping phase during which background information and landscape analysis was done to determine the heritage resources that can potentially occur within the study area. This was followed up with fieldwork by a team of archaeologist and a palaeontologist with the aim of identifying heritage resources in the development footprint areas and to

	make recommendations on the management of these resources and the possible chance finds during construction activities. The fieldwork identified a total of ten (10) areas of heritage significance. Adjustments to the project layouts based on the various specialist input resulted in the total avoidance of three (3) heritage areas that was excluded from the reporting. The remaining seven (7) sites consist of three (3) large, low to medium density scatters of later stone age sites (UMS005,008 and 009). UMS004, 006 and 007 are all round stone packed enclosures. UMS007 situated in the Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) was excluded from direct impact by design changes. UMS004 and 006 will need to be avoided during construction of the power grid through the implementation of a 30m buffer. UMS010 was identified as a fossil find spot and a 50m buffer around the fossil bearing material must be implemented. Any construction in the demarcated area must be monitored by a palaeontologist. The impact rating on the heritage resources indicated that pre-mitigation a negative high impact is projected but with the implementation of the recommended management measures this impact rating will be reduced to low negative. The results of the comparative assessment of the grid connection infrastructure alternatives provided found there to be no preference between the grid connection infrastructure alternatives. This is due to the fact that no heritage issues were identified for any of the footprints. The palaeontological sensitive area at UMS010 is the only heritage resource that influences the Options assessment, but those options affected are still favourable with the implementation of the recommended management measures. It is the specialist's considered opinion, based on the current data available, that with the consideration of the position of heritage sensitivities during the layout design and the implementation of the proposed management measures, the proposed development will have an acceptable low impact on heritage resources and can continue.
Palaeontology	The National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), states that a Palaeontological Impact Assessment (PIA) is key to detect the presence of fossil material within the planned development footprint. This PIA is thus necessary to evaluate the effect of the construction on the palaeontological resources.

	The proposed developments is underlain by the continental sediments of the Latest Permian sediments of the Balfour Formation (Upper Beaufort Group, Adelaide Subgroup) and earliest Triassic sediments of the Katberg Formation (Upper Beaufort Group, Tarkastad Subgroup, Karoo Supergroup) as well as Jurassic Karoo Dolerite. These sediments are generally mantled by a thick layer of Quaternary to Recent colluvium and alluvium. The uppermost Balfour and Katberg Formations are of extraordinary interest in that they provide some of the best existing information on ecologically complex terrestrial ecosystems during the catastrophic end-Permian mass extinction. According to the PalaeoMap of South African Heritage Resources Information System (SAHRIS), the Palaeontological Sensitivity of the Tarkastad and Adelaide Subgroups has a Very High Palaeontological Sensitivity, while that of the Quaternary superficial deposits of the Central interior is high and the Karoo dolerite (igneous rocks) is insignificant and rated as zero. A site-specific field survey of the development footprint was conducted on foot and by motor vehicle from the 24th – 28th of January 2019. Elsewhere in the Karoo Basin numerous fossils have been uncovered in these geological sediments but only two (2) sites on koppies with fossiliferous outcrops were identified. Although these localities do not currently fall in the proposed development sites, these fossiliferous sites have been identified as Highly Sensitive and No-go areas and it is recommended that a 50m buffer will be placed around these areas. In the event that construction is necessary in these sensitive areas, it is recommended that the fossils will be collected by a professional palaeontologist. Preceding excavation of any fossil material, the specialist would need to apply for a collection permit from the South African Heritage Resources Agency (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. With the above-mentioned in consideration, the proposed development, as well as all alternatives have a similar geology and therefore there is no preferences on the grounds of palaeontological fossil heritage for any specific layout among the different options under consideration. As impacts on fossil heritage usually only occur during the excavation phase, no further impacts on fossil heritage are expected during the operation and decommissioning phases of the proposed development. The impact of development on fossil heritage are usually negative but it could also have a positive impact due to the discovery of newly uncovered fossil material that would have been unavailable for scientific research. The proposed development

	could also provide a long-term benefit to the country by supplying renewable energy to the electricity grid. In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations, the Chance Find Protocol must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO 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 21 462 4509. Web: www.sahra.org.za) so that correct mitigation (e.g. recording and collection) can be carried out by a palaeontologist. 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. From a Palaeontological Heritage view there is no fatal flaws in the proposed development. However, it is recommended that the mitigation measures are included in the Environmental Management Programme (EMPr) and be fully implemented.
Social (Desktop)	**APPROACH TO STUDY** Data was gathered using the following techniques: **Collection of data** Data was gathered through: ▪ The project description prepared by the project proponent; ▪ Statistics South Africa, Census 2011 and other relevant demographic data generated by Stats SA such as the Quarterly Labour Force Survey and Mid-year population estimates; ▪ Discussions with the project proponents and Environmental Impact Assessment (EIA) Consultants; ▪ A literature review of various documents such as the relevant Municipal Integrated Development Plans (IDPs) and other specialist reports and documents; and ▪ A broader literature scan. **Impact assessment technique** The assessment technique used to evaluate the social impacts was provided by SiVEST Environmental Division and is attached in Appendix 1 of the Social Impact Assessment Report (**Appendix 6F**). **IMPACTS IDENTIFIED** The impacts are assessed in respect of the following phases of the project:

	▪ Planning and design; ▪ Construction; ▪ Operational; ▪ Decommissioning; nd ▪ The ‘no-go’ option. **Construction phase** Most of the impacts discussed above apply over the short-term to the construction phase of the proposed development and include: ▪ Annoyance, dust and noise; ▪ Increase in crime; ▪ Increased risk of HIV infections; ▪ Influx of construction workers and job seekers; ▪ Hazard exposure; ▪ Disruption of daily living patterns; ▪ Disruptions to social and community infrastructure; ▪ Job creation and skills development; and ▪ Socio-economic stimulation. **Operational phase** The social impacts that apply to the operational phase of the proposed development are: ▪ Transformation of the sense of place; and ▪ Economic. o Job creation and skills development. o Socio-economic stimulation. **Decommissioning** If the proposed development were to be completely decommissioned, the major social impacts likely to be associated with this would be the loss of jobs and revenue stream that stimulated the local economy and flowed into the municipal coffers. **‘No Go’ Alternative** The ‘no go’ option would mean that the social environment is not affected as the status quo would remain. On a negative front it would also mean that all the positive aspects associated with the proposed development would not materialise. Considering that Eskom’s coal-fired power stations are a huge contributor to carbon emissions, the loss of a chance to supplement the national grid through renewable energy would be significant at a national, if not at a global level. **Cumulative Impacts**

	In this regard, the following cumulative impacts are addressed below: ▪ Risk of HIV; ▪ Sense of place; ▪ Service supplies and infrastructure; and ▪ The economic benefit. No fatal flaws associated with the cumulative impacts are evident at a social level. The findings support the recommendations of the various reports undertaken for the different renewable energy projects in the region that, on an overall basis, the social benefits of renewable energy projects outweigh the negative benefits and that the negative social impacts can be mitigated. **COMPARATIVE ASSESSMENT OF GRID CONNECTION INFRASTRUCTURE ALTERNATIVES (POWER LINE CORRIDORS AND ASSOCIATED SUBSTATIONS)** As no social preference emerged in respect of any of the grid connection options, the other specialist reports were perused to establish if there was any preference that would have an influence on the social. Based on this analysis, the following preferences were identified and supported on a social basis: ▪ Grid Connection Option 1a = Preferred; ▪ Grid Connection Option 1b = Preferred; ▪ Grid Connection Option 2a = Favourable; and ▪ Grid Connection Option 2b = Favourable. **CONCLUSION AND RECOMMENDATIONS** In assessing the social impact of the proposed development, it was found that in respect of the energy needs of the country and South Africa's need to reduce its carbon emissions that the proposed development fits with national, provincial and municipal policy. Regarding the social impacts associated with the proposed development, it was found that most apply over the short term to the construction phase of the proposed development. Of these impacts, all can be mitigated to within acceptable ranges and there are no fatal flaws associated with the construction or operation of the proposed development. On a cumulative basis it is evident that the cumulative impacts associated with changes to the social environment of the region are more significant than those attached to the proposed development in isolation. On a negative front there are two (2) issues associated with developments in the region that are of most concern. The first of these issues is the change to the sense of place of an area that was

	once considered a pristine region of South Africa. The second is the potential, through an influx of labour and an increase in transportation to constructions sites, of the risk for the prevalence of HIV to rise in an area that has a relatively low HIV prevalence rate. In this regard, it is important that the relevant authorities recognise these issues and find ways of mitigating them to ensure that they do not undermine the benefit that renewable energy developments bring, both to the region as well as to the country as a whole. These issues are beyond a project-specific basis and as such will need to be addressed at a higher level. **Impact Statement** The project site and surrounding areas are sparsely populated with the agricultural potential of the area being low. Accordingly, the negative social impacts associated with the proposed grid connection infrastructure are of low to moderate significance with most occurring over the short term construction phase. The proposed development has a positive element which outweighs the negative in that it will contribute towards the supply of renewable energy into a grid system heavily reliant on coal-powered energy generation. In this sense, the proposed development forms part of a national effort to reduce South Africa's carbon emissions and thus carries with it a significant social benefit and is thus supported and should proceed. As the area is sparsely populated and the negative social impacts associated with the grid connection infrastructure are of moderate significance, it is most unlikely that any further social study will be necessary. This will, however, be dependent on the outcome of the public participation process which may result in a need to update the current report by incorporating the comments recorded and updating the social impacts accordingly.
Geotechnical (Desktop)	The desktop geotechnical assessment did not identify any fatal flaws that, from a geological and geotechnical perspective, would prevent the construction of the proposed development. The potential impacts the proposed development may have on the geology relate to soils that could be impacted by the construction activities. There may be a potential for soil erosion, due to removal of vegetation and exposure of the soils to the elements, during construction. The impacts were found to be of 'negative low impact'. Various corridor options were studied. While all options are considered suitable for development, the following option was found to be preferable from a geological and geotechnical perspective: ▪ Mooi Plaats – Grid Option 1.

	The geological impacts will be similar. Due the very similar bedrock geology, similar geotechnical conditions are expected across all options. From a geological and geotechnical perspective, based on the minimal negative impacts on the geology and soils and the recommendations for mitigation measures, it is recommended that the proposed development receives the 'go-ahead' from the Competent Authority.

These specialist studies were conducted to address the potential impacts relating to the proposed development. An impact assessment was conducted to ascertain the level of each identified impact, as well as mitigation measures which may be required. The potential positive and negative impacts associated with these studies have been evaluated and rated accordingly. In addition, as mentioned, grid connection infrastructure alternatives (which include on-site and collector substation sites and 132kV power line corridors) have also been investigated and comparatively assessed by the respective specialists (**section 8**).

The results of the specialist studies have indicated that the preferred options contain no fatal flaws. In addition, all applicable environmental aspects were thoroughly investigated as part the BA process and the specialists did not recommend any further studies and/or investigations to be undertaken.

It should be noted that micro-siting may be required within the authorised power line corridor during the detailed design phase. In addition, the alignment of the power line within the authorised power line corridor will be determined and confirmed during the detailed design phase, taking the identified sensitive areas into account. This is to enable the avoidance of any unidentified features on-site, or any design constraints when the proposed development reaches construction. As mentioned, the preferred layout provided is not the final layout for the proposed development. A final layout will be submitted to the DEFF for review and approval, along with a Final EMPr, prior to construction commencing. The specialist sensitivities and 'no-go areas' will be incorporated into the layout design when completing the final layout. Additionally, routing the power line or locating the substations within the authorised corridor would not be regarded as a change to the scope of work or the findings of the impact assessments undertaken during the BA process. This is based on the understanding that the specialists have assessed the larger area / corridor in detail, and all identified sensitive areas have been excluded from this area, if possible. Therefore, moving the components within the assessed corridor would not change the impact significance. Any changes to the power line route or substation sites within the boundaries of the authorised corridor following the issuing of the EA (should it be granted) will therefore be considered to be non-substantive.

It is the opinion of the EAP that the information and data provided in this DBAR is sufficient to enable the DEFF to consider all identified potentially significant impacts and to make an informed decision on the application. Furthermore, it is the opinion of the EAP that based on the findings of the BA, that the proposed development should be granted an EA and allowed to proceed, provided the following conditions are adhered to:

- Final routing of the proposed power line within the corridor should avoid tower placement within the identified sensitive areas (as shown in **Figure v**) located within the power line corridor and no construction activities should take place within these areas;
- All feasible and practical mitigation measures recommended by the various specialists must be incorporated into the Final EMPr and implemented, where applicable;
- The Draft EMPr which accompanies this DBAR should not be approved by the DEFF as part of the EA. A Final EMPr should rather be sent to the DEFF for approval prior to construction commencing;
- The final layout should be submitted to the DEFF for approval prior to commencing with the activity; and
- Where applicable, monitoring should be undertaken to evaluate the success of the mitigation measures recommended by the various specialists.

SiVEST, as the independent EAP, is therefore of the view that:

- A preferred **Grid Connection Infrastructure** alternative (which includes a power line corridor and on-site and collector substation sites) has been identified which is environmentally acceptable and will not result in significant impacts, provided that the recommended mitigation measures are implemented and the placement of substation sites and routing of the power line within the chosen corridor avoids tower placement within the identified sensitive and 'no-go' areas;
- One (1) **Grid Connection Infrastructure** alternative, with associated power line corridor route and on-site and collector substation sites, (namely **Grid Connection Option 1a**) is being recommended to be authorised. As mentioned, the substation sites are intrinsically linked to the grid connection infrastructure alternatives. The grid connection infrastructure alternative which has been chosen as 'preferred' by the respective specialists has thus informed the location of the on-site and collector substation sites being proposed;
- A preferred **On-site Eskom Substation** site has been identified. In terms of the outcome of the comparative assessment of alternatives, **Substation 2**) is being proposed as part of this application. This site is considered to be acceptable from an environmental perspective as no fatal flaws are associated with this substation site;
- A preferred **Eskom Collector Substation** site has been identified. In terms of the outcome of the comparative assessment of alternatives, **Substation 1a (Northern Collector)** is being proposed as part of this application. This site is considered to be acceptable from an environmental perspective as no fatal flaws are associated with this substation site;
- A cumulative impact assessment of similar developments in the area was undertaken by the respective specialists. Based on their findings, majority of the cumulative impacts associated with the proposed development can be kept low after the implementation of mitigation measures, with the exception of some which will be medium after the implementation of mitigation measures. Therefore, there are no high negative cumulative impacts and the proposed development should proceed from a cumulative impact assessment perspective; and
- Through the implementation of mitigation measures, together with adequate compliance monitoring, auditing and enforcement thereof by the appointed Environmental Control Officer

(ECO) as well as the competent authority, the potential detrimental impacts associated with the proposed development can be mitigated to acceptable levels.

The date on which the activity will commence cannot be determined at this stage as they are based on the timeframes dictated by the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) bid windows. The date of the next round of bid submissions has not yet been announced. The construction of the grid connection infrastructure (namely the on-site and collector substation sites and 132kV power line) is dependent on being selected as a preferred bidder or entering into an offtake agreement with a different energy consumer. The proposed development will therefore require an EA of at least ten (10) years.

It is trusted that the DBAR provides adequate information to the I&APs / stakeholders to provide input and for the competent authority to make an informed decision regarding the proposed development.

Way forward

The DBAR will be circulated for public participation for a period of 30 days (excluding public holidays), from **Monday 10 February 2020** until **Wednesday 11 March 2020**. Hard copies of the DBAR will be made available at a public venue (namely the Noupoort Public Library) and an electronic copy will also be made available on SiVEST's website (see **section 9.7**). All Interested and/or Affected Parties (I&APs) and key stakeholders, such as Organs of State (OoS) / authorities, which are registered on the project database will be notified of the submission of the DBAR and the above-mentioned 30-day public review and comment period accordingly. In addition, all OoS / authorities will be sent electronic copies (on CD) of the DBAR. The 30-day public review and comment period is provided for the general public and for the I&APs and key stakeholders, as required by the EIA Regulations, 2014 (as amended). The affected and adjacent landowners will be contacted during the 30-day DBAR public review and comment period in order to solicit comments, should they have any. SiVEST will distribute the presentations and minutes of the meetings which were undertaken during the 30-day review and comment period of the Draft Environmental Impact Assessment Report (DEIAr) for the proposed solar PV energy facility[6] (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) and will request that the affected and adjacent landowners provide comments, if they feel this is necessary. SiVEST will also use this as an opportunity to answer any questions the landowners might have. In addition, a Ward Councilor will be utilised in order to distribute / share information with members of the affected community (see **section 9.9**). All comments received during the 30-day DBAR review and comment period will be responded to in a Comments and Response Report (C&RR), which will be included prior to sending the FBAR to the decision-making authority, namely the national Department of Environment, Foresrty and Fisheries (DEFF). Comments received on the DBAR will be taken into consideration, incorporated into the report (where possible) and will be used when compiling the FBAR. Once the FBAR has been submitted and the DEFF have

[6] A single public participation process is being undertaken to consider all of the proposed developments which form part of the greater Umsobomvu PV project [i.e. three (3) solar PV energy facility EIAs and three (3) grid connection BAs]

acknowledged receipt of the report, the DEFF will have 107 days to either grant or refuse the EA for the proposed development.

All I&APs and key stakeholders are invited to register as I&APs in order to be kept informed throughout the process. To register as an I&AP / stakeholder and/or to obtain additional information, please submit your name, contact details (telephone number, postal address and email address) and the interest which you have in the application to SiVEST Environmental Division, as per the details below:

Contact: Hlengiwe Ntuli or Stephan Jacobs
PO Box 2921, RIVONIA, 2128
☎ Phone:(011) 798 0600
E-mail:hlengiwen@sivest.co.za / stephanj@sivest.co.za / sivest_ppp@sivest.co.za
Fax:(011) 803 7272
Websites:www.sivest.co.za

Please reference '*Mooi Plaats Grid*' in your correspondence, should your comments be project specific. SiVEST shall keep all registered I&APs /stakeholders informed of the BA process.

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Glossary of Terms

Alluvial: Resulting from the action of rivers, whereby sedimentary deposits are laid down in river channels, floodplains, lakes, depressions etc.

Archaeological resources: This includes:

i. material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
ii. rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
iii. wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
iv. features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Biodiversity: The diversity of genes, species and ecosystems, and the ecological and evolutionary processes that maintain that diversity.

Cultural landscape: A representation of the combined worlds of nature and of man illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (World Heritage Committee, 1992).

Cultural Significance: This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Cumulative Impact: In relation to an activity, cumulative impact means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Endemic: Restricted or exclusive to a particular geographic area and occurring nowhere else. Endemism refers to the occurrence of endemic species.

Environmental Impact Assessment: In relation to an application, to which Scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application.

Environmental Impact Report: In-depth assessment of impacts associated with a proposed development. This forms the second phase of an Environmental Impact Assessment and follows on from the Scoping Report.

Environmental Management Programme: A legally binding working document, which stipulates environmental and socio-economic mitigation measures which must be implemented by several responsible parties throughout the duration of the proposed project.

'Equator Principles': A financial industry benchmark for determining, assessing and managing social & environmental risk in project financing.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Habitat: The area of an environment occupied by a species or group of species, due to the particular set of environmental conditions that prevail there.

Heritage: That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage Resources: This means any place or object of cultural significance, such as the caves with archaeological deposits identified close to both development sites for this study.

Kilovolt (kV): a unit of electric potential equal to a thousand volts (a volt being the standard unit of electric potential. It is defined as the amount of electrical potential between two points on a conductor carrying a current of one ampere while one watt of power is dissipated between the two points).

Mitigate: The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.

'No-Go' option: The 'no-go' development alternative option assumes the site remains in its current state, i.e. there is no construction of a solar PV energy facility and associated infrastructure in the proposed project area.

Palaeontology: Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Precipitation: Any form of water, such as rain, snow, sleet, or hail that falls to the earth's surface.

PV Development Area: Area for the potential erection of PV panels within the application site

Red Data Species: All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.

Red List: A publication that provides information on the conservation and threat status of species, based on scientific conservation assessments.

Rehabilitation: Less than full restoration of an ecosystem to its pre-disturbance condition.

Restoration: To return a site to an approximation of its condition before alteration.

Riparian: The area of land adjacent to a river or stream that is, at least periodically, influenced by flooding.

Scenic route: A linear movement route, usually in the form of a scenic drive, but which could also be a railway, hiking trail, horse-riding trail or 4x4 trail.

Scoping Report: An 'issues-based' report which forms the first phase of an Environmental Impact Assessment process.

Sense of place: The unique quality or character of a place, whether natural, rural or urban. It relates to uniqueness, distinctiveness or strong identity.

Species of Special / Conservation Concern: Species that have particular ecological, economic or cultural significance, including but not limited to threatened species.

Threatened Ecosystems: An ecosystem that has been classified as Critically Endangered, Endangered or Vulnerable, based on analysis of ecosystem threat status. A threatened ecosystem has lost, or is losing, vital aspects of its structure, composition or function. The Biodiversity Act makes provision for the Minister or Environmental Affairs, or a provincial MEC of Environmental Affairs, to publish a list of threatened ecosystems.

Threatened Species: A species that has been classified as Critically Endangered, Endangered or Vulnerable, based on a conservation assessment using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.

Visual Assessment Zone: The visual assessment zone or study area is assumed to encompass a zone of 10km from the outer boundary of the proposed application site.

List of Abbreviations

AAA	- Astronomy Advantage Area
AC	- Alternating Current
AP	- Action Plan
APM	- Archaeology, Palaeontology and Meteorites
ATNS	- Air Traffic and Navigation Services Company Limited
AIA	- Archaeological Impact Assessment
BA	- Basic Assessment
BAR	- Basic Assessment Report
BFD	- Bird Flight Diverter
BID	- Background Information Document
BLSA	- BirdLife South Africa
BRICS	- Brazil, Russia, India, China and South Africa
CAA	- Civil Aviation Act (Act No. 13 of 2009)
CARA	- Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CBA	- Critical Biodiversity Area
CBD	- Convention on Biodiversity
Co_2	- Carbon Dioxide
CR	- Critically Endangered
CRM	- Cultural Resource Management
CV	- Curriculum Vitae
DBAR	- Draft Basic Assessment Report
DC	- Direct Current
DEFF	- Department of Environment, Forestry and Fisheries
DEIAr	- Draft Environmental Impact Assessment Report
DDD	- Data Deficient: well known but not enough information for assessment
DDT	- Data Deficient: taxonomic problems
DDX	- Data Deficient: unknown species
DM	- District Municipality
DSR	- Draft Scoping Report
DoE	- Department of Energy
DM	- District Municipality
DNI	- Direct Normal Irradiation
DWS	- Department of Water and Sanitation
EA	- Environmental Authorisation
EAP	- Environmental Assessment Practitioner
ECA	- Environmental Conservation Act (ECA) (Act No. 73 of 1989)
ECO	- Environmental Control Officer
ED	- Economic Development
EHS	- Environmental, Health, and Safety
EIA	- Environmental Impact Assessment
EIAr	- Environmental Impact Assessment Report
EIR	- Environmental Impact Report

EISC	- Ecological Importance and Sensitivity Categorisation
EMPr	- Environmental Management Programme
EMI	- Electromagnetic Interference
EN	- Endangered
ENPAT	- Environmental Potential Atlas
EP	- Equator Principles
EPC	- Engineering, Procurement and Construction
ERA	- The Electricity Regulation Act No. 4 of 2006
ESA	- Ecological Support Area
ESA	- Early Stone Ages
ESMP	- Environmental and Social Management Plan
ESMS	- Environmental and Social Management System
EWT	- Endangered Wildlife Trust
EX	- Extinct
FBAR	- Final Basic Assessment Report
FEIAr	- Final Environmental Impact Assessment Report
FGM	- Focus Group Meeting
FSR	- Final Scoping Report
GA	- General Authorisation
GDP	- Gross Domestic Product
GHG	- Green House Gases
GHI	- Global Horizontal Irradiation
GIS	- Geographic Information System
GUMP	- Gas Utilisation Master Plan
GW	- Gigawatts
GWh	- Gigawatt Hours
HIA	- Heritage Impact Assessment
I&AP(s)	- Interested and/or Affected Party/Parties
IBA(s)	- Important Bird Area(s)
IDP	- Integrated Development Plan
IEP	- Integrated Energy Plan
IFC	- International Finance Corporation
IKA	- Index of Kilometric Abundance
IPP(s)	- Independent Power Producers
IRP	- Integrated Resource Plan
IUCN	- International Union for the Conservation of Nature and Natural Resources
kV	- Kilovolt
LM	- Local Municipality
LED	- Local Economic Development
LSA	- Late Stone Age
MSA	- Middle Stone Age
MSL	- Mean Sea Level
Mtoe	- Millions of Tonnes of Oil Equivalent
MW	- Megawatt
NC DENC	- Northern Cape Department of Environment and Nature Conservation

NC PGDS	- Northern Cape Provincial Growth and Development Strategy
NEA	- The National Energy Act (Act No. 34 of 2008)
NEMA	- National Environmental Management Act No. 107 of 1998
NEM:AQA	- National Environmental Management: Air Quality Act (Act No. of 2004)
NEM:BA	- National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:PAA	- National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NFA	- The National Forest Act (Act No. 84 of 1998)
NFEPA	- National Freshwater Ecosystem Priority Areas
NHRA	- National Heritage Resources Act (Act No. 25 of 1999)
NPAES	- National Parks Area Expansion Strategy
NRTA	- National Road Traffic Act (Act No. 93 of 1996)
NT	- Near Threatened
NWA	- National Water Act (Act No. 36 of 1998)
OHSA	- Occupational Health and Safety Act (Act No. 85 of 1993)
PDP	- Provincial Development Plan
PES	- Present Ecological Status
PIA	- Palaeontological Impact Assessment
PoS	- Plan of Study
PM	- Public Meeting
PPA	- Power Purchase Agreement
PPP	- Public Participation Process
PV	- Photovoltaic
RDP	- Rural Development Plan
REDZ	- Renewable Energy Development Zone
REIPPPP	- Renewable Energy Independent Power Producer Procurement Programme
RE	- Renewable Energy
SA	- South Africa
SACAA	- South African Civil Aviation Authority
SAHRA	- South African Heritage Resources Agency
SAHRIS	- South African Heritage Resources Information System
SALA	- Subdivision of Agricultural Land Act (Act No. 70 of 1970)
SANBI	- South African National Biodiversity Institute
SANRAL	- South African National Roads Agency SOC Ltd
SARADA	- South African Rock Art Digital Archive
SDF	- Spatial Development Framework
SEF	- Solar Energy Facility
SPVs	- Special Purpose Vehicles
TL	- Terrain Loss
VEGRAI	- Vegetation Response Assessment Index
VIA	- Visual Impact Assessment
VU	- Vulnerable
WETFEPA	- Wetland Freshwater Priority Areas
WEF	- Wind Energy Facility
WMA	- Water Management Area
WUL	- Water Use License

WULA	- Water Use License Application
WWF	- World Wildlife Fund

1 INTRODUCTION

Mooi Plaats Solar Power (Pty) Ltd (hereafter referred to as Mooi Plaats Solar Power) is proposing to construct one (1) 33/132 kV on-site Eskom substation, one (1) 33/132kV Eskom collector substation and an associated 132kV overhead power line (hereafter referred to as the 'proposed development') near Noupoort in the Umsobomvu Local Municipality, which falls within the Pixley ka Seme District Municipality in the Northern Cape Province of South Africa (**Figure 2**) (**DEFF Ref No.:** To be Allocated). SiVEST Environmental Division has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (BA) process for the proposed development. The overall objective of the proposed development is to feed the electricity generated by the proposed Mooi Plaats Solar Photovoltaic (PV) Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) into the national grid.

The proposed development forms one (1) of three (3) electrical infrastructure developments (substations and overhead power lines) that are being proposed as part of the greater Umsobomvu PV project. In addition, three (3) solar PV energy facilities are also being proposed as part of the greater Umsobomvu PV project (**Figure 1**). The other proposed developments (solar PV and grid) which form part of the greater Umsobomvu PV project include the following:

- Mooi Plaats Solar PV – **DEFF Reference Number:** 14/12/16/3/3/2/1134 (part of separate on-going EIA process);
- Wonderheuvel Solar PV - **DEFF Reference Number:** 14/12/16/3/3/2/1135 (part of separate on-going EIA process);
- Wonderheuvel Grid – **DEFF Reference Number:** To be Allocated (part of separate on-going BA process);
- Paarde Valley Solar PV - **DEFF Reference Number:** 14/12/16/3/3/2/1136 (part of separate on-going EIA process); and
- Paarde Valley Grid – **DEFF Reference Number:** To be Allocated (part of separate on-going BA process).

As mentioned, the proposed development is being proposed to feed the electricity generated by the Mooi Plaats Solar PV Energy Facility into the national grid. The proposed solar PV energy facility will however require a separate Environmental Authorisation (EA) and is subject to a separate on-going Environmental Impact Assessment (EIA) process (**DEFF Ref No.:** 14/12/16/3/3/2/1134). It should be noted that the proposed electrical infrastructure development (substations and overhead 132kV power line) will be handed over to Eskom once constructed. The on-site and collector substations will include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substations have been included in the solar PV energy facility EIA (**DEFF Ref No.:** 14/12/16/3/3/2/1134) and in this associated electrical infrastructure BA to allow for handover to Eskom. Although the solar PV energy facility and associated electrical infrastructure (132kV overhead power line, on-site substation and collector substation) will be assessed separately, a single public participation process is being undertaken to consider all of the proposed projects [i.e. three (3) solar PV energy facility EIAs and three (3) grid connection BAs]. The potential environmental impacts associated with all of the developments will be assessed as part of the cumulative impact assessment.

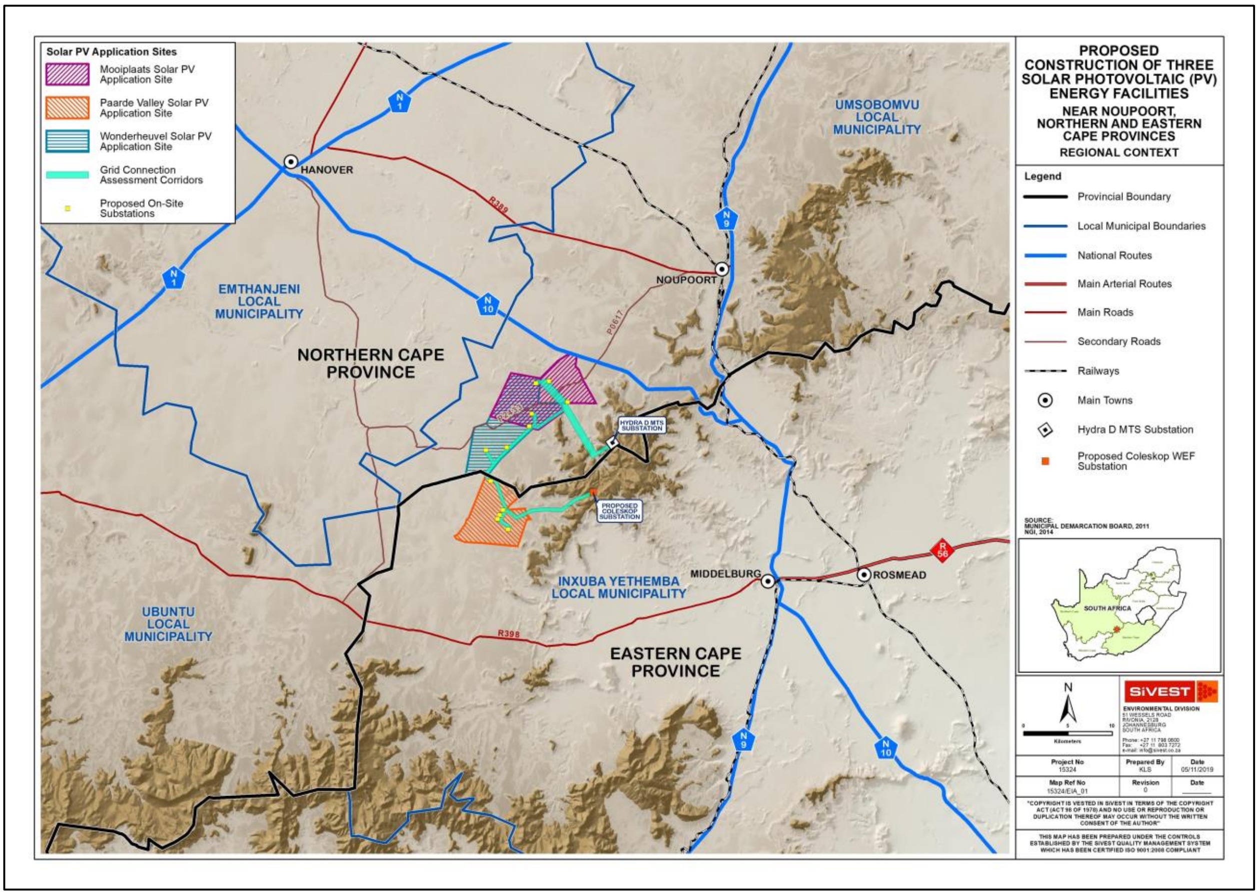

Figure 1: Regional context of greater Umsobomvu PV project

Due to the fact that the proposed development is not located within any of the Central Strategic Transmission Corridors as defined and in terms of the procedures laid out in Government Notice No. 113[7], the proposed development will be subject to a full BA process in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA), as amended, and the EIA Regulations 2014 (as amended in 2017).

The proposed development requires an EA from the National Department of Environment, Forestry and Fisheries (DEFF). However, the relevant provincial authority will also be consulted (i.e. the Northern Cape Department of Environment and Nature Conservation - NC DENC). The BA for the proposed development will be conducted in terms of the EIA Regulations, 2014 (as amended in 2017) promulgated in terms of Chapter 5 of the NEMA (as amended). In terms of these regulations, a full BA process is required for the proposed development. All relevant legislation and guidelines (including Equator Principles) will be consulted during the BA process and will be complied with at all times.

[7] Formally gazetted on 16 February 2018 (Government Notice No. 113)

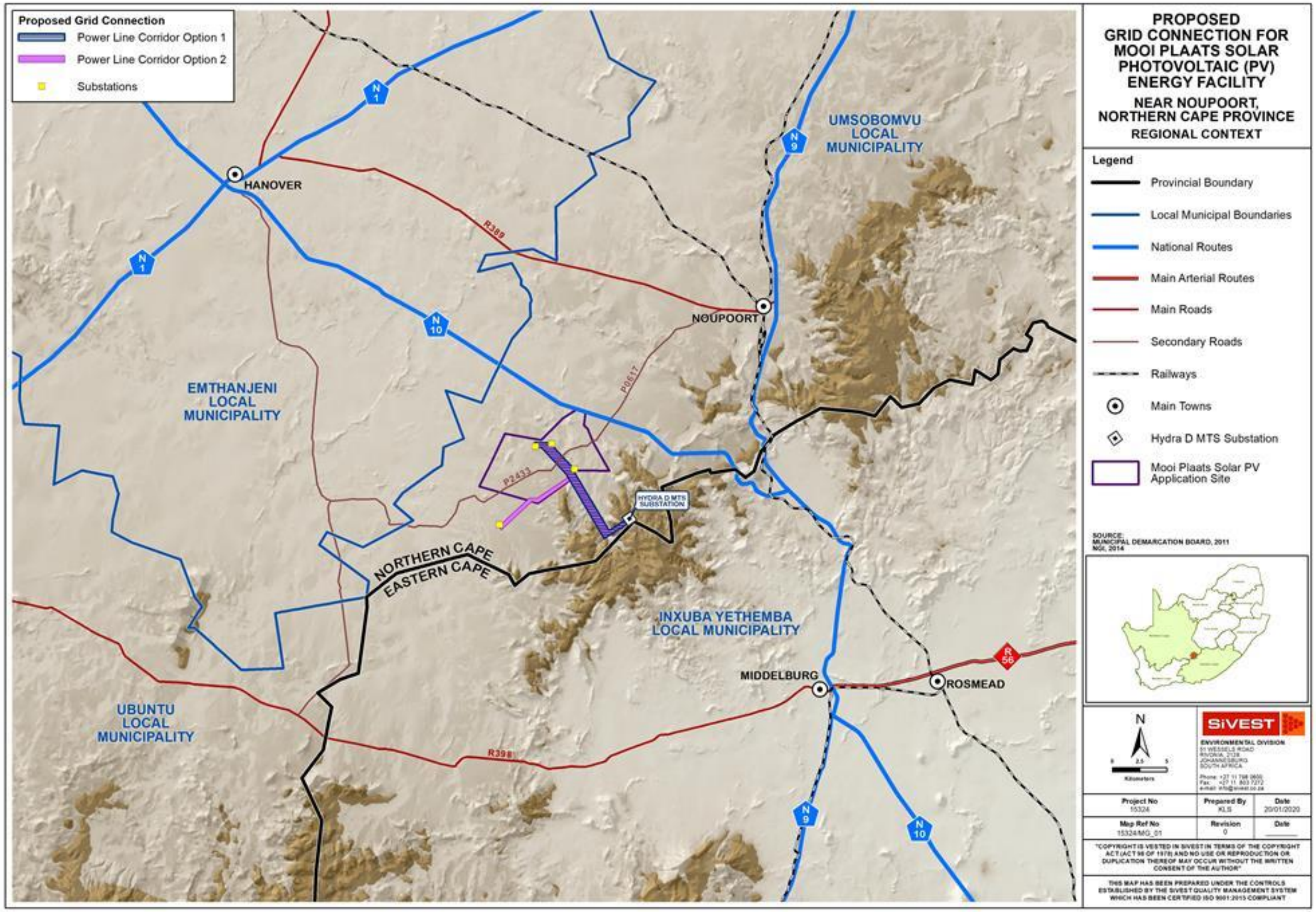

Figure 2: Mooi Plaats On-site Eskom Substation, Eskom Collector Substation and 132kV overhead power line in the regional context

1.1 Objectives of the Basic Assessment (BA) Process

The NEMA EIA Regulations, 2014 (as amended in 2017), state that the objective of the BA process is to, through a consultative process:

(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
(b) identify the alternatives considered, including the activity, location, and technology alternatives;
(c) describe the need and desirability of the proposed alternatives;
(d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine —
    (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    (ii) the degree to which these impacts—
        (aa) can be reversed;
        (bb) may cause irreplaceable loss of resources; and
        (cc) can be avoided, managed or mitigated; and
(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
    (i) identify and motivate a preferred site, activity and technology alternative;
    (ii) identify suitable measures to avoid, manage or mitigate identified impacts; and
    (iii) identify residual risks that need to be managed and monitored.

A Basic Assessment Report (BAR) must contain the information that is necessary for the competent authority to consider and come to a decision on the application. The content requirements for a BAR (as provided in Appendix 1 of the EIA Regulations 2014, as amended), as well as details of which section of the report fulfils these requirements, are shown in **Table 1** below.

Table 1: Content requirements for a BAR

Content Requirements	Applicable Section
(a) details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae (CV);	Details of the EAP and full project team are included in **section 1.4**. The expertise (including curriculum vitae) of the EAP and full project team are included in **Appendix 2**.
(b) the location of the activity, including- (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name;	The location (including 21-digit Surveyor General codes) of the proposed project is detailed on **page *iv*** of the report (under **Key Project Information**), as well as in **section 3.1** and **section 6.2** respectively. Coordinates (start middle and end

Content Requirements	Applicable Section
(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	points for power line corridors and centre point coordinates for substation sites) are provided on **page *vi*** of the report (under **Key Project Information**), as well as in **Appendix 9A**.
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	A map of the regional locality is shown in **section 1** and **section 6.1** respectively, and the site locality is shown in **section 6.2**. Additionally, all project maps are included in **Appendix 5**. Coordinates are provided on ***page vi*** of the report (under **Key Project Information**), as well as in **section 6.2**. Additionally, all coordinates (start middle and end points for power line corridors and centre point coordinates for substation sites) are included in **Appendix 9A**.
(d) a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken including associated structures and infrastructure;	The listed and specified activities triggered as per NEMA are detailed in **section 4.1.3**. The technical project description is included in **section 3**. This includes a description of activities to be undertaken, including associated structures and infrastructure.
(e) a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	A description of all legal requirements and guidelines is provided in **section 4**. This includes key legal and administrative requirements as well as key development strategies and guidelines.
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	The need and desirability of the proposed project is discussed in **section 5**.

Content Requirements	Applicable Section
(g) motivation for the preferred site, activity and technology alternative;	The motivation for the preferred development footprint of the proposed project is discussed in **section 8**.
(h) a full description of the process followed to reach the proposed preferred alternative within the site, including– (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	A description of the alternatives considered in terms of the Regulations is included in **section 3.3**. An assessment of layout alternatives is included in **section 8**. The public participation process followed is detailed in **section 9** Additionally, all public participation documents are included in **Appendix 7**. This will include a summary of issues raised by I&AP's and key stakeholders, and the responses to their comments. A full description of the environmental attributes within the development area is included in **section 6**. The impacts, risks and mitigation associated with each alternative are assessed in **section 7.2**. The methodology used in identifying the impacts and risks associated with each alternative is included in **section 7.1**. The positive and negative impacts, along with the proposed mitigation measures related to the proposed activity will have on the environment are discussed in **section 7.2** and **section 7.3**. The outcome of the site selection matrix is included in **section 5.4**. A concluding statement indicating the preferred alternatives is contained in **section 8** and **section 12.7**.

Content Requirements	Applicable Section
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	The process undertaken to assess the impacts as well as the assessment of impacts by each specialist are shown in **section 7.1**. Each environmental issue and risk are tabulated in **section 7.2**, and an assessment of the significance of each issue before and after mitigation measures is included.
(j) an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	The impact rating system contained in **section 7.1.2** details the methodology for determining the significance of an impact. This includes the points (i) to (vii) of point (j) in Appendix 1 of the EIA Regulations, 2014 (as amended). The assessment of each risk identified by the specialists is contained in **section 7.2**.
(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	All relevant specialist findings are included in **section 6**, with all recommended mitigation measures / impact management measures detailed in **section 7**. The mitigation measures have been incorporated into the Draft Environmental Management Programme (EMPr) which is contained in **Appendix 8**. The tabulated summary of key specialist findings and recommendations is included in **section 12.1** and in the **Executive Summary**.
(l) an environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities	The summary of key findings are found in **section 12.1**. The high-quality maps showing the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the

Content Requirements	Applicable Section
of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	preferred development footprint indicating any areas that should be avoided, including buffers, can be found in **Appendix 5**. The summary of the positive and negative impacts and risks of the proposed activity and identified alternatives can be found in **section 7**.
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	The recommended mitigation measures from specialist reports associated with each impact are included in **section 7**. Overall specialist recommendations and mitigation measures are also included in **section 7**. These measures are contained in the Draft EMPr which can be found in **Appendix 8**.
(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Any aspects identified by specialists or the EAP that should be included as conditions of the authorisation are identified in **section 12** and in the **Executive Summary**.
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	All assumptions and limitations are highlighted in **section 2**.
(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	A reasoned opinion as to whether the proposed activity should be authorised, and, any conditions that should be made in respect of that authorisation can be found in **section 12** and in the **Executive Summary**.
(q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	The period required for the environmental authorisation, as well as the date on which the activity and post-construction monitoring (if required) will be concluded is addressed in **section 12** and in the **Executive Summary**.
(r) an undertaking under oath or affirmation by the EAP in relation to— (i) the correctness of the information provided in the reports;	The EAP affirmation is included in **Appendix 3**.

Content Requirements	Applicable Section
(ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(s) where applicable, details of any financial provision for the rehabilitation, closure, and on-going post decommissioning management of negative environmental impacts;	Where applicable, details of any financial provisions for the rehabilitation, closure, and on-going post-decommissioning management of negative environmental impacts are included in **section 11**, **section 12** and the **Executive Summary**.
(t) any specific information that may be required by the competent authority; and	At this stage, there is no specific information required by the competent authority. However, a record of authority consultation is kept in **section 1.3**, and should there be any specific information requested, this will be detailed in the same section.
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	All requirements in terms of section 24(4)(a) and (b) of the Act have been met in this report.
(2) Where a government notice by the Minister provides for the basic assessment process to be followed, the requirements as indicated in such a notice will apply.	The BA process has been based on the findings of the Site Sensitivity Verification which was undertaken by the specialists. In addition, all specialist assessments which have been undertaken as part of the BA process comply with Appendix 6 of the EIA Regulations, 2014 (as amended), promulgated under sections 24(5) and 44 of the NEMA. The specialist assessments which have been undertaken are listed in **section 1.2** below, and the summary of the findings are detailed in **section 12.1**.

1.2 Specialist Studies

Specialist studies have been conducted in terms of the stipulations contained within **Appendix 6** of the 2014 NEMA EIA Regulations, as amended.

The following assessments were conducted to identify and assess the issues associated with the proposed development:

- Terrestrial Ecology Impact Assessment;
- Avifauna Impact Assessment (incl. pre-construction monitoring);
- Surface Water Impact Assessment;
- Desktop Agricultural and Soils Impact Assessment;
- Desktop Geotechnical Impact Assessment;
- Visual Impact Assessment;
- Heritage Impact Assessment;
- Palaeontology Impact Assessment; and
- Desktop Social Impact Assessment.

The above-mentioned specialist studies were also undertaken to inform the impact assessment of the proposed development. Based on the specialist assessments which were conducted, a few potentially sensitive areas have been identified within the study area. These sensitive areas were subsequently used to inform the area for the potential erection of the substations (on-site and collector) and 132kV overhead power line. In addition, the proposed layout was further refined to avoid environmental sensitivities and subsequently informed the current proposed layout, which was investigated by the respective specialists (**section 8**).

Key issues relating to the proposed development area are discussed in **section 6** and **section 7**.

It should be noted that based on the pre-application meeting held with the DEFF on 19 February 2019, it was confirmed that the specialists could compile one (1) combined report covering all three (3) of the proposed Umsobomvu PV projects as well as the three (3) associated grid infrastructure developments (substations and 132kV power lines), provided the findings and impact assessment sections are project specific. A copy of the pre-application meeting minutes is provided in **Appendix 9B**.

1.3 Decision-Making Authority Consultation

The DEFF is the competent authority on this project. It should be noted that a Pre-Application Meeting was undertaken on the 19th of February 2019 (prior to the submission of the application for EA and DBAR) with representatives from the EAP, Applicant and the DEFF. This meeting was undertaken in order to provide the DEFF with an overview of the proposed development, to discuss details regarding the proposed BA process, to confirm whether the DEFF is in agreement with the approach proposed and to ascertain any specific requirements regarding report writing. In addition, the EAP also sought to understand the DEFF's approach and policy should the proposed development uncover environmental issues during the BA process. The pre-application meeting minutes were sent to all attendees for review and the final minutes are included in **Appendix 9B**.

An application for EA for the proposed development was submitted to the DEFF on Monday 10 February 2020. The proof of payment for the application fee, details of the EAP and declaration of Independence, declaration signed by the Applicant, the project schedule, details of landowners, and locality map formed part of the application form. This DBAR was submitted to the DEFF on the same day that the application for EA was submitted. Following the allocation of the DEFF reference number, this will be included in the Final Basic Assessment Report (FBAR).

A record of all decision-making authority consultation is included within **Appendix 4**.

1.4 Expertise of Environmental Assessment Practitioner (EAP)

SiVEST has considerable experience in the undertaking of BAs. Staff and specialists who have worked on this proposed development and contributed to the compilation of this DBAR are detailed in **Table 2** below.

Table 2: Project Team

Name	Organisation	Role
Andrea Gibb*	SiVEST	Lead Project Coordinator and Visual Reviewer
Stephan Jacobs	SiVEST	Environmental Consultant / EAP
Hlengiwe Ntuli	SiVEST	Public Participation Consultant
Liandra Scott-Shaw	SiVEST	Environmental Consultant / Lead Project Coordinator
Kerry Schwartz	SiVEST	GIS, Mapping and Visual**
Stephen van Staden	Scientific Aquatic Services (SAS)	Visual Peer / External Reviewer
Stephen Burton	SiVEST	Surface Water**
Bruce Scott-Shaw	NatureStamp	Surface Water Peer / External Reviewer
Johann Lanz	Private	Agriculture & Soils
Chris van Rooyen	Chris van Rooyen Consulting	Avifauna
Wouter Fourie	PGS Heritage	Heritage, Archaeology & Cultural Landscape
Elize Butler	Banzai Environmental for PGS Heritage	Palaeontology
Neville Bews	Dr Neville Bews & Associates	Social
David Hoare	David Hoare Consulting	Terrestrial Ecology
Cecilia Canahai	JG Afrika	Geotechnical

** No longer employed by SiVEST*

***Specialist assessments undertaken by SiVEST's in-house specialists. Assessments have been externally reviewed by suitably qualified specialists. Details regarding the specialists who were appointed to undertake external reviews of the in-house specialist assessments have been provided in table above. In addition, CVs of these specialists have been provided in **Appendix 2**, while copies of the Declarations of Independence (DoIs) for these specialists have been provided in **Appendix 3**.*

As per the requirements of the NEMA (2014, amended in 2017), the details and level of expertise of the persons who prepared the DSR are provided in **Table 3** below. The EAP Affirmation and Declaration of Independence is contained in **Appendix 3**.

Table 3: Expertise of the EAP

Environmental Assessment Practitioner (EAP)	SiVEST SA (Pty) Ltd - Stephan Jacobs
Contact Details	stephanj@sivest.co.za
Qualifications	B.Sc. Environmental Sciences (undergraduate) and B.Sc. (Hons) Environmental Management and Analysis
Expertise	Stephan joined SiVEST in May 2015 and holds the position of Environmental Consultant in the Johannesburg and Pretoria offices. Stephan specialises in the field of Environmental Management and has been extensively involved in Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes for various types of projects / developments, in particular renewable energy projects / developments which form part of South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). As such, Stephan has vast experience with regards to the compilation of EIAs and BAs. Additionally, Stephan has extensive experience in undertaking public participation and stakeholder engagement processes. Stephan has also assisted extensively in the undertaking of field work and the compilation of reports for specialist studies such as Surface Water and Visual Impact Assessments. Stephan also has considerable experience in Environmental Compliance and Auditing and has acted as an Environmental Control Officer (ECO) for several infrastructure projects..
Lead Project Coordinator / Environmental Consultant	SiVEST SA (Pty) Ltd – Liandra Scott-Shaw
Contact Details	liandras@sivest.co.za
Qualifications	B.Sc. Biological Science and B.Sc. (Hons) Ecological Science
Expertise	Liandra joined SiVEST in January 2014 and holds the position of Environmental Consultant in the Pietermaritzburg office. Liandra specialises in the field of Vegetation Ecology and Environmental Management and has been involved in the compilation of Environmental Impact Assessments (EIAs) and Basic Assessments (BAs) and specialist vegetation studies since

	joining SiVEST.

Please refer to attached CV's in **Appendix 2** for more information. Declarations of Independence (DoIs) of each specialist are contained in **Appendix 3**.

1.5 Draft Basic Assessment Report (DBAR) Structure

This DBAR is structured as follows:

- **Chapter 1** introduces the proposed development and explains the objectives of the BA process. It also provides a background to the proposed development and the environmental impact process. The chapter also points out the specialist studies for the proposed development and describes the authority consultation thus far. Furthermore, the chapter discusses the experience of the EAP as well as specialists who have contributed to the report;
- **Chapter 2** elaborates on the assumptions and limitations pertaining to the BA process for the proposed development;
- **Chapter 3** presents the technical description of the proposed development, including a description of alternatives being considered;
- **Chapter 4** expands on the relevant legal ramifications applicable to the proposed development and describes relevant development strategies and guidelines;
- **Chapter 5** provides explanation to the need and desirability of the proposed development;
- **Chapter 6** provides a description of the region in which the proposed development is intended to be located. Although the chapter provides a broad overview of the region, it is also specific to the application. It contains descriptions of the site and the specialist studies conducted are also summarised;
- **Chapter 7** identifies potential impacts associated with the proposed development. The chapter further identifies these impacts per specialist study and discusses potential cumulative impacts per environmental issue (i.e. per specialist study). In addition, a rating of each environmental issue before and after the implementation of mitigation measures is also presented;
- **Chapter 8** discusses layout alternatives, including how they relate to sensitive areas identified by specialists and provides a comparison of alternatives;
- **Chapter 9** describes the Public Participation Process (PPP) undertaken during the BA process and tables issues and concerns raised by Interested and/or Affected Parties (I&APs) and key stakeholders;
- **Chapter 10** Provides a description of the environmental monitoring and auditing process to be undertaken for the proposed development;
- **Chapter 11** provides an assessment of the report in terms of the World Bank Standards and Equator Principles. This chapter presents a checklist that ensures that the report has been compiled according to the requirements of the World Bank Standards and Equator Principles;
- **Chapter 12** summarises the findings and recommendations per specialist study and provides the overall conclusion;
- **Chapter 13** outlines the processes to be followed, following the submission of the DBAR; and
- **Chapter 14** lists references indicated in the DBAR.

2 ASSUMPTIONS AND LIMITATIONS

2.1 General Assumptions and Limitations

- It is assumed that all information provided to the Environmental Team by the applicant was correct and valid at the time it was provided;
- It is not always possible to involve all I&APs individually, however, every effort has been / is being made to involve as many interested parties as possible. It is also assumed that individuals representing various associations or parties convey the necessary information to these associations / parties;
- It is assumed that the information provided by the various specialists is unbiased and accurate;
- It is not possible to determine the actual degree of the impact that the development will have on the immediate environment without some level of uncertainties. Actual impacts can only be determined following the commencement of construction and/or operation; and
- SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments. However, many of the documents are not currently publicly available to download. The information that could be obtained for the surrounding planned renewable energy developments was taken into account as part of the cumulative impact assessment.

2.2 Specialist Assumptions and Limitations

The following assumptions, uncertainties and gaps in knowledge were encountered by the various specialists:

2.2.1 Terrestrial Ecology

- The assessment is based on a single reconnaissance site visit from 4-8 February 2019. The current study is based on an extensive site visit as well as a desktop study of the available information. The time spent on-site was not adequate for describing seasonal floristic patterns on-site in detail but is adequate for understanding general patterns across affected areas. If necessary, additional surveys will be recommended to compensate for any short-coming related to this;
- The vegetation was in reasonably good condition for sampling at the time of the field assessment, although extensive parts of the mountainous areas had been burnt prior to the field survey and could not be adequately sampled. Nevertheless, there are few limitations with regards to the vegetation sampling of the lowland areas and the species lists obtained for these areas is considered reliable and relatively comprehensive;
- Compiling the list of species that could potentially occur on-site is limited by the paucity of collection records for the area. The list of plant species that could potentially occur on-site was therefore taken from a wider area and from literature sources that may include species that do not occur on-site and may miss species that do occur on site. In order to compile a

comprehensive site-specific list of the biota on-site, studies would be required that would include different seasons, be undertaken over a number of years and include extensive sampling. Due to time constraints, this was not possible for this study;

- Rare and threatened plant and animal species are, by their nature, usually very difficult to locate and can be easily missed;
- The faunal component of the study relies primarily on existing information, as available in various spatial databases and published accounts. These databases are not intended for fine-scale use and the reliability and adequacy of these data sources relies heavily on the extent to which the area has been sampled in the past. Many remote areas have not been well sampled with the result that the species lists for an area do not always adequately reflect the actual fauna and flora present at the site. In order to counter the likelihood that the area has not been well sampled in the past and in order ensure a conservative approach, the species lists derived for the site from the literature were obtained from an area significantly larger than the study area and are likely to include a much wider array of species than actually occur at the site. The study excludes Bats, Avifauna, Aquatic Ecology and Invertebrates; and
- Cumulative impacts are assessed by adding expected impacts from this proposed development to existing and proposed developments of a similar nature that are within a 50km radius of the site.

2.2.2 Avifauna

The Avifauna study assumed that the sources of information used in the report are reliable. In this respect, the following must be noted:

- A total of 40 SABAP2 full protocol lists had been completed to date for the broader area where the proposed project is located [i.e. bird listing surveys lasting a minimum of two (2) hours each]. In addition, twelve (12) ad hoc protocol lists [i.e. bird listing surveys lasting less than two (2) hours but still giving useful data] and 684 incidental sightings were also recorded. The SABAP2 data was therefore regarded as a good indicator of the avifauna which could occur at the proposed development area, and it was further supplemented by data collected during the on-site surveys;
- The focus of the study is primarily on the potential impacts on priority power line species;
- Priority power line species were defined as those species which could potentially be impacted by power line collisions or electrocutions, based on morphology and/or behaviour;
- The impact of solar installations on avifauna is a new field of study, with only one (1) published scientific study on the impact of PV facilities on avifauna in South Africa (Visser *et al*., 2019). Strong reliance was therefore placed on expert opinion and data from existing monitoring programmes at solar facilities in the USA where monitoring has been on-going since 2013. The precautionary principle was applied throughout as the full extent of impacts on avifauna at solar facilities is not presently known;
- The assessment of impacts is based on the baseline environment as it currently exists at the proposed development area;
- Cumulative impacts include all proposed and existing renewable energy projects within a 35km radius around the proposed development areas;

- Conclusions in the Avifauna study are based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will be valid under all circumstances; and
- The broader area is defined as the area encompassed by the nine (9) pentads where the project is located (see Figure 4 of the Avifauna Impact Assessment Report in **Appendix 6B**). The study area is defined as the combined area of the Mooi Plaats (part of a separate on-going EIA process with **DEFF Ref No:** 14/12/16/3/3/2/1134), Wonderheuvel (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1135), and Paarde Valley (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1136) PV assessment areas, and the power line corridors (see Figure 4 of the Avifauna Impact Assessment Report in **Appendix 6B**).

2.2.3 Surface Water

- Where present, the investigation of both wetlands and riparian habitat were initially identified and delineated at a desktop level. These were then ground-truthed using a Global Positioning System (GPS) device and verified in the fieldwork phase. The GPS used is expected to be accurate from 5m up to 15m, depending on meteorological conditions. The initial delineations undertaken at a desktop level were refined following findings made in the fieldwork phase and points recorded in the field;
- The site visit was undertaken from the 5th to the 7th of February 2019. Due to seasonal wetland and riparian vegetation growth preferences, vegetation species can grow at different times / seasons of the year. As such, some hydrophytic wetland vegetation species may not have been present at the time of the assessment. Seasonal vegetation identification limitations therefore apply to this assessment given the short term once-off nature of the fieldwork component. The assessment should therefore not be undertaken to be a fully comprehensive study on wetland and riparian vegetation species occurrence;
- The study has focused on the possible identification and delineation of wetlands and riparian habitat (as defined herein) that are to be affected by the layout of the proposed development on the study site. Identification and delineation of potential wetlands and riparian habitat in the wider area outside of the proposed development area were only undertaken for possible wetlands within 500m radius of the study site to make provision for Government Notice 509 of 2016 (No. 40229). A comprehensive study of wetlands and riparian habitat in the wider area was not undertaken;
- This study is limited to providing a surface water resources delineation, wetland and riparian zone ecological state [wetland Present Ecological State (PES) and Vegetation Response Assessment Index (VEGRAI) Ecological Condition (EC)] determination, wetland and riparian zone ecosystem services assessment, wetland and riparian habitat environmental importance and sensitivity classifications, an impact assessment and risk assessment in terms of Government Notice 509 of 2016 (No. 40229), where each of these assessments are applicable. No other assessments were undertaken or formed part of this study. As such, aquatic studies including fish, invertebrates and amphibians have not been included in this report. Nor have water quality, hydrological, flood line or groundwater studies been included. These will be undertaken separately and where necessary for the project;

- Use of database information for the desktop assessment included the National Freshwater Ecosystem Priority Areas (NFEPA, 2011) database. This database is a national level database and some smaller surface water resources may not be contained in the database. Additionally, mainly permanently saturated wetlands are included in the database. Therefore, wetlands with seasonal and temporary saturation cycles may not be included. The fieldwork component was included in the assessment to verify the desktop database information in order to address these shortcomings should wetlands have been identified;
- The risk assessment matrix as per Government Notice 509 of 2016 (No. 40229) was completed based on the current available layout plan. The risk assessment assumes a worst-case scenario approach in which the current layout is implemented but which also takes into consideration the recommended control measures; and
- SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments. However, many of the documents are not currently publicly available to download. The information that could be obtained for the surrounding planned renewable energy developments was taken into account as part of the cumulative impact assessment.

2.2.4 Agricultural and Soils

- The assessment rating of impacts is not an absolute measure. It is based on the subjective considerations and experience of the specialist, but is done with due regard and as accurately as possible within these constraints;
- The study makes the assumption that water for irrigation is very limited across the site. This is based on the assumption that a long history of farming experience in an area will result in the exploitation of viable water sources if they exist, and only very limited irrigation water has been exploited in this area;
- Cumulative impacts are assessed by adding expected impacts from this proposed development to existing and proposed developments with similar impacts in a 50km radius. The existing and proposed developments that were taken into consideration for cumulative impacts are listed in Appendix B of the Agricultural and Soils Impact Assessment Report (**Appendix 6A**). SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments. However, many of the documents are not currently publicly available to download, and could therefore not be reviewed during this assessment; and
- There are no other specific constraints, uncertainties and gaps in knowledge for this study.

2.2.5 Visual

- Given the nature of the receiving environment and the height of the proposed PV panels and power line towers, the study area or visual assessment zone is assumed to encompass an area of 5km from the boundary of the application sites. This limit on the visual assessment zone relates to the fact that visual impacts decrease exponentially over distance. Thus although the proposed development may still be visible beyond 5km, the degree of visual impact would diminish considerably. As such, the need to assess the impact on potential receptors beyond this distance would not be warranted;

- The identification of visual receptors involved a combination of desktop assessment as well as field-based observation undertaken during the project. Initially Google Earth imagery was used to identify potential receptors within the study area. Where possible, these receptor locations were verified and assessed during a site visit which was undertaken between the 4th and the 7th of February 2019. Due to the extent of the study area however, and the fact that many of the identified receptors are farm houses on private property, it was not possible to visit or verify every potentially sensitive visual receptor location. As such, a number of broad assumptions have been made in terms of the likely sensitivity of the receptors to the proposed development. It should be noted that not all receptor locations would necessarily perceive the proposed development in a negative way. This is usually dependent on the use of the facility, the economic dependency of the occupants on the scenic quality of views from the facility and on people's perceptions of the value of 'Green Energy'. Sensitive receptor locations typically include sites such as tourism facilities and scenic locations within natural settings which are likely to be adversely affected by the visual intrusion of the proposed development. Thus, the presence of a receptor in an area potentially affected by the proposed development does not necessarily mean that any visual impact will be experienced;
- For the purposes of the study, all analysis is based on a worst-case scenario where PV panel height has been assumed to be 4m and power line towers and substation structure heights have been assumed to be 25m;
- Due to the varying scales and sources of information; maps may have minor inaccuracies. Terrain data for this area derived from the National Geo-Spatial Information (NGI)'s 25m Digital Elevation Model (DEM) is fairly coarse and somewhat inconsistent and as such, localised topographic variations in the landscape may not be reflected on the DEM used to generate the viewsheds;
- In addition, the viewshed analysis does not take into account any existing vegetation cover or built infrastructure which may screen views of the proposed development. This analysis should therefore be seen as a conceptual representation or a worst-case scenario;
- The potential visual impact at each visual receptor location was assessed using a matrix developed for this purpose. The matrix is based on three (3) main parameters relating to visual impact and, although relatively simplistic, it provides a reasonably accurate indicative assessment of the degree of visual impact likely to be experienced at each receptor location as a result of the proposed development. It is however important to note the limitations of quantitatively assessing a largely subjective or qualitative type of impact and as such the matrix should be seen merely as a representation of the likely visual impact at a receptor location;
- No feedback regarding the visual environment has been received from the public participation process to date, however, any feedback from the public during the review period of the DBAR will be incorporated into further drafts of the visual report;
- At the time of undertaking the visual study no information was available regarding the type and intensity of lighting that will be required for the proposed solar energy facility and therefore the potential impact of lighting at night has not been assessed at a detailed level. However, lighting requirements are relatively similar for all solar PV energy facilities and as such, general

measures to mitigate the impact of additional light sources on the ambience of the nightscape have been provided;

- This study includes an assessment of the potential cumulative impacts of other renewable energy developments on the existing landscape character and on the identified sensitive receptors. This assessment is based on the information available at the time of writing the report and where information has not been available, broad assumptions have been made as to the likely impacts of these developments;
- SiVEST made every effort to obtain information for the surrounding planned renewable energy developments (including specialist studies, assessment reports and Environmental Management Programmes), however, some of the documents are not currently publicly available for download. The available information was factored into the cumulative impact assessment (Section 5.4 of Visual Impact Assessment Report – **Appendix 6I**);
- It should be noted that the site visit was undertaken in the first week of February 2019, during mid to late summer, when most rainfall occurs. Typically, the visual impact of a PV project would be less significant during the rainy periods of the year than it would during the drier periods when the surrounding vegetation is expected to provide less potential screening. The study area is however typically characterised by low levels of rainfall and the vegetation cover is largely dominated by low shrubs. Thus, the season is not expected to have a significant effect on the visual impact of the proposed development; and
- The weather conditions in the study area also affect the visual impact of the proposed development to some degree. The site visit was undertaken in clear weather conditions which tend to prevail for most of the year due to the low levels of rainfall in the area. In these clear conditions, the proposed development would present a greater contrast with the surrounding landscape than they would during overcast conditions. The weather conditions during the time of the study were therefore taken into consideration when undertaking the Visual Impact Assessment (VIA).

2.2.6 Heritage

- Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the development area. Various factors account for this, including the subterranean nature of some archaeological sites. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted;
- The accuracy of the Palaeontological Impact Assessments (PIAs), such as the one(1) included as part of this Heritage Impact Assessment (HIA), is reduced by several factors which may include the following: the databases of institutions are not always up to date and relevant locality and geological information was not accurately documented in the past. Various remote areas of South Africa have not been assessed by palaeontologists and data is based on aerial photographs alone. Geological maps concentre on the geology of an area and the sheet explanations were never intended to focus on palaeontological heritage;
- Similar Assemblage Zones, but in different areas, are used to provide information on the presence of fossil heritage in an unmapped area. Desktop studies of similar geological

formations and Assemblage Zones generally assume that exposed fossil heritage is present within the development area. The accuracy of the PIA is thus improved considerably by conducting a field-assessment; and

- Due to the prohibitive size of the application area it was agreed that fieldwork related to the heritage assessment will only be done when the footprint areas have been determined and significantly reduced, based on environmental sensitive areas determined by the other specialists. After the completion of the fieldwork the proposed grid corridors were redefined based on the information from various specialist. The final power line corridor will then be walked down during the EMPr implementation as required in the proposed management measures related to heritage resources.

2.2.7 Palaeontology

- The accuracy of PIAs is reduced by several factors which may include the following: the databases of institutions are not always up to date and relevant locality and geological information were not accurately documented in the past. Various remote areas of South Africa has not been assessed by palaeontologists and data is based on aerial photographs alone. Geological maps concentre on the geology of an area and the sheet explanations were never intended to focus on palaeontological heritage; and
- Similar Assemblage Zones, but in different areas, are used to provide information on the presence of fossil heritage in an unmapped area. Desktop studies of similar geological formations and Assemblage Zones generally assume that exposed fossil heritage is present within the development area. The accuracy of the PIA is thus improved considerably by conducting a field-assessment.

2.2.8 Social

- It is assumed that the technical information provided by the project proponent and the environmental consultants SiVEST, is credible and accurate at the time of compiling the report;
- It is also assumed that the data provided by the various specialists as used in this report are credible and accurate;
- The demographic data used in this report was sourced from Statistics South Africa and is based on data gathered during Census 2011. This data is somewhat outdated but where possible is supplemented with the latest Stats SA’s survey data such as the Mid-year population estimates and the Quarterly Labour Force Survey. The limitation of this is that this survey data is restricted to a provincial level and does not extend to a municipal level; and
- Some of the information in the documentation available from the district and local municipalities was somewhat outdated but wherever possible that information was aligned with that available from Stats SA.

3 TECHNICAL DESCRIPTION

At this stage, it is anticipated that the proposed development will include the following components:

- One (1) new on-site substation (namely Substation 2) and one (1) new collector substation (namely Substation 1a – Northern Collector) to serve the Mooi Plaats Solar PV Energy Facility (part of separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134), each occupying an area of up to approximately 4 hectares (ha). The proposed substations will be step-up substations and will include an Eskom portion and an IPP portion, hence the substations have been included in the solar PV energy facility EIA and in the grid infrastructure BA to allow for handover to Eskom; and
- A new 132kV overhead power line connecting the on-site and collector substations to either the Hydra D Main Transmission Substation (MTS) (part of separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[8]) or the proposed Coleskop Wind Energy Facility (WEF) substation (part of separate BA process with **DEFF Ref No.:** 14/12/16/3/3/1/2039[9]), depending on which grid connection infrastructure alternative is chosen as preferred, from where the electricity will be fed into the national grid. The type of power line towers being considered at this stage include both lattice and monopole towers, which will be up to approximately 25m in height.

It should be noted that the proposed layout has been informed by the environmental sensitive and 'no-go' areas which were identified by the respective specialists. The proposed layout will be further refined and updated, should this be required.

As mentioned, the proposed on-site and collector substations will each occupy an area of up to approximately 4ha. The surface area which is to be covered by the proposed power line towers has however not been determined yet. It should be noted that the final design details are yet to be confirmed and will become available during the detailed design phase of the proposed development. The surface area which is to be covered by the proposed development will thus be confirmed during the detailed design phase of the project, when the final design details have been confirmed and become available.

At this stage, the type of towers being considered for the proposed power line include both lattice and monopole towers. It is assumed that the proposed towers will be located approximately 200m to 250m apart. The towers will be up to approximately 25m in height, depending on the terrain, but will ensure minimum overhead line clearances from buildings and surrounding infrastructure. The exact height and location of the towers will however be confirmed during the final design stages of the power line design process. The exact height of the substations will also be confirmed during the final design stages of the respective substations.

[8] Originally formed part of Umsobomvu WEF (14/12/16/3/3/2/730) which was issued with an EA on 17 February 2017. EA however split into three (3) separate EAs, namely Umsobomvu I WEF (14/12/16/3/3/2/730/AM2), Coleskop WEF (14/12/16/3/3/2/730/1/AM2) and Eskom Infrastructure MTS (14/12/16/3/3/2/730/2) (which includes Eskom Hydra D MTS)

[9] Part of separate BA process for supporting infrastructure for Coleskop WEF (14/12/16/3/3/2/730/1/AM2). Was not part of original Umsobomvu WEF application (14/12/16/3/3/2/730)

The proposed substations consist of on-site and collector substations with voltages of up to approximately 33/132kV. The proposed substations will contain transformers for voltage step-up from medium voltage to high voltage. Direct Current (DC) power from the panels will be converted into Alternating Current (AC) power in the inverters and the voltage will be stepped up to medium voltage in the inverter transformers. This will however be confirmed during the final design phase. The proposed substations will be shared substations connecting the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) to the Hydra D Main Transmission Substation (MTS) (part of a separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[8]), which will still be constructed.

An overhead power line with a voltage capacity of up to approximately 132kV is proposed. Based on the option chosen as 'preferred' for the grid connection infrastructure alternatives (namely Option 1a), the proposed preferred power line corridor will run for a length of approximately 13.34km from the proposed Mooi Plaats On-site Eskom Substation (namely Substation 2), to the proposed Mooi Plaats Eskom Northern Collector Substation (namely Substation 1a) and finally to the Hydra D MTS (part of a separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[8]), which will still be constructed.

Internal access roads, between 4m and 12m wide, to the Mooi Plaats On-site Eskom Substation and Mooi Plaats Eskom Collector Substation will form part of the associated infrastructure. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary.

It should be noted that the final design details are yet to be confirmed. These details will become available during the detailed design phase of the proposed development.

Grid connection infrastructure alternatives (which include on-site and collector substation sites and 132kV power line corridors) have been identified and comparatively assessed by the respective specialists. These alternatives essentially provide for different power line route alignments with associated substations (on-site and collector) contained within an assessment corridor between approximately 400m and 900m wide. This is to allow for flexibility to route the power line on either side of the existing high voltage Eskom power lines. The sensitive areas which were identified within the study area were used to inform the assessment of layout alternatives. The layout alternatives and results of the comparative assessment of alternatives have been discussed in more detail in **section 8**.

3.1 Project Location

The proposed development is located approximately 23km south-west of the town of Noupoort, within the Umsobomvu Local Municipality, in the Pixley ka Seme District Municipality of the Northern Cape Province.

The development area assessed by the specialists incorporated six (6) farm portions. However, only five (5) farm portions are affected by the power line corridor route associated with the 'preferred' grid connection infrastructure alternative (namely Grid Connection Option 1a). These include the following:

- Remainder of the Farm Mooi Plaats No. 121;
- Portion 1 of the Farm Leuwe Kop No. 120;

- Portion 6 of the Farm Uitzicht No. 3;
- Portion 7 of the Farm Uitzicht No. 3; and
- Portion 8 of the Farm Uitzicht No. 3.

Table 4: Summary of properties affected by preferred substation sites and power line corridors

FARM DESCRIPTION		21 DIGIT SURVEYOR GENERAL (SG) CODE		
Remainder of the Farm Mooi Plaats No. 121		C03000000000012100000		
Portion 1 of the Farm Leuwe Kop No. 120		C03000000000012000001		
Portion 6 of the Farm Uitzicht No. 3		C04800000000000300006		
Portion 7 of the Farm Uitzicht No. 3		C04800000000000300007		
Portion 8 of the Farm Uitzicht No. 3		C04800000000000300008		
PREFERRED 132kV POWER LINE CORRIDOR ALTERNATIVE				
CENTRE LINE COORDINATES (DD MM SS.sss)				
CORRIDOR ALTERNATIVE	**START POINT**	**MIDDLE POINT**	**END POINT (HYDRA D MTS)**	**APPROX LENGTH (KM)**
Option 1a	S31° 17' 39.289"	S31° 20' 5.021"	S31° 21' 20.482"	13.34
	E24° 43' 51.440"	E24° 46' 36.932"	S31° 21' 20.482"	

PREFERRED ON-SITE AND COLLECTOR SUBSTATION SITE ALTERNATIVE COORDINATES			
ALTERNATIVE	**AREA (HECTARES)**	**CENTRE POINT COORDINATES**	
		SOUTH	**EAST**
Substation 1a (Eskom Northern Collector Substation)	4	S31° 18' 47.922"	E24° 46' 6.243"
Substation 2 (On-site Eskom Substation)	4	S31° 17' 39.289"	E24° 43' 51.440"

The project site has been identified based on solar resource, grid connection suitability, competition, topography, land availability and site access.

The proposed development location is shown in the locality map (**Figure 3**) below.

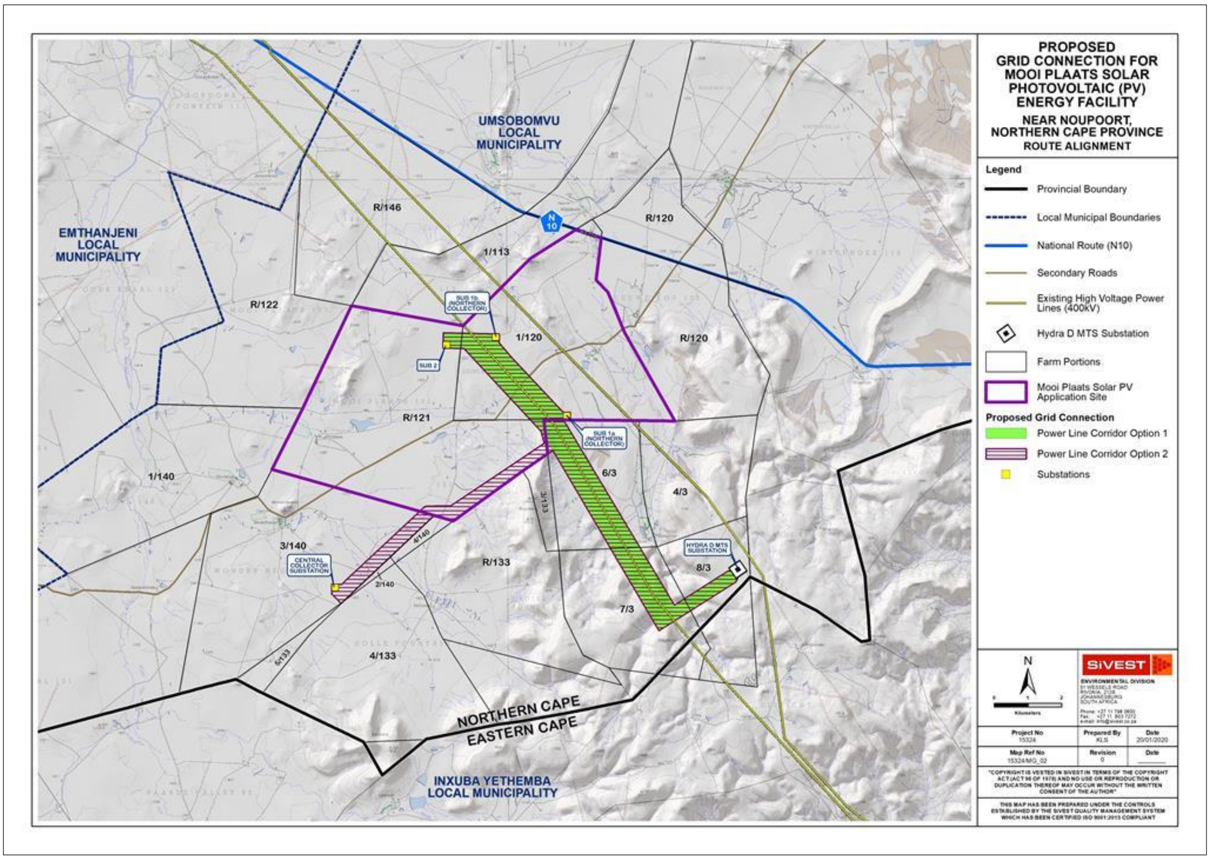

Figure 3: Layout map showing different grid connection infrastructure alternatives

3.2 Technical Details

Mooi Plaats Solar Power is proposing the construction of one (1) new on-site Eskom substation, one (1) new Eskom collector substation and associated 132kV overhead power line in order to feed the electricity generated by the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) into the national grid. The proposed substations will have voltage capacities of up to approximately 33/132kV and will be step-up substations. The proposed overhead power line will have a voltage capacity of up to approximately 132kV. Based on the option chosen as 'preferred' for the grid connection infrastructure alternatives (namely Option 1a), the proposed preferred power line will run for a length of approximately 13.34km from the proposed Mooi Plaats On-site Eskom Substation (Substation 2), to the Mooi Plaats Eskom Collector Substation (Substation 1a – Northern Collector) and finally to the Hydra D MTS (part of separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[8]), which must still be constructed. In addition, the proposed power line will have a servitude width of approximately 36m. At this stage, the type of towers being considered for the proposed power line include both lattice and monopole towers. It is assumed that the proposed towers will be located approximately 200m to 250m apart. The towers will be up to approximately 25m in height, depending on the terrain, but will ensure minimum overhead line clearances from buildings and surrounding infrastructure. The exact height, servitude width and location of the power line towers will however be confirmed during the final design stages of the power line design process. Internal access roads, between 4m and 12m wide, to the proposed on-site and collector substations will form part of the associated infrastructure. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. The proposed on-site and collector substations will each occupy an area of up to approximately 4ha. The surface area which is to be covered by the proposed power line towers has not been determined yet. The surface area which is to be covered by the entire proposed development will be confirmed during the detailed design phase of the project, when the final design details have been confirmed and become available.

The key technical details and infrastructure required are presented in the table below (**Table 5**).

Table 5: Summary of key components

PROJECT	DEFF REFERENCE	FARM NAMES AND AREA
Mooi Plaats On-site Eskom Substation, Eskom Collector Substation and 132kV Power Line	To be Allocated	**On-site Eskom Substation:** ▪ Remainder of the Farm Mooi Plaats No. 121. **Eskom Collector Substation:** ▪ Portion 1 of the Farm Leuwe Kop No. 120. **Preferred Power Line Corridor (Option 1a):** ▪ Remainder of the Farm Mooi Plaats No. 121; ▪ Portion 1 of the Farm Leuwe Kop No. 120; ▪ Portion 6 of the Farm Uitzicht No. 3; ▪ Portion 7 of the Farm Uitzicht No. 3; and ▪ Portion 8 of the Farm Uitzicht No. 3. **Area of On-site and Collector substations (combined) = 8 hectares (ha)** **Area of entire development footprint = Uknown at this stage. Will be confirmed during the detailed design phase of the project, when final design details have been confirmed and become available.**
TECHNICAL DETAILS OF ASSOCIATED INFRASTRUCTURE		
	Access roads	▪ Internal access roads, up to approximately 14m during construction (to be partly rehabilitated) and between 4m and 12m wide during operation, will provide access to proposed on-site (Substation 2) and collector (Substation 1a – Northern Collector) substations; and ▪ Existing site roads will be used wherever possible, although new site roads will be constructed where necessary.
	Substations (On-site and Collector)	▪ One (1) new 33/132kV On-site Eskom Substation (namely Substation 2). Referred to as Mooi On-site Eskom Substation; ▪ One (1) new 33/132kV Eskom Collector Substation (Substation 1a – Northern Collector). Referred to as Mooi Plaats Eskom Collector Substation; ▪ On-site and collector substations each occupy an area of up to approx. 4ha;

		▪ Height of substations and other infrastructure will be confirmed during the final design stages of the respective substations; ▪ Will be step-up substations. Will contain transformers for voltage step-up from medium voltage to high voltage. Direct Current (DC) power from PV panels will be converted into Alternating Current (AC) power in inverters and voltage will be stepped up to medium voltage in inverter transformers; and ▪ Substations will include an Eskom portion and an IPP portion.
	Overhead Power Line	▪ Voltage capacity of up to approximately 132kV; ▪ Preferred power line will link proposed Mooi Plaats On-site Eskom Substation to the Mooi Plaats Eskom Collector Substation and finally to the Hydra D MTS (part of separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[8]), which will still be constructed; ▪ Length of approximately 13.34km for preferred power line (namely Option 1a); ▪ Grid connection is to the Hydra D MTS, which will still be constructed; ▪ Type of power line towers being considered at this stage include both lattice and monopole towers, which will be up to approx. 25m in height, depending on height. Will however ensure minimum overhead line clearances from buildings and surrounding infrastructure; ▪ Assumed that proposed power line towers will be located approximately 200m to 250m apart; ▪ Exact height and location of towers will be confirmed during the final design stages of power line design process; and ▪ Area to be cleared for proposed power line to be confirmed during the detailed design phase of the project, when final design details have been confirmed and become available.

As mentioned, the proposed development forms one (1) of three (3) electrical infrastructure developments (substations and overhead power lines) that are being proposed as part of the greater Umsobomvu PV project. In addition, three (3) solar PV energy facilities are also being proposed as part of the greater Umsobomvu PV project. The other proposed developments (solar PV and grid) which form part of the greater Umsobomvu PV project include the following:

- Mooi Plaats Solar PV – **DEFF Reference Number:** 14/12/16/3/3/2/1134 (part of separate on-going EIA process);
- Wonderheuvel Solar PV - **DEFF Reference Number:** 14/12/16/3/3/2/1135 (part of separate on-going EIA process);
- Wonderheuvel Grid – **DEFF Reference Number:** To be Allocated (part of separate on-going BA process);

- Paarde Valley Solar PV – **DEFF Reference Number:** 14/12/16/3/3/2/1136 (part of separate on-going EIA process); and
- Paarde Valley Grid – **DEFF Reference Number:** To be Allocated (part of separate on-going BA process).

In addition, the proposed development is being proposed to feed the electricity generated by the Mooi Plaats Solar PV Energy Facility into the national grid. The proposed solar PV energy facility will however require a separate EA and is subject to a separate on-going EIA process (**DEFF Ref No.:** 14/12/16/3/3/2/1134). It should also be noted that the proposed on-site and collector substations will include an Eskom portion and an IPP portion, hence the substations have been included in the solar PV energy facility EIA and in the associated electrical infrastructure BA to allow for handover to Eskom.

3.2.1 On-site and Collector Substations

The proposed development will include the construction of one (1) new on-site Eskom substation (referred to as Mooi Plaats On-site Eskom Substation) and one (1) new Eskom collector substation (referred to as Mooi Plaats Eskom Collector Substation), each occupying an area of up to approximately 4ha. The substations will be step-up substations which will have capacities of up to approximately 33/132kV respectively. The proposed substations will contain transformers for voltage step-up from medium voltage to high voltage. DC power from the PV panels will be converted into AC power in the inverters and the voltage will be stepped up to medium voltage in the inverter transformers. The proposed substations will be shared substations connecting the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) to the Hydra D MTS (part of a separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[8]), which will still be constructed.

It should be noted that the substations will include an Eskom portion and an IPP portion, hence the substations have been included in the solar PV energy facility EIA and in the grid infrastructure BA to allow for handover to Eskom.

3.2.2 Electrical Infrastructure (Overhead Power Line)

An overhead power line with a voltage capacity of up to approximately 132kV is being proposed. Based on the option chosen as 'preferred' for the grid connection infrastructure alternatives (namely Option 1a), the proposed preferred power line will run for a length of approximately 13.34km from the proposed Mooi Plaats On-site Eskom Substation (Substation 2), to the Mooi Plaats Eskom Collector Substation (Substation 1a – Northern Collector) and finally to the Hydra D MTS (part of separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[8]), which must still be constructed.

At this stage, the type of towers being considered for the proposed power line include both lattice and monopole towers. It is assumed that the proposed towers will be located approximately 200m to 250m apart. The towers will be up to approximately 25m in height, depending on the terrain, but will ensure minimum overhead line clearances from buildings and surrounding infrastructure. The exact height and location of the towers will however be confirmed during the final design stages of the power line design process.

The conceptual PV electricity generation process showing the electrical connections is illustrated in **Figure 4** below.

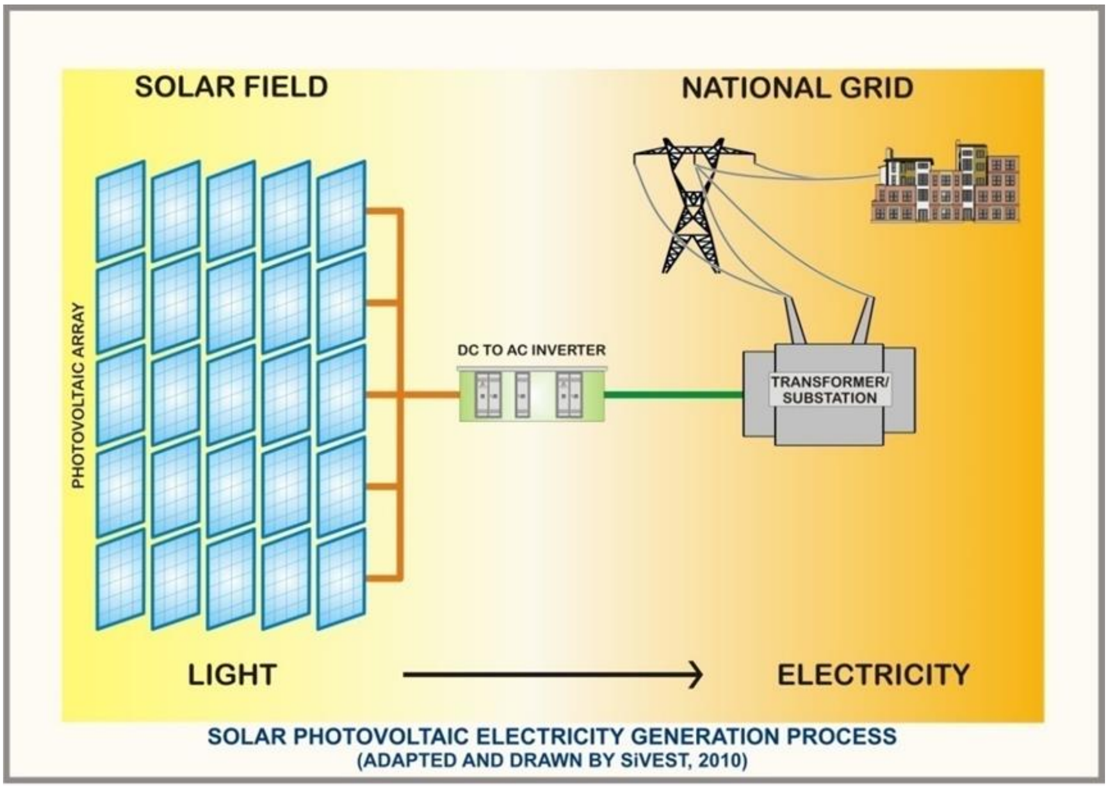

Figure 4: Conceptual PV electricity generation process showing electrical connections

3.2.3 Other Associated Infrastructure

Other associated infrastructure includes the following:

- Internal access roads, between 4m and 12m wide, to the Mooi Plaats On-site Eskom Substation and Mooi Plaats Eskom Collector Substation will form part of the associated infrastructure. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary.

3.2.4 Future Plans for Site and Infrastructure After Decommissioning

Should the proposed development's Power Purchase Agreement (PPA) not be renewed at the end of the operational phase of the proposed development, the proposed development might need to be decommissioned. This would include the decommissioning of the proposed on-site and collector substations as well as the 132kV overhead power line connecting the proposed substations to the national grid. Should the proposed development need to be decommissioned, the applicant will rehabilitate the project site as per the requirements in the NEMA Regulations, following the decommissioning of the project site. The aim of the decommissioning phase would be to return the site to its original pre-construction condition. In the unlikely event that decommissioning is required (i.e. PPA not renewed, facility becoming outdated or the land being required for other purposes), the decommissioning phase will be undertaken in line with the EMPr and the requirements in the NEMA Regulations, and the site will be rehabilitated to its original pre-construction condition.

However, should the applicant negotiate and sign a further PPA, the applicant will re-energise or re-power (re-design and re-fit proposed development to operate for a longer period) the project site. In addition, if needed, the applicant will look into the possibility of upgrading the infrastructure to more advanced technologies. It should be noted that the probability of upgrading the infrastructure is quite high should the applicant re-energise or re-power the project site.

Majority of the components of the proposed development are considered to be reusable or recyclable. In the event of the proposed development being decommissioned, the components will be reused, recycled or disposed of (where possible) in accordance with the relevant regulatory requirements. Certain components may also be traded or sold, should there be an active second-hand market for these components. Alternatively, in the event that sale is not possible, certain components may be used as scrap metal. It must be noted that the decommissioning phase of the proposed development will also create skilled and unskilled employment opportunities.

3.3 Alternatives

As per the 2014 EIA Regulations (as amended), feasible and reasonable alternatives are required to be considered during the BA process. Alternatives are defined in Chapter 1 of the 2014 EIA Regulations (as amended) as '*different means of meeting the general purpose and requirements of the activity*'. These alternatives may include:

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

Each of the alternatives in relation to the proposed development is discussed in the sections below.

3.3.1 The properties on which or location where it is proposed to undertake the activity

No site alternatives for this proposed development are being considered as the placement of the proposed substations and associated power line is dependent on the location of the proposed Mooi

Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134). The selection of a potential site for the placement of solar PV installations is dependent on several factors, all of which are favourable at the proposed site location. These include solar resource, climate, topography, grid connections and access to the site. The project site has been identified through a pre-feasibility desktop analysis based on the estimation of the solar energy resource as well as weather, dust and dirt effects. The Northern Cape Province in South Africa has favourable solar irradiation potential. The project site receives an annual Global Horizontal Irradiation (GHI) ranging from approximately 1972 to 2264kWh/m^2/year (**Figure 5**).

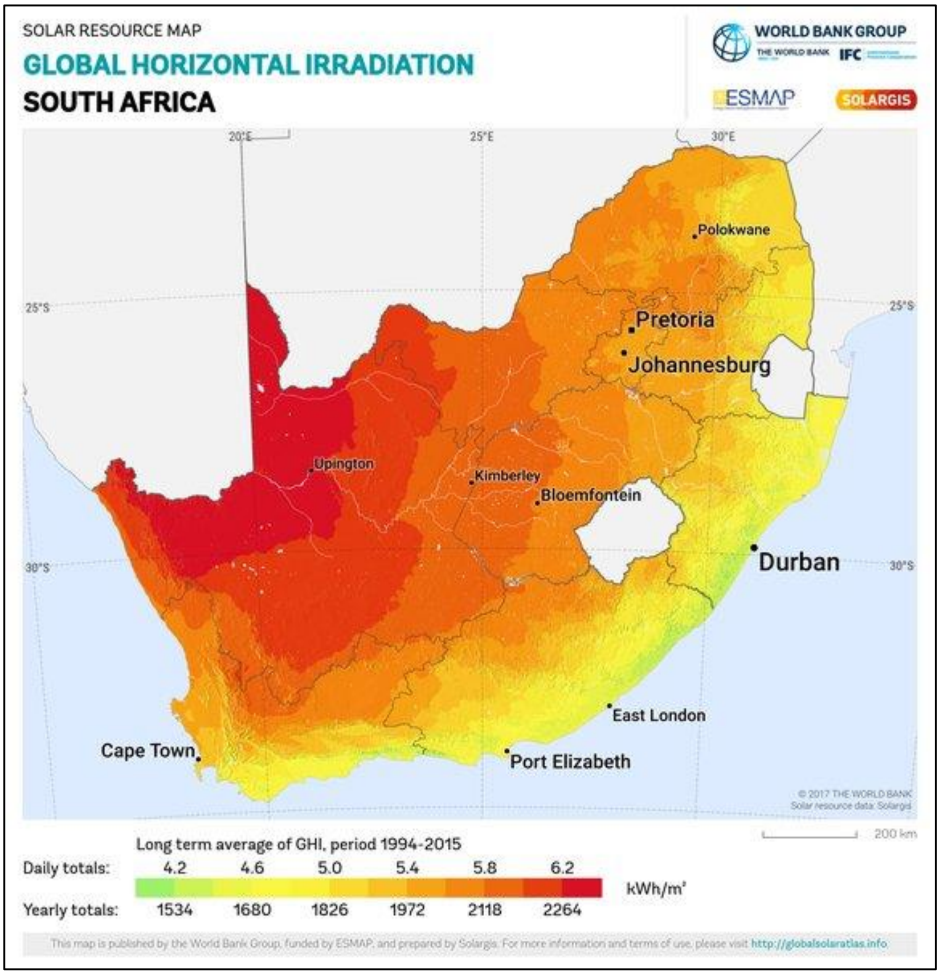

Figure 5: Global Horizontal Irradiation (GHI) map (Source **-** 2017 The World Bank, Solar resource data: SolarGis)

The project site will have access to the national grid via the Hydra D MTS (part of separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2[8]), which will be constructed (Please refer to **Appendix 7D** for the letter of no objection, allowing grid connection). There are two (2) operational renewable energy projects which are located within a 35km radius of the proposed site, namely the Linde Solar Energy Facility (SEF) and Noupoort Wind Farm, in addition to several other renewable energy developments which are being proposed or have already received approval. The project area has a relatively flat topography which is suitable for the development of a solar PV energy facility and associated grid infrastructure (substations and overhead power lines). The proposed preferred power line corridor (namely Option 1a) however traverses hilly / mountainous terrain to the south-east, towards the Hydra

D MTS. Despite this, the proposed power line will follow the same route as an existing high voltage (400kV) Eskom power line already in existence in this part of the study area (**Figure 12**), which is preferable. The project area is easily accessible via an existing dirt secondary road which connects to the tarred N10 national road. The proposed project area is therefore considered highly suitable for the proposed development and no other locations are being considered.

3.3.2 The type of activity to be undertaken

No other activity alternatives are being considered. The proposed development is required to feed the electricity generated by the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) into the national grid and therefore no other type of activity could be considered. Renewable energy development in South Africa is highly desirable from a social, environmental and development point of view.

3.3.3 The design or layout of the activity

Design or layout alternatives are being considered and assessed as part of the BA process. These include grid connection infrastructure alternatives, which include on-site and collector substation sites[10] and 132kV power line corridors (detailed in **section 8**). These alternatives essentially provide for two (2) different route alignments with associated substations (on-site and collector) contained within an assessment corridor between approximately 400m and 900m wide. This is to allow for flexibility to route the power line on either side of the existing high voltage Eskom power lines. The grid connection infrastructure alternatives were informed by the identified environmental sensitive areas, as various environmental specialists assessed the project area during their respective field investigations. The identified sensitive areas were also used to perform a comparison of grid connection infrastructure alternatives. The results of the comparative assessment of grid connection infrastructure alternatives are summarised in **section 8**.

It should be noted that the proposed layout was refined to avoid identified environmental sensitivities and was subsequently investigated by the respective specialists. These include the Terrestrial Ecologist, Palaeontologist, Surface Water, Heritage, Avifauna and Agricultural Specialists. Prior to the submission of the DBAR, preliminary power line corridor routes and substation sites were considered by the applicant. However, in order to ensure that the proposed development avoids the sensitive and 'no-go' areas identified by the specialists, the preliminary power line corridor routes and substation sites were subsequently amended (**Figure 56**).

The proposed grid connection infrastructure alternatives which were investigated and comparatively assessed in relation to the identified environmental sensitive areas are presented in **Figure 6** below.

[10] The substation sites are intrinsically linked to the grid connection infrastructure alternatives. As such, the grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists have informed the location of the on-site and collector substation sites being proposed as part of this BA application

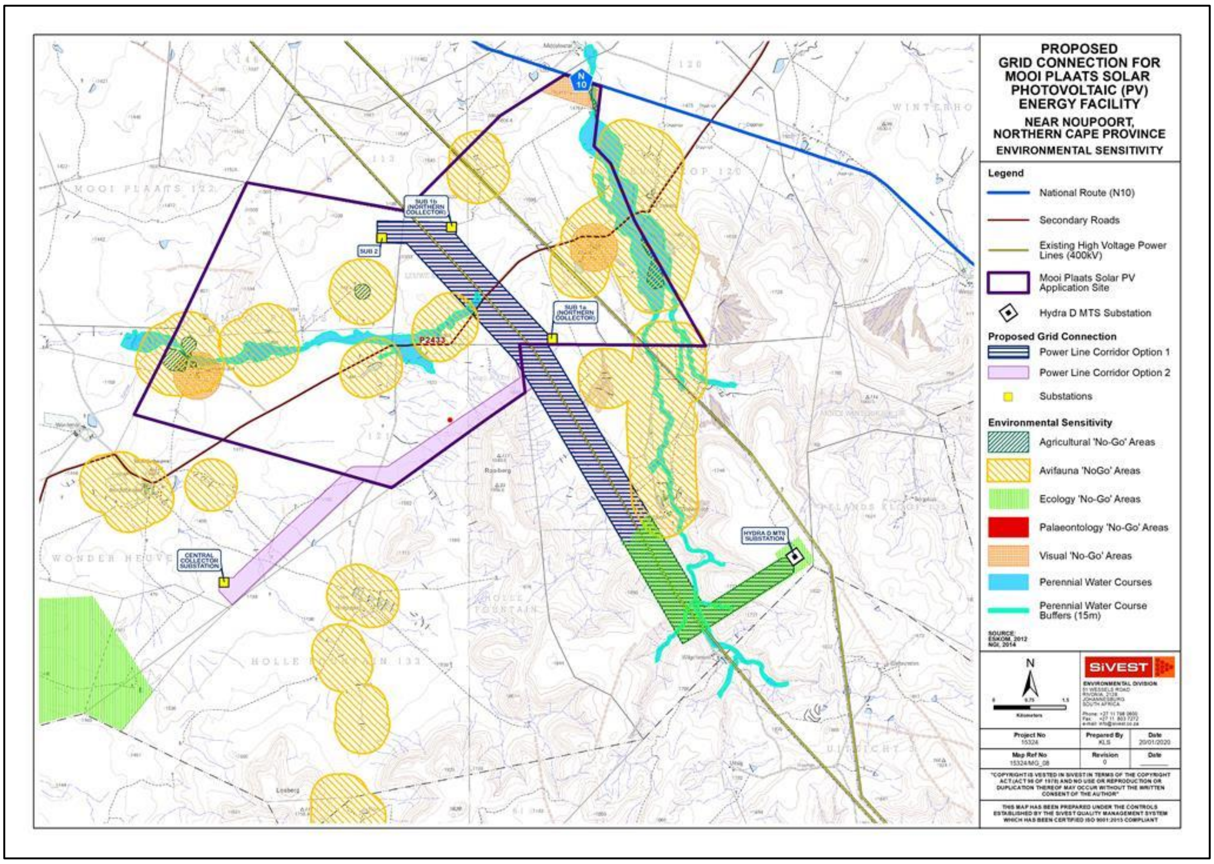

Figure 6: Proposed grid connection infrastructure alternatives in relation to environmental sensitive areas

Based on the findings of the comparative assessment of alternatives undertaken by the various specialists, preferred grid connection infrastructure alternatives, which include substation sites (on-site and collector) and a power line corridor, were selected[10]. As mentioned, the grid connection infrastructure alternatives were informed by the identified environmental sensitive areas. The preferred grid connection infrastructure alternatives, including maps, are presented in **section 8**. The selected preferred grid connection infrastructure alternatives have been based on both environmental constraints and design factors.

The preferred site layout in relation to environmentally sensitive areas identified by the specialists is presented in **section 8**.

3.3.4 The technology to be used in the activity

No technology alternatives will be considered for the proposed substations and power line. The type of technology to be used for the substations and power line will largely depend on the terrain and other technological and economic factors. At this stage, the type of towers being considered for the proposed power line include both lattice and monopole towers. It is assumed that the proposed towers will be located approximately 200m to 250m apart and will be up to approximately 25m in height, depending on the terrain, but will ensure minimum overhead line clearances from buildings and surrounding infrastructure. In addition, the proposed towers will have a servitude width of up to 36m. The exact height, servitude width and location of the power line towers will however be confirmed during the final design stages of the power line design process. The impacts on the environment of the different types of substation technology and tower types would be very similar during construction, operation and decommissioning. Therefore no technology alternatives have been considered during the BA process. The choice of technology used will ultimately be determined by Eskom, as the proposed development will ultimately be handed over to Eskom.

3.3.5 The operational aspects of the activity

No operational alternatives were assessed as part of the BA process as none are available for substations and power lines.

3.3.6 'No-go' alternative

The '*No-go*' alternative is the option of not implementing the proposed development. The option of not implementing the activity, or the 'no-go' alternative, has been considered as part of the BA process. The proposed substations and power line are intrinsically linked to the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) and will allow for the export of the generated renewable energy to the national grid at the Hydra D MTS[3], which will still be constructed. Should the proposed development not be implemented, the current agricultural land uses would continue, including rural agriculture (small stock grazing) and limited tourism.

On a regional scale, the '*No-go*' alternative is also not preferred. Renewable energy facilities and their associated grid connections are key to the success of South Africa's plan to build resilience against climate change. South Africa currently relies almost completely on fossil fuels as a primary energy source (approximately 90%). Coal combustion in South Africa is the main contributor to carbon dioxide (Co_2) emissions, which is one (1) of the main greenhouse gasses that has been linked to climate change. With the global focus on climate change, the government is under pressure to explore alternative energy sources in addition to coal-fired power stations.

An emphasis has therefore been placed on securing South Africa's future power supply through the diversification of power generation sources. Furthermore, South Africa would have to invest in a power generation mix, and not solely rely on coal-fired power generation, to honour its commitments made under the Copenhagen Accord and subsequent Paris Agreement (ratified during November 2016) to mitigate climate change challenges. Under the Paris Agreement, the country committed to working towards the goal of holding the increase in global average temperature to well below 2 degrees Celsius and pursuing efforts to limit the global temperature increase to 1.5 degrees Celsius.

The DEFF acknowledges the risks posed to South Africa by climate change confirming that '*South Africa has been experiencing the severe effects of drought conditions catalysed by the worst El Nino* *event in decades. The rising sea temperatures in the Pacific Ocean that resulted in increased temperatures and reduced rainfall in many parts of the world, was exacerbated by rising global temperatures associated with climate change. South African scientists and weather forecasters warn that this is what can be expected in the decades to come, if ambitious global action is not taken urgently to reduce the concentration of greenhouse gases in the atmosphere'* (DEFF, 2016b).

The current South African plan to achieve the goal set under the Paris Agreement, is rated as Highly Insufficient due to an unresolved strategy to secure a 'just transition' from coal to renewables, successfully and timeously implement a carbon tax and update the Integrated Resource Plan (Refer to **section 3.3.2** for more information). In December 2011, Climate Action Tracker rated South Africa's plan as Medium as at the time we committed to increasing renewable energy to enable our emissions to peak between 2020 and 2025. Based on the dismal performance to date downgrading our climate action plan from medium to highly insufficient, it is clear that the trajectory South Africa is on is insufficient to reach the goals set to avoid catastrophic climate change.

With an increasing demand in energy predicted and growing environmental concerns about fossil fuel-based energy systems, the development of large-scale renewable energy supply schemes is strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports in the country.

Although solar power is not the only solution to solving the energy crisis in South Africa, not establishing the proposed solar PV energy facility and its associated grid connection infrastructure would be detrimental to the mandate that the government has set to promote the implementation of renewable energy. It is a suitable sustainable solution to the energy crisis and this proposed development could contribute to addressing the problem. This proposed development will aid in achieving South Africa's goals in terms of sustainability, energy security, mitigating energy cost risks, local economic development and national job creation. It is a suitable sustainable solution to the energy crisis and this proposed development could contribute to addressing the problem. This proposed development will aid in achieving South Africa's goals in terms of sustainability, energy security, mitigating energy cost risks, local economic development and national job creation.

From a social perspective, the 'no-go' option would mean that the social environment is not affected as the status quo would remain. On a negative front it would also mean that all the positive aspects associated with the proposed development would not materialise. Consequently, there would be no job creation, no revenue streams into the local economy and municipal coffers and a lost opportunity to enhance the national grid with a renewable source of energy. Considering that Eskom's coal-fired power stations are a huge contributor to carbon emissions, the loss of a chance to supplement the national grid through renewable energy would be significant at a national, if not at a global level. The Intergovernmental Panel on Climate Change (6 October 2018, p. 15) has warned that that Co_2 emissions need to be reduced by 45% from 2010 levels by 2030 and to zero by 2050, which basically means that coal must go.

From an avifaunal perspective, the 'no-go' alternative will result in the current status quo being maintained as far as the avifauna is concerned. The low human population in the area is definitely advantageous to avifauna. The 'no-go' option would therefore eliminate any additional impact on the ecological integrity of the proposed development area as far as avifauna is concerned.

The '*No-go*' option is a feasible option, however, this would prevent the proposed development from contributing to the significant environmental, social and economic benefits associated with the development of the renewables sector.

4 LEGAL REQUIREMENTS AND GUIDELINES

4.1 Key Legal and Administrative Requirements Relating to the Proposed Development

4.1.1 Constitution of South Africa

The Constitution of South Africa (No. 108 of 1996) provides environmental rights and includes implications for environmental management. Section 24 of the Constitution states that:

'Everyone has the right –

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

The Constitution is the overarching legislation for South Africa. Although it provides for certain rights and obligations, the NEMA has been promulgated in order to manage the various spheres of both the social and natural environment.

4.1.2 National Environmental Management Act (NEMA) (Act No. 107 of 1998) – NEMA EIA Requirements

The National Environmental Management Act (NEMA) (Act No. 107 of 1998) was promulgated in 1998 but has since been amended on several occasions from this date. This Act replaces parts of the Environment Conservation Act (ECA) (Act No. 73 of 1989) with exception to certain parts pertaining to Integrated Environmental Management.

The Act intends to provide for:

- co-operative environmental governance by establishing principles for decision-making on matters affecting the environment;
- institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state;

- to provide for the prohibition, restriction or control of activities which are likely to have a detrimental effect on the environment; and
- to provide for matters connected therewith.

The NEMA is the overarching legislation which governs the BA process and environmental management in South Africa. Sections 24 and 44 of the NEMA make provision for the promulgation of regulations that identify activities which may not commence without an EA. Activities that may significantly affect the environment must be considered, investigated and assessed prior to implementation. Comprehensive lists of such activities were gazetted and the proposed development triggers activities from two (2) of these listing notices (namely GN R. 325 and 327 as published on 7 April 2017) gazetted on 7 April 2017 (Government Gazette 326) (the 'EIA Regulations').

Therefore, a BA process is required for the proposed development in terms of Section 21 to 24 of the 2014 EIA Regulations (as amended).

4.1.3 *NEMA EIA Regulations, 2014 (as amended)*

In terms of these Regulations, a full EIA is required for the proposed development based on triggered activities. However, several activities which trigger a BA were also identified and also need to be specified. Ultimately, these activities will not form a separate assessment, but will fall into the greater EIA.

The following Schedules of the Government Notice No. R. 983, 984 and 985 of 4 December 2014 (as amended) are of relevance to the proposed development in question. All of the Listed Activities identified in terms of Sections 24(2) and 24D include:

Table 6: Listed activities in terms of the NEMA Regulations

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 (GN R. 983, as amended)	Describe the portion of the proposed project to which the applicable listed activity relates.
11 (i)	**GN R. 983 Item 11:** *The development of facilities or infrastructure for the transmission and distribution of electricity—* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.*	**The proposed development involves the construction of one (1) new on-site substation, one (1) new collector substation and an associated overhead power line which will be located outside an urban area. The proposed power line will have a capacity of 132 kV, while the proposed on-site substation and collector substation will each have a capacity of 33/132kV. In addition, the on-site substation and collector substation will each occupy a footprint of approximately 4ha.**
12 (ii) (a) (c)	**GN R. 983 Item 12:** *The development of:* *ii) infrastructure or structures with a physical footprint of 100 square metres or more;*	**The proposed development involves the construction of one (1) new on-site substation, one (1) new collector**

	where such development occurs- *(a) within a watercourse;* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.*	**substation and an associated overhead power line which will have a physical footprint of 100m^2 or more. The infrastructure avoids the identified surface water features (drainage lines) where possible, although some structures may be within a watercourse and/or within 32m of a watercourse.**
19	**GN R. 983 Item 19:** *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;*	**The surface water impact assessment revealed that there are surface water features located within the development area. The construction of the proposed development will thus likely involve the excavation, removal, infilling, depositing and moving of more than 10m^3 of soil, sand, pebbles or rock from some of the identified watercourses.** **Although the layout of the proposed development will be designed to avoid the identified surface water features / watercourses as far as possible, some of the internal and access roads may need to traverse the identified surface water features and during construction of these roads, soil may need to be removed from some of the identified watercourses.**
24 (ii)	**GN R. 983 Item 24:** *The development of a road –* *ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;*	**Internal access roads will likely be required to access the proposed on-site Eskom substation site, Eskom collector substation site and power lines. At this stage it is proposed that these internal access roads will be up to approximately 14m during construction (to be partly rehabilitated) and between 4m and 12m during operation. Existing site roads will be used wherever possible. However, where required, internal access roads will be constructed.**
27	**GN R. 983 (as amended) Item 27:** *The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.*	**The proposed development includes the clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation. The proposed development involves the construction of one (1) new on-site substation and one (1) new collector substation which will each occupy an area of approximately 4ha. All vegetation on the on-site and**

		collector substation sites will need to be cleared for construction. Cleared vegetation will amount to an area of up to approximately 8ha.
28 (ii)	**GN R. 983 Item 28:** *Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;*	**The proposed development site is currently used and zoned for agricultural purposes and will result in special zoning being required, as an area greater than 1ha will likely be transformed into industrial / commercial use.**
Activity 31 (i)	***GN R. 983 Item 31:*** *The decommissioning of existing facilities, structures or infrastructure for -* *(i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014;*	**Should the proposed development's PPA not be renewed after 20 years (anticipated operational lifespan of proposed development), the proposed development might need to be decommissioned. This would include the decommissioning of the substation sites as well as the overhead power lines connecting the substations to the grid.**
Activity 48 (i) (a) (c)	**GN R. 983 Item 48:** The expansion of *(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more;* *where such expansion occurs—* *(a) within a watercourse; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;*	**The proposed development will most likely entail the expansion (upgrading) of roads and other infrastructure by 100 m^2 or more within an identified watercourse or within 32m from the edge of an identified watercourse.** **Although the layout of the proposed development will be designed to avoid the identified surface water features / watercourses as far as possible, some of the internal and access roads to be upgraded will likely need to traverse the identified surface water features and construction will likely occur within some of the watercourses and/or be within 32m of some of the watercourses.**
56 (ii)	**GN R. 983 Item 56:** *The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre -* *(ii) where no reserve exists, where the existing road is wider than 8 metres –*	**As mentioned, internal access roads will be required to access the on-site and collector substations. Existing site roads will be used wherever possible, however, where required, internal access roads will be constructed. The existing access roads might thus need to be upgraded by widening them more**

		than 6m, or by lengthening them by more than 1km.
Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 (GN R. 985, as amended)**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
Activity 4 g. ii. (ee)	**GN R. 985 Item 4:** *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* ***g. Northern Cape*** *ii. Outside urban areas:* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	**Internal access roads will be required to access the on-site and collector substations. At this stage it is proposed that these internal access roads will be up to approximately 14m during construction (to be partly rehabilitated) and between 4m and 10m during operation. Existing site roads will be used wherever possible. However, where required, internal access roads will be constructed. These roads will occur within the Northern Cape Province, outside an urban area and the development site contains Critical Biodiversity Areas (CBAs). Refer to the CBA map attached in Appendix 5.**
Activity 12 g. ii.	**GN R. 985 Item 12:** *The clearance of an area of 300 square meters or more of indigenous vegetation* ***g. Northern Cape*** *ii. Within critical biodiversity areas identified in bioregional plans;*	**The proposed development will likely transform more than 300m^2 of indigenous vegetation. Clearance will be required for the proposed on-site substation, collector substation, internal access roads and overhead power line. Clearance will likely occur within a CBA. Refer to the map attached in Appendix 5.** **An ecology impact assessment has been undertaken to assesses the impacts of the proposed development on the indigenous vegetation, as well as the CBAs.**
Activity 14 (ii) (a) (c); g. ii. (ff)	**GN R. 985 Item 14:** *The development of -* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs –* *(a) within a watercourse;* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* ***g. Northern Cape*** *ii. Outside urban areas:* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic*	**The proposed development will entail the development of infrastructure or structures with a physical footprint of 10m^2 or more within a watercourse or within 32m from the edge of a watercourse. The proposed development involves the construction of one (1) new on-site substation and one (1) new collector substation which will each occupy an area of approximately 4ha.** **Although the layout of the proposed development will be designed to avoid the identified surface water features**

	biodiversity plans adopted by the competent authority or in bioregional plans;	**(drainage lines) as far as possible, some of the power line pylons and/or internal and access roads will likely need to traverse some of the identified surface water features.** **The proposed development will be located outside an urban area. In addition, the development of sections the overhead power line will occur within CBAs. Refer to the CBA map attached in Appendix 5.** **An ecology impact assessment has been undertaken to assesses the impacts of the proposed development on the indigenous vegetation, as well as the CBAs.**
Activity 18 g. ii. (ee) (ii)	**GN R. 985 Item 18:** *The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre-* ***g. Northern Cape*** *ii. Outside urban areas:* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;*	**As mentioned, internal access roads will be required to access the on-site and collector substations as well as the overhead power line. Existing site roads will be used wherever possible. However, where required, internal access roads will be constructed. It is thus likely that existing access roads will need to be upgraded. Internal access roads will likely be widened by more than 4m or lengthened by more than 1km. These roads will occur within the Northern Cape Province, outside an urban area. In addition, this widening of the roads will occur within CBAs, and may also occur within a watercourse and/or within 100m from the edge of a watercourse.** **An ecology impact assessment has been undertaken to assess the impacts of the proposed development on the CBAs. In addition, a surface water impact assessment has been undertaken to assess the impacts of the proposed development on the identified watercourses.**
Activity 23 (ii) (a) (c); g. ii. (ee)	**GN R. 985 Item 23:** *The expansion of –* *(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more;*	**The proposed development will likely entail the development and expansion of roads and other infrastructure by 10m^2 or more within a watercourse or within 32m from the edge of a watercourse.**

	where such expansion occurs – *(a) within a watercourse;* *(b) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* ***g. Northern Cape*** *ii. Outside urban areas:* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	**Although the layout of the proposed development will be designed to avoid the identified surface water features as far as possible, some of the existing internal and access roads which might be expanded may likely need to traverse some of the identified surface water features.** **The proposed development occurs within CBAs and is located outside an urban area.** **An ecology impact assessment was undertaken to assess the impacts of the proposed development on CBAs. In addition, a surface water impact assessment was undertaken to assess the impacts of the proposed development on the identified surface water features.**

4.1.4 Environmental Impact Assessment (EIA) Guideline for Renewable Energy Projects, DEFF Notice 989 of 2015

The purpose of this document is primarily to provide guidance on the environmental management legal framework applicable to renewable energy operations and all the role players in the sector. The guideline is principally intended for use by the following stakeholder groups:

- Public Sector Authorities (as regulator and/or competent authority);
- Joint public sector authorities and project funders (e.g., Eskom, IDC, etc.);
- Private Sector Entities (as project funder/developer/consultant); and
- Other interested and affected parties (as determined by the project location and/or scope).

This guideline seeks to identify activities requiring authorisation prior to commencement of that activity and provide an interface between national EIA regulations and other legislative requirements of various authorities.

The guidelines are applicable for the construction, installation and/or development of the following renewable energy projects:

- Concentrating Solar Power (CSP) Plant;
- Wind Energy Facility;
- Hydropower Station; and
- Photovoltaic (PV) Power Plant.

As the proposed development is for electricity distribution infrastructure which will form part of the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134), it is subject to the recommendations proposed in the guidelines.

4.1.5 National Energy Act (Act No. 34 of 2008)

South Africa has two (2) acts that direct the planning and development of the country's electricity sector, namely:

i. The National Energy Act of 2008 (Act No. 34 of 2008); and
ii. The Electricity Regulation Act (ERA) of 2006 (Act No. 4 of 2006) (see **section 3.1.6**).

The National Energy Act (Act No. 34 of 2008), promulgated in 2008, has, as one (1) of its key objectives, the promotion of the diversity of supply of energy and its sources. From this standpoint, the Act directly references the importance of the RE sector, with a mention of the solar energy sector included. The aim is to ensure that the South African economy is able to grow and develop, fast-tracking poverty alleviation, through the availability of a sustainable, diverse energy mix. Moreover, the goal is to provide for the increased generation and consumption of RE (Republic of South Africa, 2008).

4.1.6 Electricity Regulation Act (Act No. 4 of 2006)

In 2011, the electricity regulation on new generation capacity was published under Section 35(4) of the Electricity Regulation Act (ERA) (Act No. 4 of 2006). These regulations apply to the procurement of new generation capacity by organs of state.

The objectives of the regulations include:

- To facilitate planning for the establishment of new generation capacity;
- The regulation of entry by a buyer and a generator into a Power Purchase Agreement (PPA);
- To set minimum standards or requirements for PPAs;
- The facilitation of the full recovery by the buyer of all costs efficiently incurred by it under, or in connection with, a PPA including a reasonable return based on the risks assumed by the buyer thereunder and to ensure transparency and cost reflectivity in the determination of electricity tariffs; and
- The provision of a framework for implementation of an IPP procurement programme and the relevant agreements concluded.

The Act establishes a National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licenses and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

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

This Act requires investigation to determine the impact of heritage resources when developments exceed the thresholds listed in section 38(1) of the act:

(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site—

(i) exceeding 5000m^2 in extent; or

(ii) involving three (3) or more existing erven or subdivisions thereof; or

(iii) involving three (3) or more erven or divisions thereof which have been consolidated within the past five (5) years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10000m^2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

The proposed development would involve; (a) the construction of linear infrastructure exceeding 300m in length, (c) the development of grid connection infrastructure (substations and power line) that will change the character of more than 0.5ha, three (3) or more erven and (d) the re-zoning of a site that will exceed 1ha.

The NHRA stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, '*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…*' The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA. This study falls under section 38(8) and requires comment from the relevant heritage resources authority.

The law ensures community participation in the protection of national heritage resources and will involve all three (3) levels of government in the management of the country's national heritage. The South African Heritage Resources Agency (SAHRA) will establish and maintain a national policy, strategy plans and standards for heritage resources management and will monitor the system as a whole.

A Heritage Impact Assessment (**Appendix 6D**) has been conducted to explore how the proposed development may impact on heritage resources as protected by the Act. It should be noted that the Heritage Impact Assessment was originally undertaken via desktop means, however, following the desktop assessment, it was identified that further field truthing would need to be undertaken through an archaeological walk down. The aim of this was to compile a comprehensive database of heritage sites within the development area, with the aim of developing a heritage management plan for inclusion in the EMPr. This field truthing exercise was subsequently undertaken in August 2019 and the results have been incorporated into this DBAR, as well as the updated Heritage Impact Assessment Report.

In addition, the SAHRA will be consulted throughout the BA process in order to obtain comments on the proposed development from a heritage perspective.

4.1.8 National Water Act (NWA) (Act No. 36 of 1998, as amended)

The National Water Act (NWA) (Act No. 36 of 1998), as amended, was promulgated on the 20th of August 1998. This Act was created in order to ensure the protection and sustainable use of water resources (including wetlands) in South Africa. This Act is important in that it provides a framework to protect water resources against over-exploitation and to ensure that there is water for socio-economic and economic development, human needs and to meet the needs of the aquatic environment. The Act also recognises that water belongs to the whole nation for the benefit of all people.

It is important to note that water resources (including wetlands) are protected under the Act. Under the NWA, a 'water resource' includes a watercourse, surface water, estuary, or aquifer. Specifically, a watercourse is defined as (*inter alia*):

- A river or spring;
- A natural channel in which water flows regularly or intermittently; and
- A wetland, lake or dam into which, or from which, water flows.

One (1) of the main aims of the Act is the protection of water resources. 'Protection' in relation to a water resource entails:

- Maintenance of the quality of the water resource to the extent that the water use may be used in a sustainable way;
- Prevention of degradation of the water resource; and
- The rehabilitation of the water resource.

In the context of the proposed development and any potential impact on water resources, the definition of pollution and pollution prevention contained within the Act is relevant. 'Pollution', as described by the Act, is the direct or indirect alteration of the physical, chemical or biological properties of a water resource, so as to make it (*inter alia*):

- less fit for any beneficial purpose for which it may reasonably be expected to be used; or
- harmful or potentially harmful to the welfare of human beings, to any aquatic or non-aquatic organisms, or to the resource quality.

This definition of pollution is quite wide-ranging, and it applies to all types of water resource. The inclusion of physical properties of a water resource within the definition of pollution entails that any physical alterations to a water body (for example, the excavation of a wetland or changes to the morphology of a water body) can be considered to be pollution. Activities which cause alteration of the biological properties of a watercourse (i.e. the fauna and flora contained within that watercourse) are also considered pollution.

In terms of section 19 of the Act, owners / managers / people occupying land on which any activity or process was undertaken which causes / or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. These measures may include measures to (*inter alia*):

- measures to cease, modify, or control any act or process causing the pollution;
- comply with any prescribed waste standard or management practice;
- contain or prevent the movement of pollutants;
- remedy the effects of the pollution; and
- remedy the effects of any disturbance to the bed and banks of a watercourse.

From a licensing perspective, according to the NWA, the following are considered 'water uses' and will require a water use license application (WULA):

a) Taking water from a water resource;
b) Storing water;
c) Impeding or diverting the flow of water in a watercourse;
d) Engaging in stream flow reduction activity contemplated in Section 36 of the NWA;
e) Engaging in a controlled activity identified as such in Section 37 (1) or declared under Section 38(1) of the NWA;
f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) Disposing of waste in a manner which may detrimentally impact on a water resource;
h) Disposing of waste in a manner of water which contains waste from, or which has been heated in any industrial or power generation process;
i) Altering the bed, banks, course or characteristics of a watercourse;
j) Removing, discharging or disposing of water found underground if it is necessary for efficient continuation of an activity or for the safety of people; and
k) Using water for recreational purposes.

In light of the above, there are a number of stipulations within the NWA that are relevant to the potential impacts on rivers, streams and wetlands that may be associated with the proposed development. A Surface Water Impact Assessment (**Appendix 6G**) has however been conducted to explore how the proposed development may impact on identified water resources as protected by the Act.

4.1.9 National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004, as amended)

The overarching aim of the National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004), within the framework of the NEMA, is to provide for:

- The management and conservation of biological diversity within South Africa, and of the components of such biological diversity;
- The use of indigenous biological resources in a sustainable manner; and
- The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.

In terms of this Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations);
- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity; and
- Limit further loss of biodiversity and conserve endangered ecosystems.

The South African National Biodiversity Institute (SANBI) was established in terms of the NEM:BA, its purpose being (*inter alia*) to report on the status of the country's biodiversity and the conservation status of all listed threatened or protected species and ecosystems.

The NEM:BA provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including a prohibition on carrying out a '*restricted activity'* involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7 of the Act. According to Section 57 of the Act, '*Restricted activities involving listed threatened or protected species'*:

- A person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7.

Such activities include any that are '*of a nature that may negatively impact on the survival of a listed threatened or protected species*'. Lists of critically endangered, endangered, vulnerable and protected species have been published and a permit system for listed species has been established.

The NEM:BA is relevant to the proposed development as the construction of the proposed development may impact negatively on biodiversity. Additionally, the proposed power line traverses a Critical Biodiversity Area (CBA) 1 and CBA 2, and therefore the proposed development may impact negatively on these areas, if not avoided. The project proponent is therefore required to take appropriate reasonable measures to limit the impacts on biodiversity, to obtain permits if required and to also invite the SANBI to provide commentary on any documentation resulting from the proposed development.

It should be noted that a Terrestrial Ecology Impact Assessment (**Appendix 6H**) has been undertaken to explore how the proposed development may impact on biodiversity as protected by the Act.

4.1.10 National Environmental Management: Protected Areas Act (NEM: PAA) (Act No. 57 of 2003, as amended)

The overarching aim of the National Environmental Management: Protected Areas Act (NEM: PAA) (Act No. 57 of 2003, as amended), within the framework of NEMA, is to:

- provide for the declaration and management of protected areas;
- provide for co-operative governance in the declaration and management of protected areas;
- affect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;

- provide for a representative network of protected areas on state land, private land and communal land;
- promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas;
- promote participation of local communities in the management of protected areas, where appropriate; and
- provide for the continued existence of South African National Parks.

The proposed development falls **outside** any formally protected areas and outside the areas earmarked as part of the National Protected Areas Expansion Strategy (NPAES).

4.1.11 National Forests Act (NFA) (Act No. 84 of 1998)

The National Forest Act (NFA) (Act No. 24 of 1998) was enacted to:

- Provide for the protection, management and utilisation of forests;
- The protection of certain plant and animal life;
- The regulation of trade in forest produce;
- The control and management of a national hiking way system and National Botanic Gardens.

The NFA enforces the necessity for a license to be obtained prior to destroying any indigenous tree in a natural forest and, subject to certain exemptions, cutting, disturbing, damaging, destroying or removing any protected tree. The list of protected trees is currently contained in GN 908 of 21 November 2014. Licenses are issued by the Minister and are subject to periods and conditions as may be stipulated.

Protected Trees

According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that '*no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'*.

Forests

Prohibits the destruction of indigenous trees in any natural forest without a licence.

The NFA is relevant to the proposed development as the removal and/or disturbance and/or clearance of indigenous vegetation will be required and a license in terms of the NFA may be required for this to be done.

It should be noted that the Ecologist confirmed that there are no plant species occurring on-site or likely to occur on-site that are protected according to the NEM:BA. There are however a number of plant species occurring on-site that are protected according to the Northern Cape Nature Conservation Act (Act No. 9 of 2009). It is also likely that additional protected species occur on a site that were not observed during the field survey. None of these are of conservation concern, but a permit is required from the Provincial authorities to destroy them. Lastly, it was confirmed that there are no protected tree species that are likely to occur in the study area.

4.1.12 Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983) controls the utilisation of natural agricultural resources in South Africa. The Act promotes the conservation of soil, water sources and vegetation as well as the combating weeds and invader plants.

The primary objective of the Act is to conserve natural agricultural resources by:

- maintaining the production potential of land;
- combating and preventing erosion and weakening or destruction of the water resources;
- protecting vegetation; and
- combating weeds and invaders plants.

Rehabilitation after disturbance to agricultural land is managed by this Act. The CARA is relevant to the proposed development as the construction of substations and power lines may impact on agricultural resources and vegetation on the site. The Act prohibits the spreading of weeds and prescribes control measures that need to be complied with in order to achieve this. As such, measures will need to be taken to protect agricultural resources and prevent weeds and exotic plants from invading the site as a result of the proposed development.

An Agricultural and Soils Impact Assessment (**Appendix 6A**) has been conducted to explore how the proposed development may impact on the agricultural production potential of the proposed site. According to this assessment, no application is required in terms of the CARA. The BA process covers the required aspects of this.

4.1.13 Subdivision of Agricultural Land Act (SALA) (Act No. 70 of 1970, as amended)

The Subdivision of Agricultural Land Act (SALA) (Act No. 70 of 1970, as amended) controls the subdivision of all agricultural land in South Africa; prohibiting certain actions pertaining to agricultural land. Under the Act, the owner of agricultural land is required to obtain consent from the Minister of Agriculture in order to subdivide agricultural land. This Act thus requires that an application for the solar PV development be approved by the Department of Agriculture, Forestry and Fisheries (DAFF). Despite the name of the Act, it does not apply only to subdivision, and its purpose is to ensure productive use of agriculturally zoned land. Therefore, even if land is not being subdivided or leased, the SALA approval is required to develop agriculturally zoned land for non-agricultural purposes.

The purpose of the Act is to prevent uneconomic farming units from being created and degradation of prime agricultural land. To achieve this purpose, the Act also regulates leasing and selling of agricultural land as well as registration of servitudes.

The Act is of relevance to the proposed development as any portion of land within the study area that is zoned for agricultural purposes that will need to be leased for a period exceeding ten (10) years, will be regulated by this Act. The Act 70 of 1970 consent is separate from the BA and needs to be applied for and obtained after the BA.

4.1.14 National Road Traffic Act (NRTA) (Act No. 93 of 1996, as amended)

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

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

4.1.15 Civil Aviation Act (CAA) (Act No. 13 of 2009)

The Civil Aviation Act (CAA) (Act No. 13 of 2009) controls and regulates aviation within South Africa. It provides for the establishment of a South African Civil Aviation Authority (SACAA) and independent Aviation Safety Investigation Board in compliance with Annexure 13 of the Chicago Convention. It gives effect to various conventions related to aircraft offences, civil aviation safety and security, and provides for additional measures directed at more effective control of the safety and security of aircrafts, airports and matters connected thereto.

Although the Act is not directly relevant to the proposed development, it should be considered as the establishment of electricity distribution infrastructure (such as substations and power lines) may impact on aviation and air traffic safety if located directly within aircraft flight paths.

Air Traffic and Navigation Services Company Limited (ATNS) and the SACAA are being consulted throughout the BA process and the required approvals will be obtained, where necessary.

4.1.16 Northern Cape Nature Conservation Act (Act No. 9 of 2009)

The Northern Cape Nature Conservation Act (Act No. 9 of 2009) and the Nature and Environmental Conservation Ordinance 19 of 1974 are of relevance to the Northern Cape Province. These are developed to protect both animal and plant species within the province. These may be species which are under threat or which are already considered to be endangered. The provincial environmental authorities are responsible for the issuing of permits in terms of this legislation.

Northern Cape Nature Conservation Act (Act No. 9 of 2009) provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project:

- Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property;
- Aquatic habitats may not be destroyed or damaged;
- The owner of the land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species.

The Act provides lists of protected species for the Province. According to Northern Cape Nature Conservation officials, a permit is required for the removal of any species on this list.

As mentioned, the proposed power line corridor traverses a CBA 1 and CBA 2, and therefore the proposed development may impact negatively on these areas. Terrestrial Ecology Impact Assessment (Appendix 6H) has however been conducted to explore how the proposed development may impact on biodiversity as protected by the Act. In addition, the relevant provincial environmental authority (namely the Northern Cape Department of Environment and Nature Conservation – NC DENC) as well as the DEFF's Biodiversity Conservation Department are being consulted throughout the BA process.

4.1.17 Astronomy Geographic Advantage Act (Act No. 21 of 2007)

The Astronomy Geographic Advantage Act (Act No. 21 of 2007) provides for:

- The preservation and protection of areas that are uniquely suited for optical and radio astronomy; and
- Intergovernmental cooperation and public consultation on matters concerning nationally significant astronomy advantage areas and matters connected therewith.

Under Section 22(1) of the Act, the Minister has the authority to protect the radio frequency spectrum for astronomy observations within a core or central astronomy advantage area. As such, the Minister may under section 23(1) of the Act, declare that no person may undertake certain activities within a core or central Astronomy Advantage Area (AAA). These activities include the construction, expansion or operation; of any fixed radio frequency interference source, facilities for the generation, transmission or distribution of electricity, or any activity capable of causing radio frequency interference or which may detrimentally influence the astronomy and scientific endeavours.

In terms of section 7(1) and 7(2) of this Act, national government established the following AAAs:

- Central Karoo AAA (GN 198 of 2014) – proposed development falls outside this AAA
- Sutherland Central AAA – proposed development falls outside this AAA
- Northern Cape AAA (GN 115 of 2010) – proposed development falls outside of this AAA

It should be noted that the proposed development is located approximately 145km from the nearest Central Karoo AAA. In addition, the Sutherland Central AAA only applies to areas within 75km of the Sutherland Observatory (situated in the town of Sutherland) and will not be affected as the proposed development is located almost 400km from the town of Sutherland.

Due to the fact that the proposed development is not situated within any of the established AAAs, the Astronomy Geographic Advantage Act is not relevant. The relevant authorities, including the Square Kilometre Array (SKA), will however be consulted throughout the BA process and attempts will be made to obtain comments from these authorities with regards to the acceptability of the proposed development. Any correspondence received from these authorities will be included throughout the BA process (see C&RR attached as **Appendix 7E**).

4.1.18 Renewable Energy Development Zones (REDZs) and Central Strategic Transmission Corridors

The Strategic Environmental Assessment (SEA) for Wind and Solar PV Energy in South Africa (CSIR, 2015) has identified eight (8) Renewable Energy Development Zones (REDZs) that are of strategic importance for large-scale wind and solar PV development in terms of *Strategic Integrated Project 8: Green Energy in Support of the South African Economy*, as well as associated strategic transmission corridors, including the rollout of its supporting transmission and distribution infrastructure, in terms of *Strategic Integrated Project 10: Electricity Transmission and Distribution*.

- REDZs for large-scale wind and solar photovoltaic development;
- associated Strategic Transmission Corridors which support areas where long-term electricity grid will be developed;
- process of basic assessment to be followed and reduced decision-making timeframe for processing of applications for environmental authorisation in terms of NEMA; and
- acceptance of routes which have been pre-negotiated with all landowners as part of applications for environmental authorisations for power lines and substations.

It should be noted that the proposed development is not located within any of the Central Strategic Transmission Corridors as defined and in terms of the procedures laid out in Government Notice No. 113[11]. This notice sets out procedures to be followed in applying for EAs for large scale electricity transmission and distribution development facilities and states that a BA process should be followed in respect of electricity transmission and distribution developments triggering Activity 9 of Listing Notice 2 (and any other listed activities) where the greater part of facility is located in a Strategic Transmission Corridor. Since the proposed grid connection falls does not fall within any of the Strategic Transmission Corridors, the proposed development will be subject to a full BA process in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA), as amended, and the EIA Regulations, 2014 (as amended).

Although the proposed development falls outside of the Strategic Transmission Corridors, it will nevertheless contribute towards the requirement of renewable energy highlighted by the development of the REDZs and Strategic Transmission Corridors.

[11] Formally gazetted on 16 February 2018 (Government Notice No. 113)

4.1.19 Additional Relevant Legislation

- Occupational Health and Safety Act (OHSA) (Act No. 85 of 1993);
- Road Safety Act (Act No. 93 of 1996);
- National Road Traffic Regulations Act (Act No. 22 of 2000);
- National Environmental Management: Air Quality Act (NEM:AQA) (Act No. 39 of 2004);
- National Environmental Management: Waste Act (NEM:WA) (Act No. 59 of 2008, as amended);
- Development Facilitation (Act No. 67 of 1995);
- The Hazardous Substances Act (Act No. 15 of 1973);
- Water Services Act (Act No. 108 of 1998);
- Electricity Regulation Act (ERA) (Act No. 4 of 2006, as amended);
- Municipal Systems Act (Act No. 32 of 2000);
- Mineral and Petroleum Resource Development Act (Act No. 28 of 2002, as amended); and
- Northern Cape Planning and Development Act (Act No. 7 of 1998).

4.2 Key Development Strategies and Guidelines

4.2.1 Integrated Development Plan (IDP)

An Integrated Development Plan (IDP) is defined in the Local Government: Municipal Systems Act (Act No. 32 of 2000), as an inclusive and strategic plan that:

- Links, integrates and co-ordinates plans and takes into account proposals for the development of the municipality;
- Aligns the resources and capacity of the municipality with the implementation of the plan
- Forms the policy framework on which annual budgets must be based; and
- Is compatible with national and provincial development plans and planning requirements binding on the municipality in terms of legislation.

Considering the nature and location of the proposed development, there is a clear fit with international, national, provincial and local, at both district and municipal levels, policy and legislation. The IDP for the Pixley ka Seme District Municipality is aligned with the National Development Plan, which has identified various central development challenges.

In September 2015 the world's governments signed a historic agreement to eradicate poverty, improve the living standards and well-being of all people, promote peace and more inclusive societies and reverse the trend of environmental degradation. The 2030 Agenda for Sustainable Development commits to promoting development in a balanced way—economically, socially and environmentally—in all countries of the world, leaving no one behind and paying special attention to those people who are poorest or most excluded. It contains 17 Sustainable Development Goals with associated targets to assess progress.

The 17 goals, ranging from alleviating poverty and reducing inequality through job creation and economic growth, as well as ensuring access to affordable, reliable, sustainable and modern energy for all, are in many ways interrelated and cross-cutting in nature. The role of Namakwa DM in the electricity distribution industry, including consideration of renewable energy, reticulation, and municipal debt and tariff structures will be critical.

In his 2015/16 State of the Nation Address, former President Jacob Zuma announced the Nine Point Plan with a purpose of growing the economy and at the same time fast-tracking the implementation of the NDP.

The first key priority area identified for the Nine Point Plan is resolving the energy challenge. The Province is moving ahead with the implementation of the nine-point plan, which amongst others include coordinating high impact projects such as the Renewable energy projects and facilitate the forging of partnerships to ensure that these key priorities reach their full potential but more specifically that the people of the Northern Cape people benefit from these.

The proposed development is located within the Umsobomvu Local Municipality and greater Pixley ka Seme District Municipality. On a municipal level, wide support is evident across the affected municipalities. The Pixley ka Seme District Municipality's IDP recognises the potential of renewable energy initiatives and states in its Spatial Development Plan (SDP) that: '*The Pixley Ka Seme District area with its abundance of sunshine and vast tracts of available land has been attracting considerable interest from solar energy investors of late. The high solar index of the area, as indicated by the Solar Index Diagram, provides many opportunities in terms of the development of renewable energy. The growth and development context in the district has also changed radically since 2013 (after it had been stagnant for decades) owing mainly to private and public investments in the area as a hub for renewable energy generation and astronomy, respectively*' (Pixley Ka Seme District Municipality, 2014). The towns of Prieska and Carnarvon have in recent years changed character from small rural towns to potentially regional hubs as a result of investment in renewable energy generation. It should also be noted that as part of one (1) of the IDP's objectives, namely Objective 5: Environmental sustainability and resilience, at least 20 000MW of renewable energy should be contracted by 2030. In addition, it is noted that the municipality has favourable conditions for renewable energy generation, a factor which gives it a possible competitive advantage from an economic perspective. The economy is also characterised by the potential of renewable energy resource generation. In terms of possible opportunities within the municipality, it has been identified that there is a possibility to allow investment in renewable energy resource generation (Pixley ka Seme District Municipality IDP 2017-2022, 2017).

Upon reviewing the spatial planning component, the Pixley ka Seme District Municipality as well as the Umsobomvu Local Municipality's spatial development frameworks do not suggest any potential conflicts between the planned spatial development visions and the proposed development. In addition, the site where the proposed development will be constructed is not located near any settlement or significant tourist attraction that might be sensitive to the environmental effects of the proposed development. Although the proposed development is located within relatively close proximity to small patches of agricultural land, it is not expected to affect these areas significantly and the current agricultural activities can thus continue.

After considering the reviewed documentation, the proposed development is in alignment with national, provincial and local objectives, plans and strategies relating to the socio-economic development of the areas under analysis. There were no fatal flaws or contraventions identified as all spheres of government prioritise the development of RE projects. The proposed development fits well with the plans to diversify the provincial, district and local economies through investment in RE projects.

It can be suggested that the proposed development does not conflict with any of the identified developmental priorities of the local governments in question but is also in alignment with the identified means to stimulate the local economy. Policy decisions taken in the next decade will largely determine the dimension of the impact of climate change. Local government is in the front line of implementation and service delivery, and thus needs to pursue adequate mitigation and adaptation strategies which should include participation from the public sector, the private sector and NGOs. Therefore, it is evident that the proposed development is aligned with the goals of the municipal IDPs in the study area.

4.2.2 Draft Integrated Energy Plan (IEP) for the Republic of South Africa, 2016

The Draft Integrated Energy Plan (IEP), developed by the Department of Energy (DoE), is anchored in the National Energy Act (Act No. 34 of 2008). The purpose of the Draft IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development, while:

- Maintaining control over economic costs;
- Serving national imperatives such as job creation and poverty alleviation; and
- Minimising the adverse impacts of the energy sector on the environment.

The Draft IEP takes into consideration the crucial role that energy plays in the entire economy and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple objectives, some of which include:

- To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector;
- To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels);
- To guide investment in and the development of energy infrastructure in South Africa; and
- To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

The Draft IEP considers the national supply and demand balance and proposes alternative capacity expansion plans based on varying sets of assumptions and constraints. While infrastructural matters are briefly discussed, the Draft IEP does not explicitly consider supply and demand at specific geographical locations within the country, nor does it take into account infrastructure bottlenecks at specific locations. These are, or will be, covered in detail as follows:

- Electricity infrastructure (transmission and distribution) is dealt with in other plans and the Integrated Resource Plan (IRP) should assess these in detail, taking into consideration the grid planning currently conducted by Eskom;
- Electricity supply is dealt with in the IRP;

- Liquid fuels will be dealt with in the 20-Year Liquid Fuel Infrastructure Roadmap which will cover logistical matters relating to pipelines and storage facilities for petroleum products; and
- The Gas Utilisation Master Plan (GUMP) will take into consideration the bottlenecks and capacity constraints of the current natural gas infrastructure. All the above will inform the integrated energy planning process and will enable overall enhancement through ongoing periodic iterations to ensure alignment.

4.2.3 Integrated Resource Plan (IRP), 2019

The Integrated Resource Plan (IRP) was created in order to plan for projected national electricity demand. The IRP (2019) was promulgated in October 2019 and was planned to be a '*living plan*', as it needs to consider changes in the macro-economic environment, developments in new technologies and changes in national priorities and imperatives, amongst other factors. Since the promulgation of the original IRP (2010-30) there have been a number of developments in the energy sector in South and Southern Africa.

- Since the promulgated IRP 2010–2030, the following capacity developments have taken place:
    - A total 6 422 MW under the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has been procured, with 3 876MW operational and made available to the grid.
    - In addition, IPPs have commissioned 1 005MW from two (2) Open Cycle Gas Turbine (OCGT) peaking plants.
- Under the Eskom build programme, the following capacity has been commissioned:
    - 1 332MW of Ingula pumped storage;
    - 1 588MW of Medupi;
    - 800MW of Kusile; and
    - 100MW of Sere Wind Farm.
- In total, 18 000MW of new generation capacity has been committed to.

Besides capacity additions, a number of assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs.

The IRP 2019 recommends that 10.5% of the generation capacity should be from solar PV energy by 2030, as indicated below in **Figure 7** below.

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
TOTAL INSTALLED	33 847	1 860	4 696	2 912	7 958	11 442	600	11 930	499	2600
Installed Capacity Mix (%)	44.6	2.5	6.2	3.8	10.5	15.1	0.9	15.7	0.7	

Installed Capacity
Committed / Already Contracted Capacity
New Additional Capacity (IRP Update)

Figure 7: Published Draft IRP 2018 (Approved by Cabinet for Consultation)

4.2.4 Renewable Energy Independent Power Producer Procurement Program (REIPPPP)

The following information was extracted from the Eskom website: Guide to Independent Power Procurement processes in South Africa and Eskom, June 2010 (http://www.eskom.co.za/live/content.php?Item_ID=14324).

The objective of this section is to provide an overview of the processes in the country and within Eskom relating to IPPs. It is important that certain enabling policies, rules and regulations are in place to provide certainty and transparency in the introduction of IPPs.

- Country Process

South Africa has two (2) acts that direct the planning and development of the country's electricity sector, namely:

- The National Energy Act, 2008 (Act No. 34 of 2008); and
- The Electricity Regulation Act (ERA), 2006 (Act No. 4 of 2006).

In August 2009, the DoE gazetted the Electricity Regulations on New Generation Capacity under the ERA. The New Generation Regulations establish rules and guidelines that are applicable to the undertaking of an IPP Bid Programme and the procurement of an IPP for new generation capacity. They also facilitate the fair treatment and non-discrimination between IPPs and the buyer of the energy. In terms of the New Generation Regulations, the IRP developed by the DoE sets out the new generation capacity requirement per technology, taking energy efficiency and the demand-side management projects into account. This required, new generation capacity must be met through the technologies and projects listed in the IRP and all IPP procurement programmes will be executed in accordance with the specified capacities and technologies listed in the IRP.

A decision that additional capacity be provided by an IPP must be made with the concurrence of the Minister of Finance. Once such a decision is made, a procurement process needs to be embarked upon to procure that capacity in a fair, equitable and transparent process.

The New Generation Regulations set out the procurement process. The stages within a bid programme are prescribed as follows:

i. Request for Qualifications
ii. Request for Proposals
iii. Negotiation with the preferred bidder(s).

A successful bidder will be awarded a Power Purchase Agreement (PPA) subject to signature by the Regulator, namely Eskom.

4.2.5 Department of Energy (DoE) White Paper on Renewable Energy, 2003

The DoE gazetted its White Paper on Renewable Energy in 2003 and introduced it as a '*policy that envisages a range of measures to bring about integration of renewable energies into the mainstream energy economy*.' At that time, the national target was fixed at 10 000GWh (0.8Mtoe) renewable energy contribution to final energy consumption by 2013. The White Paper proposed that this would be produced mainly from biomass, wind, solar and small-scale hydropower. It went on to recommend that this renewable energy should be utilised for power generation and non-electric technologies such as solar water heating and biofuels. Since the White Paper was gazetted, South Africa's primary and secondary energy requirements have remained heavily fossil-fuel dependent, both in terms of indigenous coal production and use, as well as the use of imported oil resources. Alongside this, the projected electricity demand of the country has led the National utility Eskom, to embark upon an intensive build programme to secure South Africa's longer-term energy needs, together with an adequate reserve margin.

4.2.6 The Northern Cape Provincial Spatial Development Framework (SDF)

Energy is one (1) of the primary objectives addressed in the SDF. Their energy objectives include promoting the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimising detrimental environmental impacts. The development of the energy sector holds huge benefit for the Northern Cape which would have significant multipliers in the local economy. It is important that innovative planning is undertaken to provide the necessary infrastructure and associated amenities to accommodate the industry in an efficient manner. Therefore, in order to ensure the sustainability of the current and future economic sectors and to maximise synergies, it is imperative that industrial development be undertaken in a manner that promotes the principles of environmental integrity, human wellbeing and economic efficiency.

4.2.7 *Convention on Biodiversity (CBD)*

South Africa became a signatory to the United Nations Convention on Biological Diversity (CBD) in 1993, which was ratified in 1995. The CBD requires signatory states to implement objectives of the Convention, which are the conservation of biodiversity; the sustainable use of biological resources and the fair and equitable sharing of benefits arising from the use of genetic resources. According to Article 14(a) of the CBD, each Contracting Party, as far as possible and as appropriate, must introduce appropriate procedures, such as environmental impact assessments of its proposed projects that are likely to have significant adverse effects on biological diversity, to avoid or minimize these effects and, where appropriate, to allow for public participation in such procedures.

4.2.8 *National Veld and Forest Fire Act (Act No. 101 of 1998)*

Provides requirements for veldfire prevention through firebreaks and required measures for fire-fighting. Chapter 4 of the Act places a duty on landowners to prepare and maintain firebreaks. Chapter 5 of the Act places a duty on all landowners to acquire equipment and have available personnel to fight fires.

4.2.9 *Heritage*

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

- National Environmental Management Act (NEMA) (Act No. 107 of 1998);
- National Heritage Resources Act (NHRA) (Act No. 25 of 1999); and
- Mineral and Petroleum Resources Development Act (MPRDA) (Act No. 28 of 2002).

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources:

- National Environmental Management Act (NEMA) (Act No. 107 of 1998)
  - Basic Environmental Assessment (BEA) – Section (23)(2)(d);
  - Environmental Scoping Report (ESR) –Section (29)(1)(d);
  - Environmental Impact Assessment (EIA) – Section (32)(2)(d); and
  - Environmental Management Plan (EMP) – Section (34)(b).
- National Heritage Resources Act (NHRA) (Act No. 25 of 1999)
  - Protection of Heritage Resources – Sections 34 to 36; and
  - Heritage Resources Management – Section 38.
- Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
  - Section 39(3).

The NHRA stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, '*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant* *provincial heritage resources authority…*' The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of the NHRA. This study falls under section 38(8) and requires comment from the relevant heritage resources authority.

5 PROJECT NEED AND DESIRABILITY

It is an important requirement in this BA Process to review the need and desirability of the proposed development. Guidelines on Need and Desirability were published in the Government Gazette of 20 October 2014. These guidelines list specific questions to determine need and desirability of proposed developments. This checklist is a useful tool in addressing specific questions relating to the need and desirability of a proposed development and assists in explaining that need and desirability at the provincial and local context. Need and desirability answer the question of whether the activity is being proposed at the right time and in the right place. **Table 7** includes a list of questions based on the DEFF's Guideline to determine the need and desirability of the proposed development. It should be noted this table was informed by the outcomes of the BA Process.

Current energy supply in South Africa is primarily coal-based and, although these resources will last for more than a century if used at current rates, large power plants will need to be replaced over the next 30 years. Coal and other fossil fuels, including oil, produce Carbon Dioxide when burned to produce energy. It is now widely accepted that climate change, partially caused by human-generated Carbon Dioxide, is to blame for the higher-than-usual incidence of extremely damaging weather experiences (e.g. storms, droughts, melting polar ice-caps). Local air pollution is strongly related to energy supply options, with coal and oil products being major contributors to urban and rural air pollution and acid rain. One (1) of the primary reasons for promoting renewable energy developments is the desire to make South Africa compliant with international treaties regarding climate-change effects.

Renewable energy options are a sustainable energy supply option that can significantly reduce reliance on fossil fuels. Other advantages include employment creation, proximity to point-of-use, minimal demand for water and less reliance on concentrated sources of energy. Greater use of renewable energy would also reduce South Africa's economic vulnerability to the variable costs of imported fuels. International and local communities are increasingly trying to find ways to shift economies towards greater reliance on renewable energy. Greater uptake of renewable energy would furthermore reduce the global risk of climate change, one (1) of the factors taken into account in designing the conservation network in South Africa.

The combined generation capacity of all the renewable energy developments considered here in this BA (35km buffer) is just less than 1 600 MW, which is more than the average size of one (1) of the fourteen (14) coal power stations in South Africa (Eskom's Generation Division has fourteen (14) coal-fired power stations with an installed capacity of 38 548 MW: www.eskom.co.za).

Table 7: The guideline on the Need and Desirability's list of questions to determine the 'Need and Desirability' of a proposed development

NEED	
Question	**Response**
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area)?	
1.1. How were the following ecological integrity considerations taken into account?: 1.1.1. Threatened Ecosystems, 1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure, 1.1.3. Critical Biodiversity Areas ('CBAs') and Ecological Support Areas ('ESAs'), 1.1.4. Conservation targets, 1.1.5. Ecological drivers of the ecosystem, 1.1.6. Environmental Management Framework, 1.1.7. Spatial Development Framework, and 1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	**The environmental sensitivities present within the development area were assessed within the Terrestrial Ecological Assessment undertaken as part of this BA Process, including CBAs and ESAs. It should be noted that a detailed site walkthrough of the entire project footprint was undertaken in order to inform the impact assessment. The specialist identified all ecological sensitive areas that would need to be avoided by the proposed development, as well as how to suitably develop within these areas so that the ecological integrity of the areas are maintained (refer to section 6.7 and Appendix 6G).** **Following the identification of 'no-go' and sensitive areas, the applicant revised the initial layout.** **The mitigation hierarchy of avoidance, reduction and improved management have been applied to inform the findings of the Terrestrial Ecology Impact Assessment. The Ecologist is of the view that the proposed development should be authorised.** **An environmental sensitivity map based on the input obtained from the various specialist studies has been included in section 8 of this DBAR, as well as Appendix 5. This map was refined prior to the submission of this DBAR.**
1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were	**The environmental sensitivities present within the development area were assessed within the Terrestrial Ecological Assessment undertaken as part of this BA Process, including CBAs and ESAs. It should be noted that a detailed site walkthrough of the entire**

NEED	
Question	**Response**
explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**project footprint was undertaken in order to inform the impact assessment. The specialist identified all ecological sensitive areas that would need to be avoided by the proposed development, as well as how to suitably develop within these areas so that the ecological integrity of the areas are maintained (refer to section 6.7 and Appendix 6G).** **The mitigation hierarchy of avoidance, reduction and improved management have been applied to inform the findings of the Terrestrial Ecology Impact Assessment. The Ecologist is of the view that the proposed development should be authorised.** **An environmental sensitivity map based on the input obtained from the various specialist studies has been included in section 8 of this DBAR, as well as Appendix 5. This map was refined prior to the submission of this DBAR. Measures to avoid, remedy, mitigate and manage impacts are included within the EMPr (Appendix 8), which forms part of this BA report.**
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**This proposed development has the potential to impact on the terrestrial and aquatic ecology of the area, this includes impacts on the natural vegetation, biodiversity (including avifauna), sensitive habitats (such as watercourses) and ecosystem function. Environmental sensitivities present within the development footprint (including CBAs and ESAs) were assessed by various specialists. This included terrestrial ecology, surface water and avifauna. From a terrestrial ecology perspective, the assessment of impacts indicates that all impacts are of low significance or can be reduced to low significance with mitigation, with the**

NEED	
Question	**Response**
	exception of loss of natural vegetation, for which the impact remains of medium significance after mitigation. From a surface water perspective, overall, all impacts were assessed to be low, post-implementation of mitigation measures. From an avifauna perspective, the proposed development will have some pre-mitigation impacts at a site and local level which will range from Medium to Low. **The amount of habitat that will be lost to the proposed development is insignificant compared to the area (in hectares) of the regional vegetation type that occurs on-site but may be significant in terms of local patterns and diversity that could be affected**. **Assessment of the ecological impacts is incorporated in Appendix 6H of this report. In addition, the surface water and avifauna assessments are provided in Appendix 6G and Appendix 6B respectively. Measures to avoid, remedy, mitigate and manage impacts have been included within the terrestrial ecology, avifauna and surface water impact assessments and the Draft EMPr (Appendix 8), which form part of this BA report.**
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether; what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	**It is not anticipated that a significant amount of waste will be generated.** **The EMPr (Appendix 8) includes measures to avoid, remedy, mitigate and manage impacts with regards to waste and waste management.**
1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What	**A Heritage Impact Assessment (HIA), including a full Palaeontology Impact Assessment (PIA), was undertaken as part of the BA process for this proposed development. <u>The overall findings of the HIA indicate that pre-mitigation a negative high impact is projected but with the</u>**

NEED	
Question	**Response**
measures were explored to enhance positive impacts?	**<u>implementation of the recommended management measures this impact rating will be reduced to low negative.</u>** **The HIA consisted of a scoping phase during which background information and landscape analysis was done to determine the heritage resources that can potentially occur within the study area. This was followed up with fieldwork by a team of archaeologist and a palaeontologist with the aim of identifying heritage resources in the development footprint areas and to make recommendations on the management of these resources and the possible chance finds during construction activities. The fieldwork was undertaken in August 2019 and the results have been incorporated into this DBAR, as well as the updated HIA Report (Appendix 6D).** **It is anticipated that the proposed development will have an acceptable low impact on heritage resources. However, it must be noted that there are two (2) operational projects which are located within a 35km radius of the proposed site, namely the Linde SEF and Noupoort Wind Farm, in addition to several other renewable energy developments which are being proposed or have already received approval. Thus, changes to the current cultural landscape are already in process. The HIA Report is included in Appendix 6D. The PIA Report is included in Appendix6E.**
1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid	**This proposed development requires water during the construction phase. Minimal water is required during the operational phase. At this stage, it is anticipated that water will be sourced from the local municipality. Should the local municipality not be able to ensure water supply, other**

NEED	
Question	**Response**
these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**local water sources (e.g. Boreholes) will be investigated. The necessary approvals from the Department of Water and Sanitation (DWS) will be applied for separately.**
1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? 1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life) 1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources of the proposed development alternative?)	**The proposed development aims to assist in feeding the electricity generated by the associated solar PV energy facility (part of separate on-going EIA process with DEFF Ref No.: <u>14/16/12/3/3/2/1134</u>), which harnesses solar energy for the generation of electricity, into the national grid. This proposed development assists in reducing the dependence on non-renewable sources, such as coal-fired power plants. The proposed development is however <u>not</u> located in any of the Central Strategic Transmission Corridors as defined and in terms of the procedures laid out in Government Notice No. 113. For more information, <u>please refer to the Alternatives section included in section 3.3 for an outline of the suitability of this activity.</u>**

NEED	
Question	**Response**
1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	
1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?: 1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 1.8.2. What is the level of risk associated with the limits of current knowledge? 1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	**The precautionary approach has been adopted for this BA process (i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts).** **The assessment of cumulative impacts assumed that all proposed renewable energy developments within a 35km radius will be constructed. In reality, only a handful of proposed renewable energy developments would be constructed and therefore this approach is considered to be precautionary in nature.** **Additionally, based on the specialist findings, the layout was amended to avoid sensitive areas, where possible. This has been assessed and discussed in more detail in section 8 of this report.** **Please refer to Appendix 6 of this report for the full specialist studies which were undertaken as part of this BA process. These studies outline the assumptions and limitations that were applicable to the respective studies. The assumptions and limitations have also been detailed in section 2 of this report.** **The risk associated with the limits in knowledge is considered to be low.**
1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following?: 1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance	**Please refer to section 6 and section 7 for the results of the specialist assessments which were undertaken as part of this BA process. In addition, all specialist assessments are provided in Appendix 6.**

NEED	
Question	**Response**
(noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? 1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	**The overall negative impact to people's environmental right in terms of social and visual impacts are considered to be low to moderate and moderate respectively. In addition, the Social Impact Assessment found that the proposed development has a positive element which outweighs the negative in that it will contribute towards the supply of renewable energy into a grid system heavily reliant on coal-powered energy generation.**
1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	**This is considered and addressed as part of the Social Impact Assessment which was undertaken as part of the BA process for this proposed development (included in Appendix 6F and summarised in section 6.14 and section 7).** **The study concluded that '*regarding the social impacts associated with the project it was found that most apply over the short term to the construction phase of the project. Of these impacts all can be mitigated to within acceptable ranges and there are no fatal flaws associated with the construction or operation of the project.* *On a cumulative basis it is evident that the cumulative impacts associated with changes to the social environment of the region are more significant than those attached to the project in isolation. On a negative front there are two (2) issues associated with developments in the region that are of most concern. The first of these issues is the change to the sense of place of an area that was once considered a pristine region of South Africa. The second is the potential, through an influx of labour and an increase in transportation to constructions sites, of the risk for the prevalence of HIV to rise in an area that has a relatively low HIV prevalence***

NEED	
Question	**Response**
	rate. In this regard it is important that the relevant authorities recognise these issues and find ways of mitigating them to ensure that they do not undermine the benefit that renewable energy projects bring, both to the region as well as to the country as a whole. These issues are beyond a project-specific basis and as such will need to be addressed at a higher level.' **Additionally, *'the project site and surrounding areas are sparsely populated with the agricultural potential of the area being low. Accordingly, the negative social impacts associated with the proposed grid connection infrastructure are of low to moderate significance with most occurring over the short term construction phase. The project has a positive element which outweighs the negative in that it will contribute towards the supply of renewable energy into a grid system heavily reliant on coal-powered energy generation. In this sense the project forms part of a national effort to reduce South Africa's carbon emissions and thus carries with it a significant social benefit and is thus supported and should proceed.'*** **In addition, the following was noted: *'As the area is sparsely populated and the negative social impacts associated the grid infrastructure of moderate significance it is most unlikely that any further social study will be necessary. This will, however, be dependent on the outcome of the public participation process which may result in a need to update the current report by incorporating the comments recorded and updating the social impacts accordingly.'***

NEED	
Question	**Response**
1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	**The proposed development will have a positive impact on the ecological integrity objectives or targets of the area. This has been discussed in detail in the Social Impact Assessment, which is summarised in section 6.14 and Section 7. The full impact assessment is included in Appendix 6F.** **The proposed development will therefore be aligned with the vision and goals of the DM and the LM.**
1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the 'best practicable environmental option' in terms of ecological considerations?	**Please refer to the Alternatives section (section 3.3) for an outline of the suitability of this activity.**
1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	**Please refer to the summary of the findings from the Terrestrial Ecology Impact Assessment in section 6.7 and section 7. The full Terrestrial Ecology Impact Assessment is provided in Appendix 6H.**
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	

NEED	
Question	**Response**
2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area.	**The Pixley ka Seme District Municipality's IDP recognises the potential of renewable energy initiatives and states in its SDP that: *'The Pixley Ka Seme District area with its abundance of sunshine and vast tracts of available land has been attracting considerable interest from solar energy investors of late. The high solar index of the area, as indicated by the Solar Index Diagram, provides many opportunities in terms of the development of renewable energy. The growth and development context in the district has also changed radically since 2013 (after it had been stagnant for decades) owing mainly to private and public investments in the area as a hub for renewable energy generation and astronomy, respectively.'*** **The proposed development will therefore be aligned with the vision and goals of the DM.** **The proposed development will also be supportive of the IDPs' objective of creating more job opportunities. The proposed development will lead to the creation of both direct and indirect job which will have a positive economic benefit within the region (if the DEFF grants an EA). There are approximately 297 jobs associated with the construction phase. It is likely that approximately 75% of this workforce will be recruited from within local communities, creating employment opportunities for residents of Middelburg, Noupoort and Hanover. Many of the beneficiaries are likely to be historically disadvantaged members of the community and the project will provide opportunities to develop skills amongst these people. The operational phase will employ approximately 16 people full time for a period of up to 20 years.**

NEED	
Question	**Response**
	It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase. Therefore, the proposed development would help to address the need for increased electricity supply (on a national level) while also be providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. **Apart from construction and operational phase jobs, the proposed development is also likely to stimulate the local economy as there will be a significant economic contribution attached to the proposed development. This contribution will be in the form of disposable salaries and the purchases of services and supplies from the local communities in and around the towns of Noupoort, Hannover and Middleburg. Apart from job creation and procurement spend, the proposed development will also have broader positive socio-economic impacts as far as socio-economic development contributions are concerned. This will create an opportunity to support the local community over the life span of the operational phase of the proposed development which will stretch over a 20-year period.**
2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integration of segregated communities, need to upgrade informal settlements, need for densification, etc.),	**Not applicable. The proposed development is located within a rural area and the site is zoned for agricultural use.**
2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	**Please refer to section 6 and section 7 for a description of the receiving environment and results of the impact assessment, respectively.**

NEED	
Question	**Response**
	The impact of the proposed development on cultural / heritage areas (archaeology and palaeontology) have been assessed in the form of a HIA and full PIA. The HIA Report is provided in Appendix 6D, and the results are summarised in section 6.13 and section 7 respectively. The PIA Report is provided in Appendix 6E, and the results are summarised in section 6.14 and section 7 respectively. **As mentioned, the HIA consisted of a scoping phase during which background information and landscape analysis was done to determine the heritage resources that can potentially occur within the study area. This was followed up with fieldwork by a team of archaeologist and a palaeontologist with the aim of identifying heritage resources in the development footprint areas and to make recommendations on the management of these resources and the possible chance finds during construction activities. The fieldwork was undertaken in August 2019 and the results have been incorporated into this DBAR, as well as the updated HIA Report.** **The proposed site is currently being used for agricultural purposes, predominantly sheep farming. The climate does not support any cultivation, except for small patches of irrigation associated with farm dams. Low-intensity natural grazing is the dominant agricultural activity. The low climatic moisture availability means that natural grazing is the only viable agricultural land-use for most of the area, except for the small patches of irrigation. The majority of the study area has low agricultural potential and therefore low agricultural sensitivity to**

NEED	
Question	**Response**
	development and consequent loss of agricultural land use. The only exception are the small patches of irrigation. These should be considered no-go areas for any footprint of development that will exclude cultivation. **Should the proposed development proceed, a relatively large area will be developed on. However, it is not expected that this will significantly threaten the agricultural activities present in the study area. An Agricultural and Soils Impact Assessment (Appendix 6A and results summarised in section 6.10 and section 7 respectively) was undertaken as part of the BA process and is included within this DBAR to reflect the impact of the proposed development in terms of the land-use and agricultural potential. Agricultural impacts of the proposed development are assessed as being of low to medium significance.**
2.1.4. Municipal Economic Development Strategy (‘LED Strategy’).	**Please refer to the Social Impact Assessment summarised in section 6.15 and section 7 respectively, and included in Appendix 6F, for an outline of how the LED Strategy has been considered.**
2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? 2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	**Please refer to the Social Impact Assessment summarised in section 6.15 and section 7 respectively, and included in Appendix 6F, for an outline of the social impacts that could occur due to the proposed development.**
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution,	

NEED	
Question	**Response**
in the short- and long term? Will the impact be socially and economically sustainable in the short- and long-term?	
2.5. In terms of location, describe how the placement of the proposed development will:	
2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	**Please refer to the Social Impact Assessment summarised in section 6.15 and section 7 respectively, and included in Appendix 6F, for an outline of the positive impacts associated with the creation of employment opportunities that could be created by the proposed development.**
2.5.2. reduce the need for transport of people and goods,	**Not applicable. This is a proposal for grid connection infrastructure to serve a renewable energy development.**
2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	**Not applicable. This is a proposal for grid connection infrastructure to serve a renewable energy development.**
2.5.4. compliment other uses in the area, 2.5.5. be in line with the planning for the area,	**An Agricultural and Soils Impact Assessment was undertaken as part of the BA process in order to determine the impact on the current land-use. Refer to section 6.10, section 7 and Appendix 6A for a summary of the study and the full study, respectively.** **The proposed site is currently being used for agricultural purposes, predominantly sheep farming. The climate does not support any cultivation, except for small patches of irrigation associated with farm dams. Low-intensity natural grazing is the dominant agricultural activity. The low climatic moisture availability means that natural grazing is the only viable agricultural land-use for most of the area, except for the small patches of irrigation. The majority of the study area has low agricultural potential and therefore low agricultural sensitivity to development and consequent loss of**

NEED	
Question	**Response**
	agricultural land use. The only exception are the small patches of irrigation. These should be considered 'no-go areas for any footprint of development that will exclude cultivation. **Should the proposed development proceed, a relatively large area will be developed on. However, it is not expected that this will significantly threaten the agricultural activities present in the study area as it will be undertaken in tandem.**
2.5.6. for urban-related development, make use of underutilised land available with the urban edge,	**Not applicable. The proposed development is located within a rural area and the proposed site is zoned for agricultural use.**
2.5.7. optimise the use of existing resources and infrastructure,	**The proposed development will connect to the Hydra D MTS, which will still be constructed. In addition, the proposed development will make use of existing site roads as far as possible. The proposed power line will also follow the same route as an existing high voltage (400kV) Eskom power line, where possible.**
2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	**Not applicable. This is a proposal for grid connection infrastructure to serve a renewable energy development and is not related to bulk infrastructure expansion.**
2.5.9. discourage 'urban sprawl' and contribute to compaction/densification,	**Please refer to the Social Impact Assessment summarised in section 6.15 and section 7 respectively, and included in Appendix 6F, for management measures on how to manage the impact associated with the '*disruption of local social structures as a result of the construction workforce and in-migration of job seekers*'.**
2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	**Not applicable. The proposed development is located within a rural area and the site is zoned for agricultural use.**

NEED	
Question	**Response**
2.5.11. encourage environmentally sustainable land development practices and processes,	**Based on the findings of the assessments, the proposed development would not have a significant ('high') negative impact on the receiving environment, with the implementation of suitable mitigation measures (refer to section 7) and will therefore not go against sustainable land development practices and processes. In addition, the proposed development will be designed according to relevant national specifications and standards which are regarded as best practice in the renewable energy sector. In addition, the proposed development will be aligned with national planning priorities, despite not being located within any of the Central Strategic Transmission Corridors as defined and in terms of the procedures laid out in Government Notice No. 113.**
2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	**Please refer to the Alternatives section included in section 3.3 for an outline of the selection and suitability of this activity.**
2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	**Please refer to the Social Impact Assessment summarised in section 6.15 and section 7 respectively, and included in Appendix 6F. It should be noted that the applicant will ultimately own the proposed development and, if successful, will compile an Economic Development Plan which will be compliant with REIPPPP requirements and will inter alia set out to achieve the following:** ▪ **Create a local community trust or similar (as required by REIPPPP) which has an equity share in the project life to benefit historically disadvantaged communities;** ▪ **Initiate a skills development and training strategy to facilitate future employment from the local community;**

NEED	
Question	**Response**
	▪ **Give preference to local suppliers for the construction of the facility; and** ▪ **Support local community upliftment projects and entrepreneurship through socio-economic and enterprise development initiatives.**
2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	**A HIA, including a full PIA, was undertaken as part of the BA process for this proposed development. <u>The overall findings of the HIA indicate that pre-mitigation a negative high impact is projected but with the implementation of the recommended management measures this impact rating will be reduced to low negative.</u>** **As mentioned, the HIA consisted of a scoping phase during which background information and landscape analysis was done to determine the heritage resources that can potentially occur within the study area. This was followed up with fieldwork by a team of archaeologist and a palaeontologist with the aim of identifying heritage resources in the development footprint areas and to make recommendations on the management of these resources and the possible chance finds during construction activities. The fieldwork was undertaken in August 2019 and the results have been incorporated into this DBAR, as well as the updated HIA Report (Appendix 6D).**
2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	**The proposed development is not located within any of the Central Strategic Transmission Corridors as defined and in terms of the procedures laid out in Government Notice No. 113. There are however two (2) operational projects which are located within a 35km radius of the proposed development (namely the Linde SEF and Noupoort Wind Farm), in addition to several other renewable energy**

NEED	
Question	**Response**
	developments which are being proposed or have already received approval, which lends itself potentially to a renewable energy development area. Refer to Table 22 for an outline of the other renewable energy developments which are operational, are being proposed or have already received approval within a 35km radius.
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	
2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	**Please refer to the Social Impact Assessment summarised in section 6.15 and section 7 respectively, and included in Appendix 6F.**
2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	**Please refer to the Social Impact Assessment summarised in section 6.15 and section 7 respectively, and included in Appendix 6F.**
2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	
2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	

NEED	
Question	**Response**
2.9. What measures were taken to pursue the selection of the 'best practicable environmental option' in terms of socio-economic considerations?	
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the 'best practicable environmental option' to be selected, or is there a need for other alternatives to be considered?	
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	
2.13. What measures were taken to:	
2.13.1. ensure the participation of all interested and affected parties,	**The activities which have been undertaken as part of the Public Participation Process (PPP) for the proposed development, and which will still be undertaken as part of the BA process, are outlined in this DBAR (Appendix 7 and summarised in section 9 of this report). Various methods were employed to notify potential I&APs of the proposed development, namely through an advert in a local newspaper, site notices on one (1) of the affected properties, notification letters and Background Information Documents**
2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	
2.13.3. ensure participation by vulnerable and disadvantaged persons,	
2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing	

NEED	
Question	**Response**
of knowledge and experience and other appropriate means, 2.13.5. ensure openness and transparency, and access to information in terms of the process, 2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, 2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was promoted.	**(BIDs). In addition, posters were erected in Noupoort and BIDs were also distributed here (Appendix 7A).** **The DBAR will be released for a 30-day review and commenting period to all the relevant Interested and/or Affected Parties (I&APs), Organs of State (OoS) / authorities and key stakeholders from Monday 10 February 2020 to Wednesday 11 March 2020 (excluding public holidays and the DEFF's closure period). Hard copies of the DBAR will be made available at a public venue (namely the Noupoort Public Library) and an electronic copy will also be made available on SiVEST's website. All I&APs and key stakeholders / OoS / authorities, who are registered on the project database, will be notified of the submission of the DBAR and the above-mentioned 30-day public review and comment period accordingly. In addition, all key stakeholders / OoS / authorities will be sent electronic copies (on CD) of the DBAR. All comments received will be responded to in a Comments and Response Report (C&RR) (included as Appendix 7E). Following the completion of the 30-day review and comment period, the DBAR will be updated, taking into account any comments received, and the Final Basic Assessment Report (FBAR) will be submitted to the DEFF for decision-making. All &APs and key stakeholders / OoS / authorities, who are registered on the project database, will be notified of the submission of the FBAR.** **Please refer to section 9 for details regarding the PPP which has been undertaken as part of the BA process to date, as well as what is still planned.**

NEED	
Question	**Response**
	The BA process has taken cognisance of all interests, needs and values espoused by all I&APs, including occupiers. Opportunity for public participation will be provided to all I&APs throughout the BA process in terms of the 2014 EIA Regulations, as amended.
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	**Please refer to the Social Impact Assessment summarised in section 6.15 and section 7, and included in Appendix 6F.**
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	**An EMPr has been developed to address health and safety concerns and is included in this BA report. An ECO will also be appointed to monitor compliance from an environmental perspective.**
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1. the number of temporary versus permanent jobs that will be created,	**Please refer to the Social Impact Assessment summarised in section 6.15 and section 7 respectively, and included in Appendix 6F.**
2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	
2.16.3. the distance from where labourers will have to travel,	
2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits),	
2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17. What measures were taken to ensure:	

NEED	
Question	**Response**
2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment,	**Legislation, policies and guidelines, which could apply to impacts of the proposed development on the environment, have been considered. The scope and content of this DBAR have been informed by applicable integrated environmental management legislation and policies. This has been outlined in section 4.**
2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	**The activities which have been undertaken as part of the PPP for the proposed development, and which will still be undertaken as part of the BA process, are summarised in section 9. Various methods were employed to notify potential I&APs of the proposed development, namely through an advert in a local newspaper, site notices on the affected property, notification letters and BIDs. In addition, posters were erected in Noupoort and BIDs were also distributed here (Appendix 7A).** **The DBAR will be released for a 30-day review and commenting period to all the relevant Interested and/or Affected Parties (I&APs), Organs of State (OoS) / authorities and key stakeholders from Monday 10 February 2020 to Wednesday 11 March 2020 (excluding public holidays and the DEFF's closure period). Hard copies of the DBAR will be made available at a public venue (namely the Noupoort Public Library) and an electronic copy will also be made available on SiVEST's website. All I&APs and key stakeholders / OoS / authorities, who are registered on the project database, will be notified of the submission of the DBAR and the above-mentioned 30-day public review and comment period accordingly. In addition, all key stakeholders / OoS / authorities will be sent electronic copies (on CD) of the DBAR. All comments received will be responded to in a Comments and**

NEED	
Question	**Response**
	Response Report (C&RR) (included as Appendix 7E). Following the completion of the 30-day review and comment period, the DBAR will be updated, taking into account any comments received, and the Final Basic Assessment Report (FBAR) will be submitted to the DEFF for decision-making. All &APs and key stakeholders / OoS / authorities, who are registered on the project database, will be notified of the submission of the FBAR. **Please refer to section 9 for details regarding the PPP which has been undertaken as part of the BA process to date, as well as what is still planned.** **The BA process has taken cognisance of all interests, needs and values espoused by all I&APs, including occupiers. Opportunity for public participation will be provided to all I&APs throughout the BA process in terms of the 2014 EIA Regulations, as amended.**
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	**The outcomes of this BA process and the associated conditions of the EA (should it be granted) will serve to address this question.**
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	**The mitigation measures proposed by the respective specialists have been included in the EMPr (Appendix 8), where applicable.** **The proposed mitigation measures have been informed by the respective specialist studies undertaken. This includes a detailed assessment of the environment as well as the impacts associated with the proposed development. Solar PV energy facilities and associated grid connections can be dismantled and completely removed from the site leased for the proposed development and do not permanently prevent alternative**

NEED	
Question	**Response**
	land-uses on the same land parcel. Based on material and socio-economic terms and measured to the value of the best alternative that is not chosen, the proposed development will result in positive opportunity costs.
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	**The EMPr which is included in the BA report (Appendix 8) must form part of the contractual agreement and be adhered to by both the contractors / workers and the applicant.**
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	**Please refer to the Alternatives section included in section 3.3 for an outline of the selection and suitability of this activity.**
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	**Please refer to section 7.3 for a summary of the cumulative impacts.**

5.1 National Renewable Energy Requirement

In 2010, South Africa had 44 157MW of power generation capacity installed. Current forecasts indicate that by 2025, the expected growth in demand will require the current installed power generation capacity to be almost doubled to approximately 74 000MW (SAWEA, 2010).

This growing demand, fuelled by increasing economic growth and social development within Southern Africa, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of the environmental impact, climate change and the need for sustainable development. Despite the worldwide concern regarding Green House Gas (GHG) emissions and climate change, South Africa continues to rely heavily on coal as its primary source of energy, while most of the countries renewable energy resources remain largely untapped (DME, 2003).

There is therefore an increasing need to establish a new source of generating power in South Africa within the next decade.

The use of renewable energy technologies, as one (1) of a mix of technologies needed to meet future energy consumption requirements are being investigated as part of Eskom's long-term strategic planning and research process. It must be remembered that solar energy is plentiful, renewable, widely distributed, clean and reduces GHG emissions when it displaces fossil-fuel derived from electricity. In this light, renewable solar energy can be seen as desirable.

The REIPPPP and the competitiveness nature of the bidding process has resulted in significant lowering of solar and wind tariff prices since 2011. Solar PV, for example, was bid with tariffs of R2.80/kWh at the inception of the REIPPPP in 2011, to 60c/kWh at present. Further projects will increase the competitive nature of the REIPPPP and further result in cost savings to South African consumers.

5.2 National Renewable Energy Commitment

In support of the need to find solutions for the current electricity shortages, the increasing demand for energy, as well as the need to find more sustainable and environmentally friendly energy resources, South Africa has embarked on an infrastructure growth programme supported by various government initiatives. These include the National Development Plan (NDP), the Presidential Infrastructure Coordinating Commission (PICC), the DoE's Integrated Resource Plan, the National Strategy for Sustainable Development, the National Climate Change Response White Paper, the Presidency of the Republic of South Africa's Medium-Term Framework, and the National Treasury's Carbon Tax Policy Paper.

The Government's commitment to growing the renewable energy industry in South Africa is also supported by the *White Paper on Renewable Energy* (2003) which sets out the Government's principals, goals and objectives for promoting and implementing renewable energy in South Africa. In order to achieve the long-term goal of achieving a sustainable renewable energy industry, the DoE has set a target of contributing 17,8*GW* of renewable energy to the final energy consumption by 2030. This target is to be produced mainly through, wind and solar; but also, through biomass and small-scale hydro (DME, 2003; IRP, 2010). According to the 2018 Draft IRP, 1474MW of solar energy output capacity had been installed by 2018 already, while 1980MW of wind energy output capacity had been installed (**Figure 7**). Additionally, the 2018 Draft IRP states that new installed energy capacity to 2030 will include 2500MW hydro, 5600MW wind and 8100MW solar PV. It is also recommended that 10.5% of the generation capacity should be from solar PV energy by 2030 (Draft IRP, 2018).

5.3 Site Specific Suitability

The location of the proposed power line and substations (on-site and collector) was determined based on the selection of a potential project site for the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134). This included several key aspects, namely solar resource, climate, topography, environmental, grid connections and access to the site. As mentioned, the proposed project site has been identified through a pre-feasibility desktop analysis based on the estimation of the solar energy resource as well as weather, dust and dirt effects.

According to the Direct Normal Solar Irradiation (DNI) map below (**Figure 8**), the Northern Cape Province of South Africa has the highest DNI predicted, ranging from approximately 2556 to 3287 kWh/m^2/year. In addition, as mentioned, the project site receives an annual GHI ranging from approximately 1972 to 2264kWh/m^2/year (**Figure 5**).

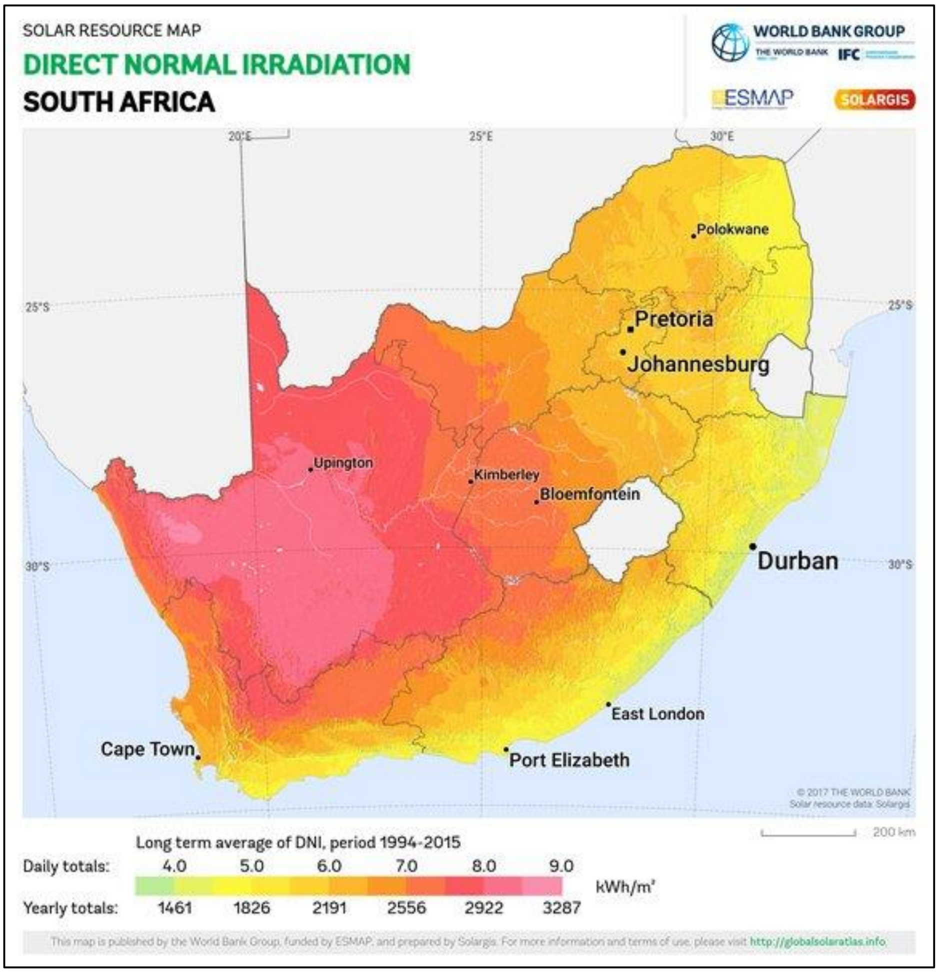

Figure 8: Direct Normal Solar Irradiation (DNI) map (Source - 2017 The World Bank, Solar resource data: SolarGis)

Based on the PV Power Potential map below (**Figure 9**), the Northern Cape is the province in South Africa with the highest solar potential. The project area is thus suitable for the establishment of a solar PV energy facility, including associated grid connection infrastructure. Based on an estimation of the solar energy resource as well as weather, dust, dirt, surface albedo and the pre-feasibility studies conducted by Mooi Plaats Solar Power, the area has been identified as optimal for the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134).

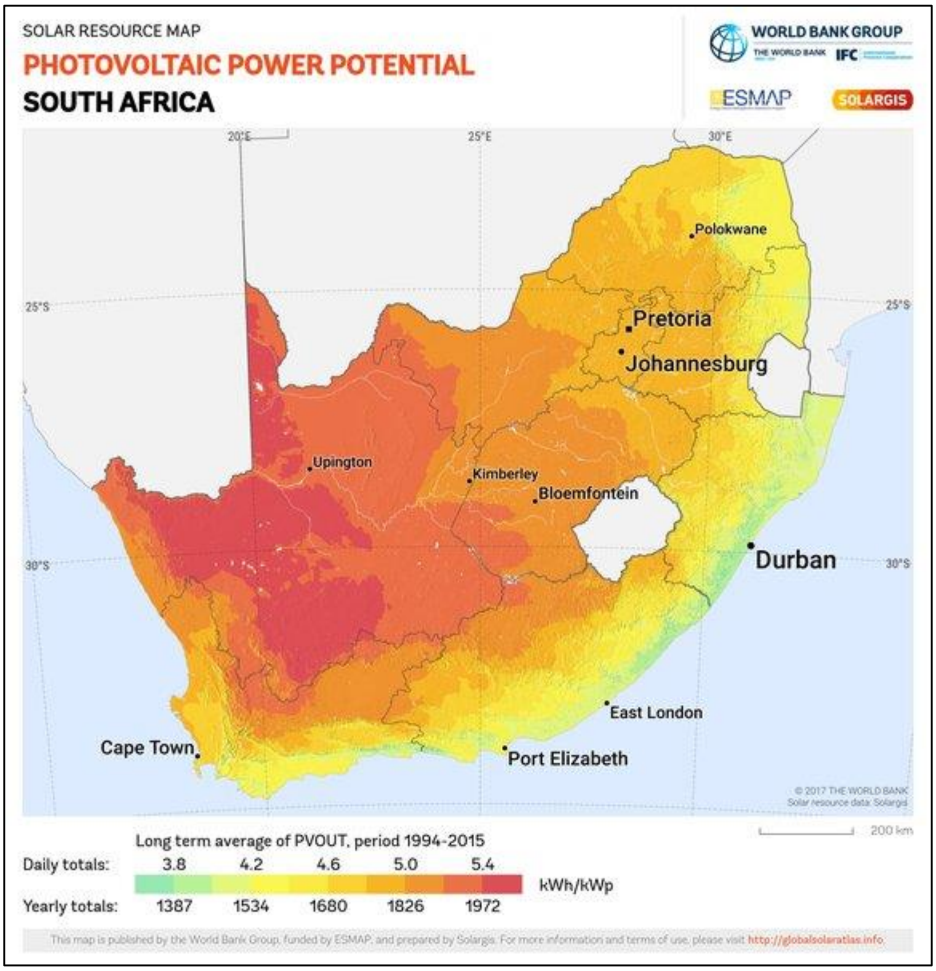

Figure 9: Photovoltaic (PV) Power Potential map (Source - © 2017 The World Bank, Solar resource data: SolarGis)

The proposed project site for the proposed solar PV energy facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) is not located in any of the eight (8) identified REDZs, which are geographical areas that have been identified on a strategic planning level to have reduced negative environmental impacts but high commercial attractiveness (due to its proximity to, *inter alia*, the national grid) and socio-economic benefit to the country. In addition, the proposed power line is not located within any of the Central Strategic Transmission Corridors as defined and in terms of the procedures laid out in Government Notice No. 113. Despite this, the development of the proposed solar PV energy facility and associated grid connection infrastructure is still considered to be important for South Africa as it will reduce the country's overall environmental footprint from power generation (including externality costs), and thereby steer the country on a pathway towards sustainability. The proposed development will provide socio-economic benefits to the region it is situated in and will have a high commercial attractiveness. In addition, the negative environmental impacts associated with the proposed development can be mitigated to acceptable levels.

Solar resource is only one (1) driver of site selection. The other aspects should be considered when holistically evaluating a proposed development.

The proposed project area is currently being used for agricultural purposes, predominantly sheep farming. The climate does not support any cultivation, except for small patches of irrigation associated with farm dams. Low-intensity natural grazing is the dominant agricultural activity. The low climatic moisture availability means that natural grazing is the only viable agricultural land use for most of the area, except for the small patches of irrigation. In addition, isolated farmsteads, including farm worker's dwellings, and ancillary farm buildings can also be found within the study area. It should also be noted that three (3) sensitive visual receptors linked to leisure or nature-based activities can be found within the study area. These three (3) receptors are all component facilities of Transkaroo Adventures, a nature-based tourism undertaking providing secluded accommodation facilities, hiking trails and 4 x 4 routes in the study area. It is expected that the small patches of irrigation will be unaffected by the proposed development as these should be considered 'no-go' areas for any footprint of development that will exclude cultivation. As such, it is not envisioned that farming activities will be impacted after the construction phase has been completed. It is not anticipated that any of the farmsteads, farm worker's dwellings or ancillary farm buildings located within the project area will need to be moved or decommissioned. The Applicant is however willing to relocate any farm workers' dwellings or any other farm buildings, if needed. Additionally, the three (3) component facilities of Transkaroo Adventures will also not be affected. Should infrastructure changes be required, this will be discussed with the relevant landowner(s). It must be noted that the affected landowners are in support of the proposed development as they understand the importance of building generation capacity. The proposed project area is therefore considered to be suitable from a land use perspective.

Grid connection suitability is the next element which drives the project location. Long connection lines have increased environmental impacts as well as add increased costs to the proposed development. The proposed project site has good grid connection potential as the proposed power line will connect the proposed solar PV energy facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) to the Hydra D MTS (part of separate EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/730/2), which is still to be constructed, thereby minimising the need for an extensive grid network upgrade or long power line. In addition, proposed power line will follow the same route as an existing high voltage (400kV) Eskom power line already in existence (**Figure 12**), which is preferable.

Environmental is a key aspect that Mooi Plaats Solar Power considers when evaluating renewable energy developments. The proposed development should be developed in a sustainable and ecologically friendly manner ensuring its development has the least possible impact on the land on which it will be built.

Other key criteria which refine the site selection on a micro level include competition, topography and site access.

The proposed project area has a relatively flat topography, which is suitable for the development of a solar PV energy facility and associated grid connection infrastructure. The proposed preferred power line corridor (namely Option 1a) however traverses hilly / mountainous terrain to the south-east, towards the Hydra D MTS. As mentioned however, the proposed power line will follow the same route as an existing high voltage (400kV) Eskom power line already in existence in this part of the study area (**Figure 12**), which is preferable. The project site can be accessed easily via an existing dirt secondary road which connects to the tarred N10 national road.

The farms are currently used for agricultural purposes, specifically commercial sheep farming. The proposed development is not envisioned to impact farming activities after the construction phase had been completed. The project area is therefore considered to be suitable from a land use perspective.

5.4 Local Need

The Northern Cape Province faces numerous socio-economic and developmental challenges, which are not unique to the Province and are observed throughout the country. Reducing poverty through social development and achieving sustainable economic growth in the Province through diversification and transformation of its economy are at the forefront of the provincial government's developmental objectives (Northern Cape Government, 2008; Office of the Premier of the Northern Cape, 2012).

The Northern Cape Province is endowed with biological diversity, mineral resources, and renewable energy sources such as solar and wind. Therefore, the achievement of its developmental objectives is envisaged to be done by capitalising on the local resources and specifically, the development of the agriculture and agro-processing, mineral extraction and mineral beneficiation, fishing and aquaculture, manufacturing, and tourism industries (Northern Cape Government, 2008; Office of the Premier of the Northern Cape, 2012).

Ensuring availability of inexpensive energy is seen to be fundamental to growing competitive industries in the Province (Northern Cape Government, 2008). However, provincial government advocates the development of the energy sector in the Province through '*the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments'* (Northern Cape Government, 2008). This implies the use of renewable energy sources and natural gas fields that the Province enjoys (Northern Cape Government, 2008). Provincial strategic documents specifically promote the development of large-scale renewable energy projects, similar to the one (1) under analysis, which among others, would contribute to renewable energy targets set by national government and allow to secure supply, tackle climate change and address the needs of the Province (Office of the Premier of the Northern Cape, 2012).

Harnessing renewables is also seen to contribute towards alleviation and reduction of poverty in the Province. One (1) of the interventions that underpin the provincial approach to poverty eradication is '*utilisation of natural resources in a sustainable manner'*, which in turn implies the transition to greater exploitation of renewables, including solar (Northern Cape Government, 2008).

Considering the above, it can be concluded that the proposed development follows the provincial priorities and developmental objectives. From a spatial perspective, the proposed development also does not appear to raise any red flags.

The district and local municipalities where the proposed development is to be established also face similar challenges to the Province. Therefore, the municipalities' developmental priorities largely coincide. In like manner with the national and provincial policies, the district and local municipalities have placed considerable emphasis on the prioritisation and promotion of renewable energy resources within their boundaries. As previously mentioned, the IDP for the Pixley ka Seme District Municipality recognises the potential of renewable energy initiatives and states in its SDP that: '*The Pixley Ka Seme District area with its abundance of sunshine and vast tracts of available land has been attracting considerable interest from solar energy investors of late. The high solar index of the area, as indicated by the Solar Index Diagram, provides many opportunities in terms of the development of renewable energy. The growth and development context in the district has also changed radically since 2013 (after it had been stagnant for decades) owing mainly to private and public investments in the area as a hub for renewable energy generation and astronomy, respectively*' (Pixley Ka Seme District Municipality, 2014). The towns of Prieska and Carnarvon have in recent years changed character from small rural towns to potentially regional hubs as a result of investment in renewable energy generation. It should also be noted that as part Objective 5: Environmental sustainability and resilience, at least 20 000MW of renewable energy should be contracted by 2030. In addition, it is noted that the municipality has favourable conditions for renewable energy generation, a factor which gives it a possible competitive advantage from an economic perspective. The economy is also characterised by the potential of renewable energy resource generation. In terms of possible opportunities within the municipality, it has been identified that there is a possibility to allow investment in renewable energy resource generation (Pixley ka Seme District Municipality IDP 2017-2022, 2017). /

Based on the information above, it is evident that the proposed development fits well with the plans to diversify the provincial, district and local economies through investment in renewable energy developments.

6 DESCRIPTION OF THE RECEIVING ENVIRONMENT

A general description of the study area is outlined in the section below. The receiving environment in relation to each specialist study is also provided.

As mentioned, the specialists compiled one (1) combined report covering all three (3) of the proposed Umsobomvu PV projects as well as the three (3) associated grid infrastructure developments (substations and 132kV power lines). Some of the sections below therefore provide a general description of the greater area surrounding the proposed development. Findings and impact assessment sections are however project specific. The DEFF confirmed that this approach is acceptable during a pre-application meeting (refer to **Appendix 9B** for pre-application meeting minutes).

6.1 Regional Locality

The proposed development will be located approximately 23km south-west of the town of Noupoort, within the Umsobomvu Local Municipality, in the Pixley ka Seme District Municipality of the Northern Cape Province of South Africa (**Figure 10**). As mentioned, the proposed development will be accessed by the N10 national road which lies north / north-east of the proposed development.

The centre point coordinates for the preferred substation sites (on-site and collector) as well as the centre line coordinates for the preferred power line corridor are included in **Table 8 - Table 10** below.

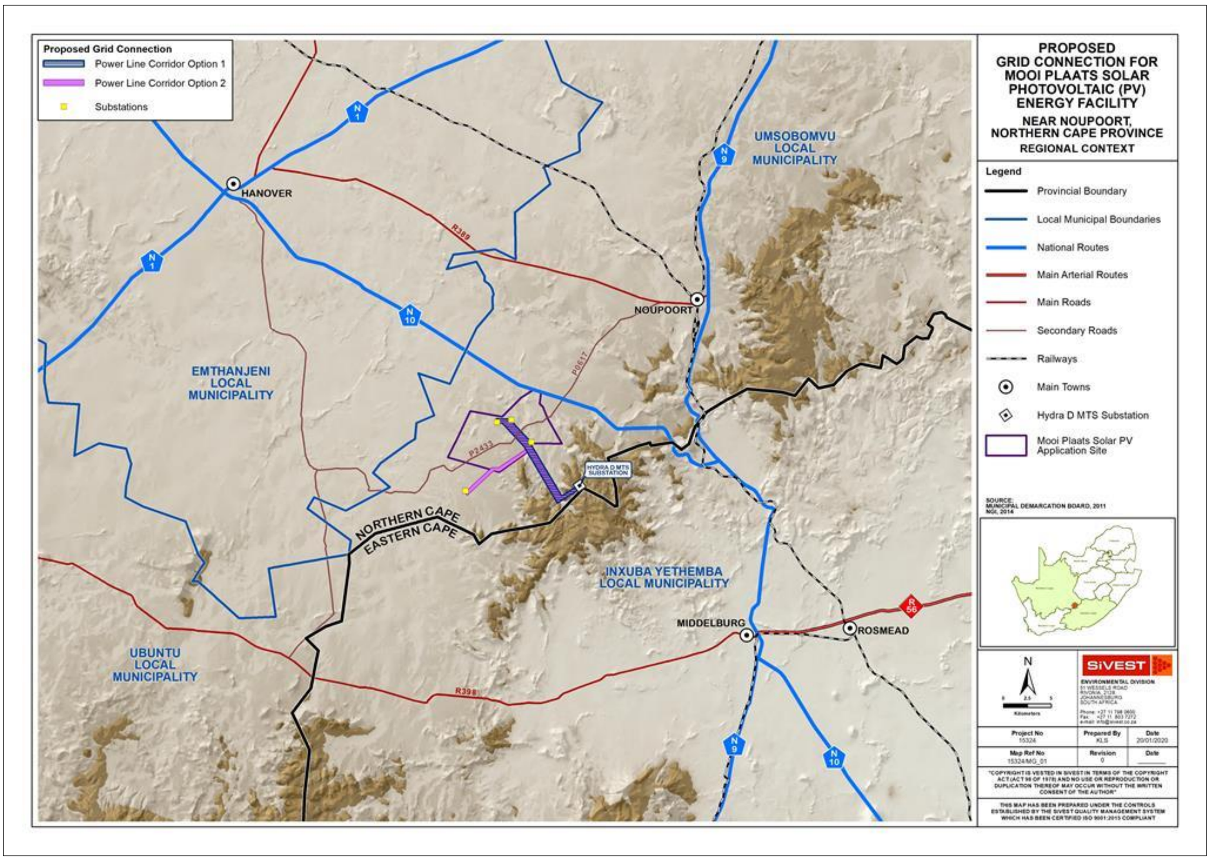

Figure 10: Mooi Plaats On-site Eskom Substation, Eskom Collector Substation and 132kV overhead power line in the regional context

6.2 Study Site Description

The proposed preferred Mooi Plaats On-site Eskom Substation (namely Substation 2) will be located on Remainder of the Farm Mooi Plaats No. 121, while the proposed preferred Mooi Plaats Eskom Northern Collector Substation (namely Substation 1a) will be located on Portion 1 of the Farm Leuwe Kop No. 120. As mentioned, the substation sites are intrinsically linked to the grid connection infrastructure alternatives. The grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists have informed the location of the on-site and collector substation sites being proposed as part of this application. The substation sites mentioned above are intrinsically linked to Grid Connection Option 1a, which has been selected as the preferred grid connection infrastructure alternative.

Grid Connection Option 1a has been selected as the preferred grid connection infrastructure alternative and thus the power line corridor associated with this alternative is preferred. The following farms / properties will be traversed by the preferred 132kV power line corridor (i.e. Option 1a):

- Remainder of the Farm Mooi Plaats No. 121;

- Portion 1 of the Farm Leuwe Kop No. 120;
- Portion 6 of the Farm Uitzicht No. 3;
- Portion 7 of the Farm Uitzicht No. 3; and
- Portion 8 of the Farm Uitzicht No. 3.

A locality map indicating the farms / properties affected by the substation site alternatives as well as those traversed by the power line corridor route alignment alternatives (namely the grid connection infrastructure alternatives) is provided in **Figure 11** below.

A layout map indicating the preferred layout in relation to the sensitive areas identified by the specialists is indicated in **Figure 52** in **section 8**.

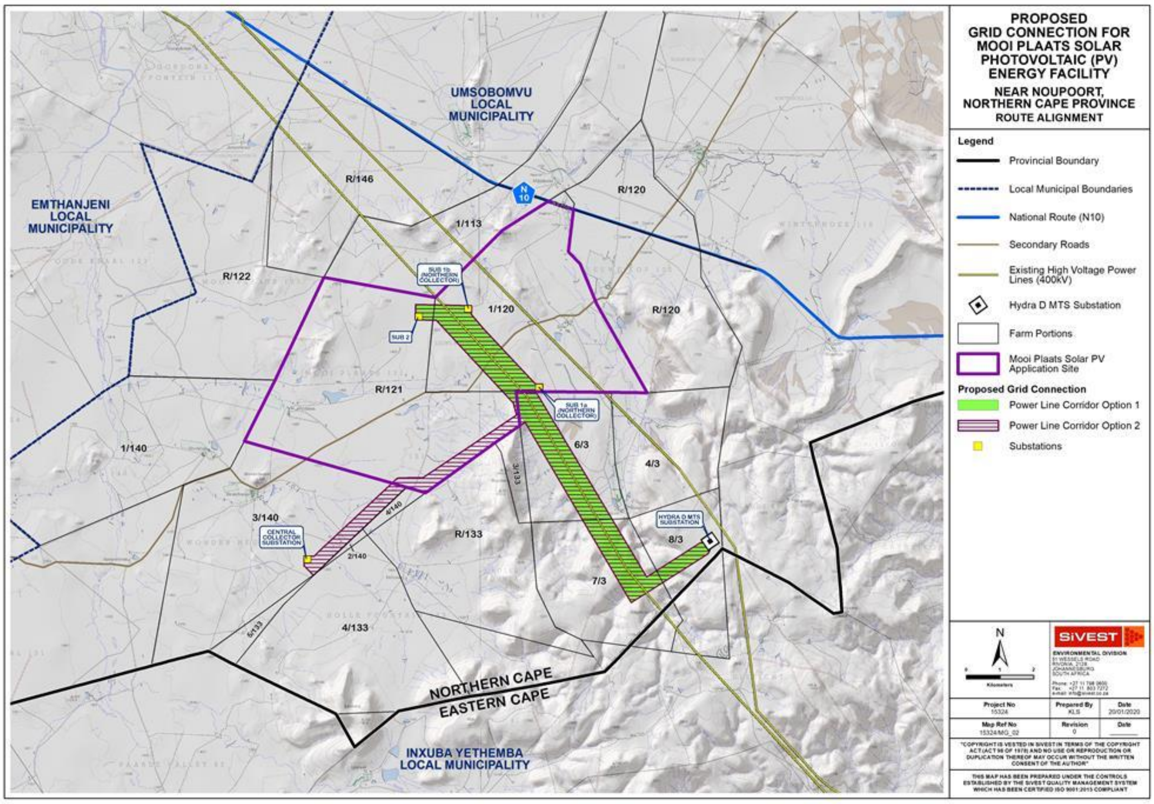

Figure 11: Locality map indicating farms / properties affected by substation site alternatives as well as those traversed by power line corridor route alignment alternatives

The centre point coordinates for the preferred substation sites (on-site and collector) as well as the centre line coordinates for the preferred power line corridor are included in **Table 8 - Table 10** below.

Table 8: Mooi Plaats On-site Eskom Substation Site Location

MOOI PLAATS GRID: PREFERRED ON-SITE ESKOM SUBSTATION SITE ALTERNATIVE COORDINATES			
ALTERNATIVE	**AREA (HECTARES)**	**CENTRE POINT COORDINATES**	
		SOUTH	**EAST**
Substation 2 (On-site Eskom Substation)	4	S31° 17' 39.289"	E24° 43' 51.440"

Table 9: Mooi Plaats Eskom Collector Substation Site Location

MOOI PLAATS GRID: PREFERRED ESKOM COLLECTOR SUBSTATION SITE ALTERNATIVE COORDINATES			
ALTERNATIVE	**AREA (HECTARES)**	**CENTRE POINT COORDINATES**	
		SOUTH	**EAST**
Substation 1a (Eskom Northern Collector Substation)	4	S31° 18' 47.922"	E24° 46' 6.243"

Table 10: Preferred Power Line Corridor Alternative Centre Line Coordinates

MOOI PLAATS GRID: PREFERRED 132kV POWER LINE CORRIDOR ALTERNATIVE				
CENTRE LINE COORDINATES (DD MM SS.sss)				
CORRIDOR ALTERNATIVE	**START POINT**	**MIDDLE POINT**	**END POINT (HYDRA D MTS)**	**APPROX LENGTH (KM)**
Option 1a	S31° 17' 39.289"	S31° 20' 5.021"	S31° 21' 20.482"	13.34
	E24° 43' 51.440"	E24° 46' 36.932"	S31° 21' 20.482"	

For the purpose of this BA, corridors between approximately 400m and 900m wide were assessed for the proposed grid connection infrastructure alternatives. This is to allow for flexibility to route the power line on either side of the existing high voltage Eskom power lines. However, the final servitude width of the proposed 132kV power line will only be 36m. As such, the selected preferred 132kV power line will be routed within the assessed corridor.

Refer to **Appendix 9A** for the list of coordinates. A full list of coordinates (including all the bending points of the proposed power line corridor alternatives, from the starting point to the finishing point) will be provided as part of the FBAR.

The entire study area is largely in a natural state but used for animal production. There is well-established farm infrastructure on each landholding, including homesteads, farm buildings, camps, dams, small areas of cultivated lands, and some stands of exotic trees used as shade and windscreens. There are also access roads, narrow gravel roads, jeep tracks and fences. The vegetation in the study area is used primarily for livestock grazing and is affected to some degree by this usage, but not to the extent that any severe degradation was noted on-site. Except for this infrastructure, the vegetation and habitats in the study area appear to be largely in a natural state and reflecting what would be expected according to the natural relationship between the physical environment and the vegetation. This natural pattern extends beyond the study area in all directions and gives the general area a sense of being relatively untransformed and largely natural.

6.3 Topography

The study area is situated in an area along the boundary between plains and mountain ranges, with moderately to steeply sloping topography in the south-eastern parts, and relatively flat to undulating terrain in the remainder of the area. The elevation on-site varies from 1430 to 1855m above sea level, an elevation difference of approximately 425m across a distance of around 15,0km. The mountains rise fairly steeply from the surrounding plains resulting in much steeper gradients along this interface. The mountain areas are incised by steep valleys and are dissected and variable in topography. The plains are relatively flat to undulating, but with regular low ridges and koppies to break the landscape, some isolated and others linked into long, low ridges. The study area is drained by several dry drainage valleys, most of which drain eventually towards the north-west. The dry stream beds on-site coalesce into the Klein Seekoeirivier that runs northwards out of the study area.

The northern section of the corridor for Grid Connection Option 1 has generally mildly undulating topography with a few isolated ridges. The southern portion of the corridor traverses a number of drainage features as it moves into a hilly / mountainous region in the south. The northern and southern sections of the corridor for Grid Connection Option 2 overlap or runs parallel to a large extent to sections of Option 1. Therefore, in the north, the topography is generally mildly undulating topography with a few isolated ridges. In the south the corridor traverses several drainage features as it moves into a hilly / mountainous region in the south. The topography is mildly undulating, except for a ridge roughly in the middle of the section.

The topography of the study area is shown in **Figure 12** below. The degree of slope of the study area is shown in **Figure 13** below.

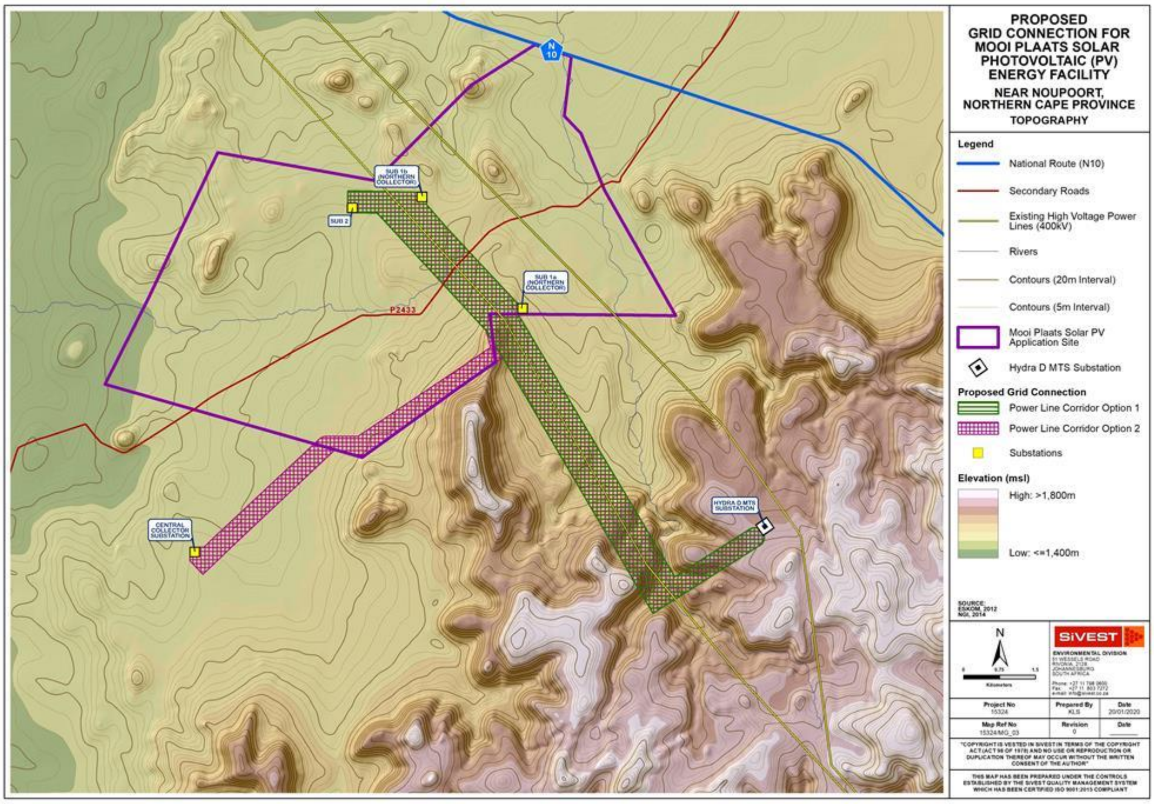

Figure 12: Topography of the study area

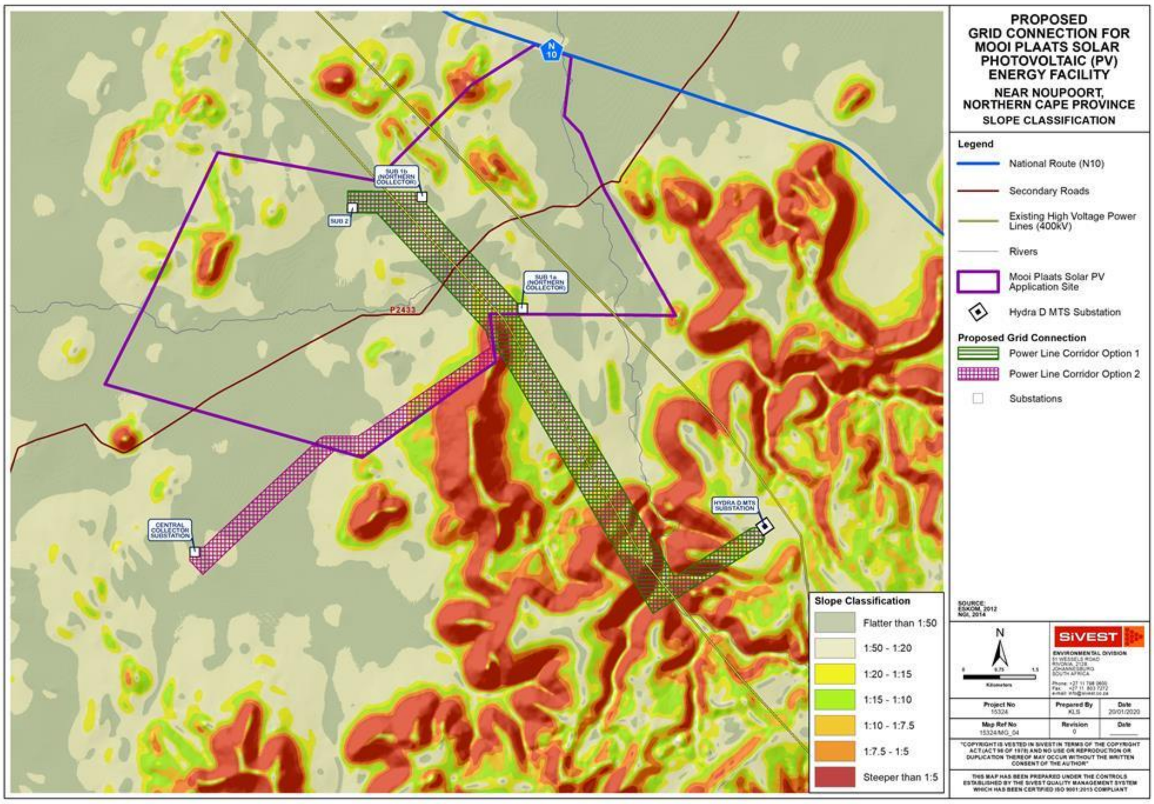

Figure 13: Degree of slope in region of the study area

6.4 Geology

The development area is underlain by a series of Karoo sandstones, mudstones and shales, deposited under fluvial environments of the Adelaide Subgroup that forms part of the Beaufort Group. The Beaufort group overlays the Ecca Group and consists essentially of sandstones and shales. The Beaufort Group covers a total land surface area of approximately 200 000km^2 in South Africa and is the first fully continental sequence in the Karoo Supergroup. The Beaufort Group is divided into the Adelaide subgroup and the overlying Tarkastad subgroup (Johnson *et al.*, 2006).

6.5 Land Use

Much of the land use in the study area is characterised by low shrubland with large areas of grassland and smaller patches of woodland / open bush and thicket / dense bush occurring in the hilly areas in the eastern sector of the study area. Significant tracts of land in the study area are classified as 'bare (none vegetated)', and while some of these 'bare' areas are representative of transformation due to human activity, in many cases these patches of land are merely undisturbed areas with very sparse vegetation cover (**Figure 14**).

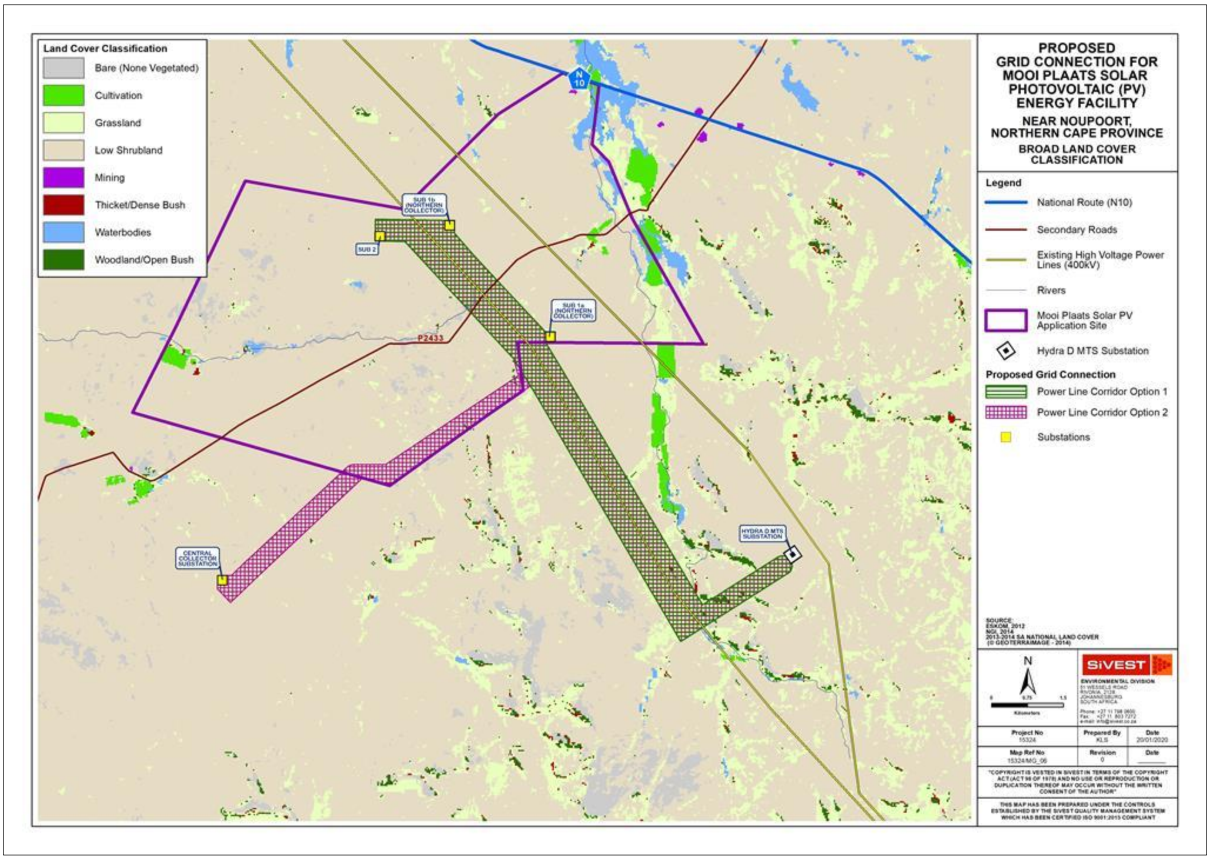

Figure 14: Land use in the region of the study area

Agricultural activity in the area is restricted by the arid nature of the local climate and areas of cultivation are largely confined to relatively limited areas distributed along drainage lines. As such, the natural vegetation has been retained across much of the study area.

Livestock farming (mostly sheep) is the dominant activity, although the climatic and soil conditions have resulted in low densities of livestock and relatively large farm properties across the area. Thus, the area has a very low density of rural settlement, with relatively few scattered farmsteads in evidence.

Built form in much of the study area is limited to isolated farmsteads, including farm worker's dwellings and ancillary farm buildings, gravel access roads, telephone lines, fences and windmills.

Further human influence is visible in the area in the form of the N10 national route which traverses the study area in a north-west to south-east direction. In addition, there are several small patches of land scattered across the study area which are classified as 'Mines / Quarries'. These areas appear to be small quarries or 'diggings' and are mostly located adjacent to the public roads, especially along the N10.

The closest built-up area is the town of Noupoort, which is situated approximately 23km north-east of the proposed development. This small town is well outside the study area and are thus not expected to have an impact on the visual character of the study area.

Existing power lines in the study area are also significant man-made features in an otherwise undeveloped landscape. Two (2) sets of high voltage (400kV) power lines traverse the northern section of the study area, bisecting the Mooi Plaats Solar PV application site (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) in a north-west to south-east alignment.

6.6 Climate

The study area is within an arid environment. Rainfall for the site is given as a low 378mm per annum (The World Bank Climate Change Knowledge Portal, 2015). Rainfall can potentially occur at any time of the year, but is more likely in summer to late-summer, most often from October to April. Winters can be cold, with mean minimum temperatures approaching zero in July. Winter frost is common and occurs on average 30-days per year. In contrast, summers can be very hot with mean maximum temperatures in January exceeding 30°C.

The average monthly temperature and distribution of rainfall is shown in **Figure 15** below.

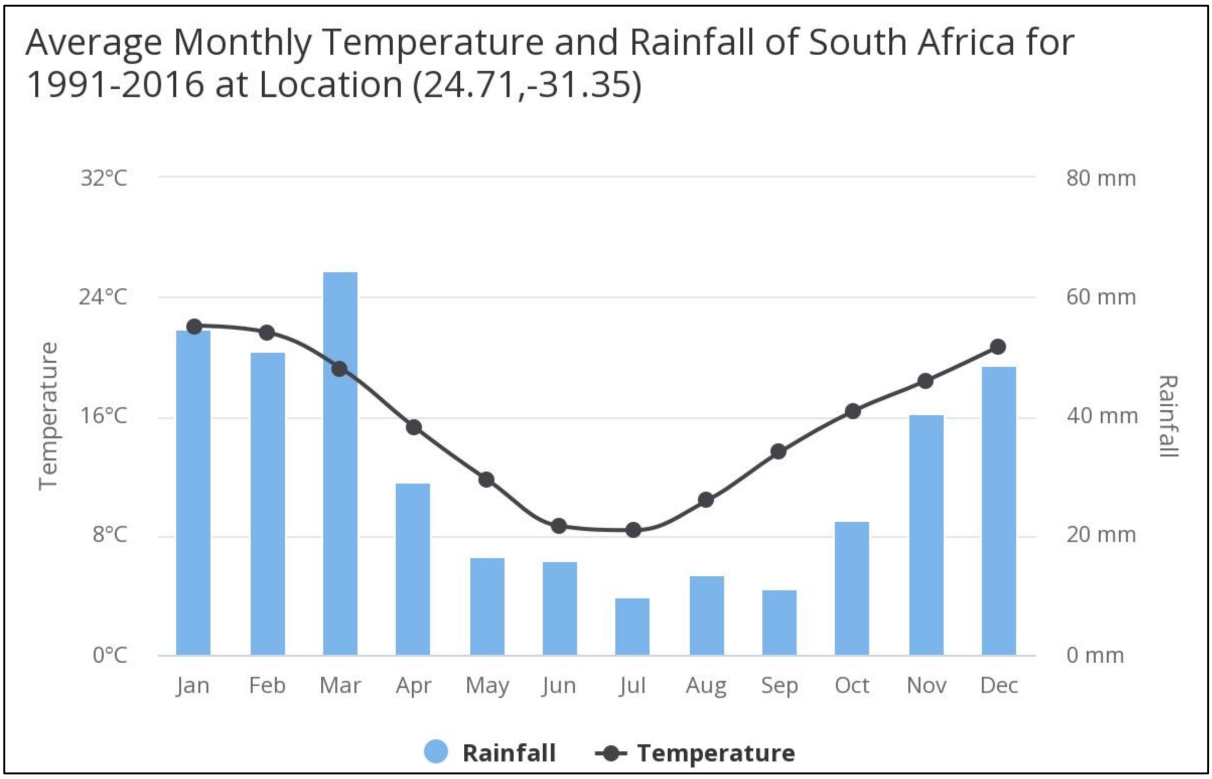

Figure 15: Average monthly temperature and rainfall for a position approximately in the centre of the development (The World Bank Climate Change Knowledge Portal, 2015)

6.7 Terrestrial Ecology

The Terrestrial Ecological Impact Assessment was conducted by Dr David Hoare and is included as **Appendix 6H**. The study commenced as a desktop-study, followed by a site-specific field study which was undertaken from the 4th – 8th of February 2019.

The environmental baseline from a terrestrial ecological perspective is presented below.

6.7.1 Broad Vegetation Patterns

There are two (2) regional vegetation types occurring in the study area, namely Eastern Upper Karoo and Besemkaree Koppies Shrubland. The first of these two (2) units (Eastern Upper Karoo) occurs across most of the study area, whereas the second (Besemkaree Koppies Shrubland) is restricted to the mountainous areas and is only affected by small proportions of the proposed infrastructure (mostly the proposed power line corridors). There are three (3) additional units that occur in nearby areas, namely Southern Karoo Riviere, Tarkastad Montane Shrubland and Karoo Escarpment Grassland. It is possible that floristic components and/or plant community patterns related to any of these could extend locally into the study area. This is especially true of Southern Karoo Riviere, which as a unit is only mapped as broad but is probably representative of all shallow drainage lines in the study area.

The national vegetation map (Mucina & Rutherford, 2006) for the study area is depicted below in **Figure 16** below.

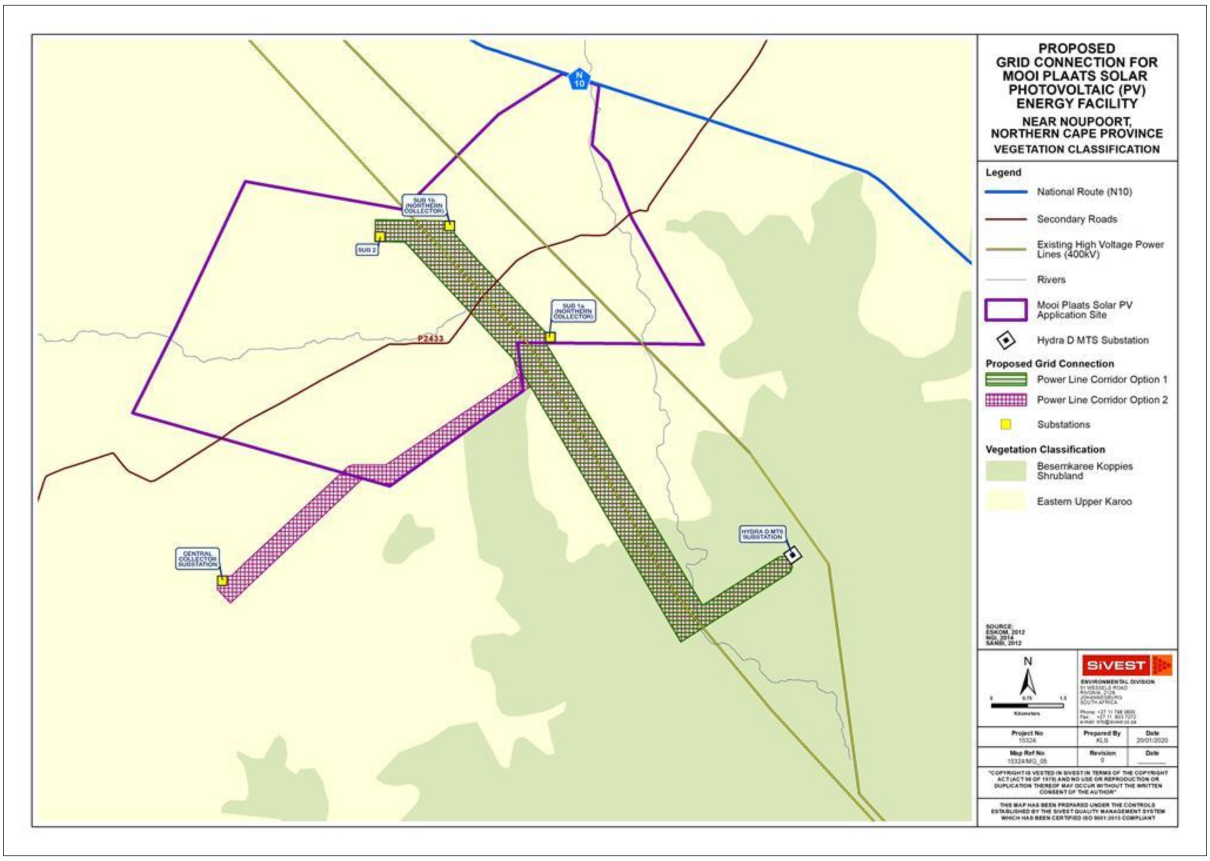

Figure 16: The national vegetation map (Mucina & Rutherford, 2006) for the study area.

The vegetation types that occur in the study area and nearby areas are briefly described below.

Eastern Upper Karoo

The vegetation occurs on flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the north-east and Tarkastad Montane Shrubland in the south-east), dominated by dwarf microphyllous shrubs, with 'white' grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from south-west to north-east.

Besemkaree Koppies Shrubland

Slopes of koppies, butts and tafelbergs covered by two-layered karroid shrubland. The lower (closed-canopy) layer is dominated by dwarf small-leaved shrubs and, especially in precipitation-rich years, also by abundant grasses, while the upper (loose canopy) layer is dominated by tall shrubs, namely *Sersia erosa*, *S. burchellii*, *S. ciliata*, *Euclea crispa* subsp*. ovata*, *Diospyros austro-africana* and *Olea europaea* subsp. *africana*.

Southern Karoo Riviere

Narrow riverine flats supporting a complex of *Acacia karoo* or *Tamarix usneoides* thickets (up to 5 m tall) and fringed by tall *Salsola*-dominated shrubland (up to 1.5 m high), especially on heavier (and saltladen) soils on very broad alluvia. In sandy drainage lines *Stipagrostis namaquensis* may occasionally also dominate. Mesic thicket forms in the far eastern part of this region (see Van der Walt 1980: Table 4) may also contain *Leucosidea sericea*, *Rhamnus prinoides* and *Ehrharta erecta*.

Tarkastad Montane Shrubland

Ridges, hills and isolated mountain slopes, characterised by high surface rock cover, this often consisting of large, round boulders. The vegetation is low, semi-open, mixed shrubland with 'white' grasses and dwarf shrubs forming a prominent component of the vegetation.

Karoo Escarpment Grassland

Mountain summits, low mountains and hills with wiry, tussock grasslands, usually dominated by *Merxmuellera disticha*. Other common species include the grasses typical of dry grasslands (genera *Eragrostis*, *Tetrachne*, *Karroochloa*, *Helictotrichon*, *Melica*, *Tragus*, *Elionurus* and *Aristida*). An important low shrub component occurs throughout this grassland unit.

6.7.2 Conservation Status of Broad Vegetation Types

On the basis of a scientific approach used at national level by the South African National Biodiversity Institute (SANBI) (Driver *et al*., 2005), vegetation types can be categorised according to their conservation status which is, in turn, assessed according to the degree of transformation relative to the expected extent of each vegetation type. The status of a habitat or vegetation type is based on how much of its original area remains intact relative to various thresholds. The original extent of a vegetation type is as presented in the most recent national vegetation map (Mucina, Rutherford & Powrie, 2005) and is the extent of the vegetation type in the absence of any historical human impact. On a national scale, the thresholds are as depicted in **Table 11** below, as determined by best available scientific approaches (Driver *et al*., 2005). The level at which an ecosystem becomes Critically Endangered differs from one ecosystem to another and varies from 16% to 36% (Driver *et al*., 2005).

Determining ecosystem status (Driver *et al*., 2005). *BT = biodiversity target (the minimum conservation requirement).

Habitat remaining (%)		
80–100	least threatened	LT
60–80	vulnerable	VU
*BT–60	endangered	EN
0–*BT	critically endangered	CR

Table 11: Conservation status of different vegetation types occurring in the study area

Vegetation Type	Target (%)	Conserved (%)	Transformed (%)	Conservation status	
				Driver *et al*., 2005; Mucina *et al*., 2006	National Ecosystem List (NEM:BA)
Eastern Upper Karoo	21	3	2	Least threatened	Not listed
Besemkaree Koppies Shrubland	28	5	3	Least threatened	Not listed

Vegetation Type	Target (%)	Conserved (%)	Transformed (%)	Conservation status	
				Driver *et al*., 2005; Mucina *et al*., 2006	National Ecosystem List (NEM:BA)
Southern Karoo Riviere	24	3	12	Least threatened	Not listed
Tarkastad Montane Shrubland	28	1	3	Least threatened	Not listed
Karoo Escarpment Grassland	24	3	3	Least threatened	Not listed

According to scientific literature (Driver *et al*., 2005; Mucina *et al*., 2006), as shown in **Table 11**, all regional vegetation types described here are listed as Least Threatened. The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), lists national vegetation types that are afforded protection on the basis of rates of transformation. The thresholds for listing in this legislation are higher than in the scientific literature, which means there are fewer ecosystems listed in the National Ecosystem List versus in the scientific literature. None of the vegetation types described here are listed in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011).

6.7.3 Biodiversity Conservation Plans

The Northern Cape CBA Map was published in 2016 (Holness & Oosthuysen 2016) and it '*updates, revises and replaces all older systematic biodiversity plans and associated products for the province*'. This includes the Namakwa District Biodiversity Sector Plan (Desmet & Marsh 2008), from which the Northern Cape CBA Map derived identified CBA1 and CBA2 areas (and added additional CBA1 and CBA2 areas). This is important, since the rationale for defining the recent (2016) CBA areas is derived from the earlier (2008) conservation plan. CBA1 and CBA2 areas in the 2016 map include the following areas:

1. Important Bird Areas;
2. SKEP expert identified areas;
3. Threatened species locations;
4. Features from previous conservation plans (including CBA1 and CBA2 areas from the Namakwa District Biodiversity Sector Plan);
5. Areas supporting climate change resilience, e.g. areas of high diversity, topographic diversity, strong biophysical gradients, climate refugia, including kloofs, south-facing slopes and river corridors;
6. Conservation Plans from adjacent provinces; and
7. Landscape structural elements, e.g. rocky outcrops, koppies, dolerite dykes, boulder fields, woody vegetation on outwash plains.

The Northern Cape CBA map classifies the natural vegetation of the province according to conservation value in decreasing value, as follows:

1. Protected;

2. Critical Biodiversity Area One (Irreplaceable Areas);
3. Critical Biodiversity Area Two (Important Areas);
4. Ecological Support Area; and
5. Other Natural Area.

This map shows features within the study area within three (3) of these classes, as follows:

1. Critical Biodiversity Areas (CBA): Most of the development area is within a CBA2 area, with two (2) patches of CBA1 areas in the south-eastern and south-western parts of the study area. One (1) of the power line corridors leading to the Hydra D MTS traverses the CBA1 area in the south-east of the study area;
2. Ecological Support Areas (ESA): The drainage valley in the extreme north-eastern part of the study area is within an ESA. There is also an ESA to the south of the proposed power line corridors, on the border of the Northern and Eastern Cape Provinces; and
3. Other Natural Areas (ONA): Areas surrounding the drainage valley in the north-eastern part of the study area are within an area mapped as ONA.

A map showing the CBAs and ESAs which can be found within the study area is provided in **Figure 17** below.

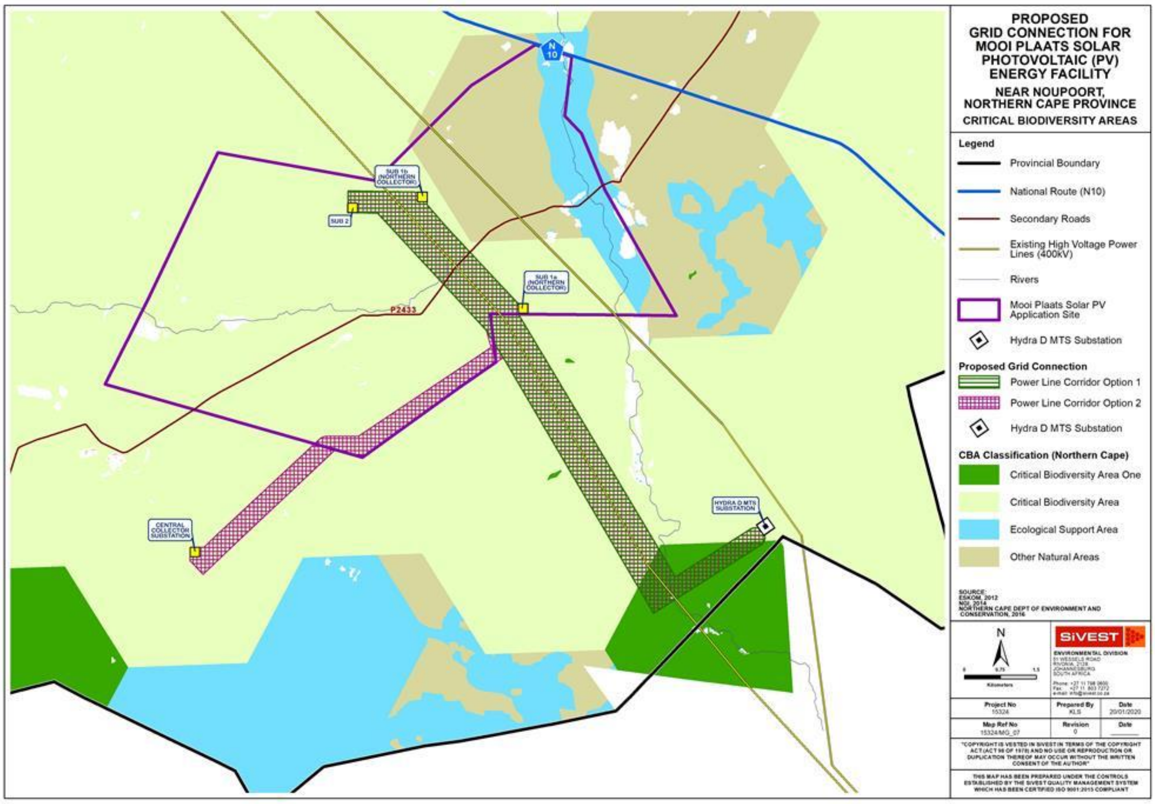

Figure 17: Map showing Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

The presence of CBA areas 1 and 2 in the study area, indicate that these areas are considered important for biodiversity conservation in the Northern Cape. Additionally, the ESAs in the study area indicate that the study area has importance in a wider ecological context for supporting biodiversity patterns.

The Namakwa District Biodiversity Sector Plan (Desmet & Marsh, 2008) provides recommended guidelines for land-use activities within different CBA categories. Those that are relevant to the current project are as follows:

Land use	CBA1	CBA2	ESA	ONA
Major/extensive development projects	N	N	R	R
Linear engineering structures	R	R	R	R

N=No, not permitted, R=Restricted, only when unavoidable, not usually permitted.

In CBA1 areas, the land management objective is to maintain the area in a natural state with no biodiversity loss and no biodiversity offsets are possible for developments that result in the transformation of natural habitat. It is interpreted here that solar arrays would not be desirable within CBA1 areas, but that linear infrastructure could be constructed there, if impacts are comprehensively managed to avoid habitat loss or degradation.

In CBA2 areas the land management objective is to maintain the landscape in a near-natural state, possibly allowing some loss in ecosystem integrity and functioning. Biodiversity compatible land uses are strongly encouraged, and industries encouraged to adopt and implement acceptable biodiversity management plans. It is further recommended to restrict expansion of any activity that would cause loss of natural habitat and where possible utilise existing transformation or degraded areas for hard development. Biodiversity offsets are required where development impacts on land management objectives.

It should be noted that the ecologist undertook a detailed site walkthrough of the project footprint to verify the relevance of the CBAs and ESAs. This was done to address any uncertainty in the coarse scale delineation of CBAs and ESAs. In addition, the identified CBA1 areas are traversed by the power line corridors only, and no other infrastructure will be constructed in these areas.

6.7.4 Proposed Protected Areas

According to the National Parks Area Expansion Strategy (NPAES), there are only small areas within the study area that have been identified as priority areas for inclusion in future protected areas. These are located approximately where the two (2) Eskom substations will be built (namely the Hydra D MTS and Coleskop WEF Substation). The majority of the study area is therefore outside the NPAES focus area. There is a large core block of area to the south-east of the study site that is included as being part of future protected areas (**Figure 18**).

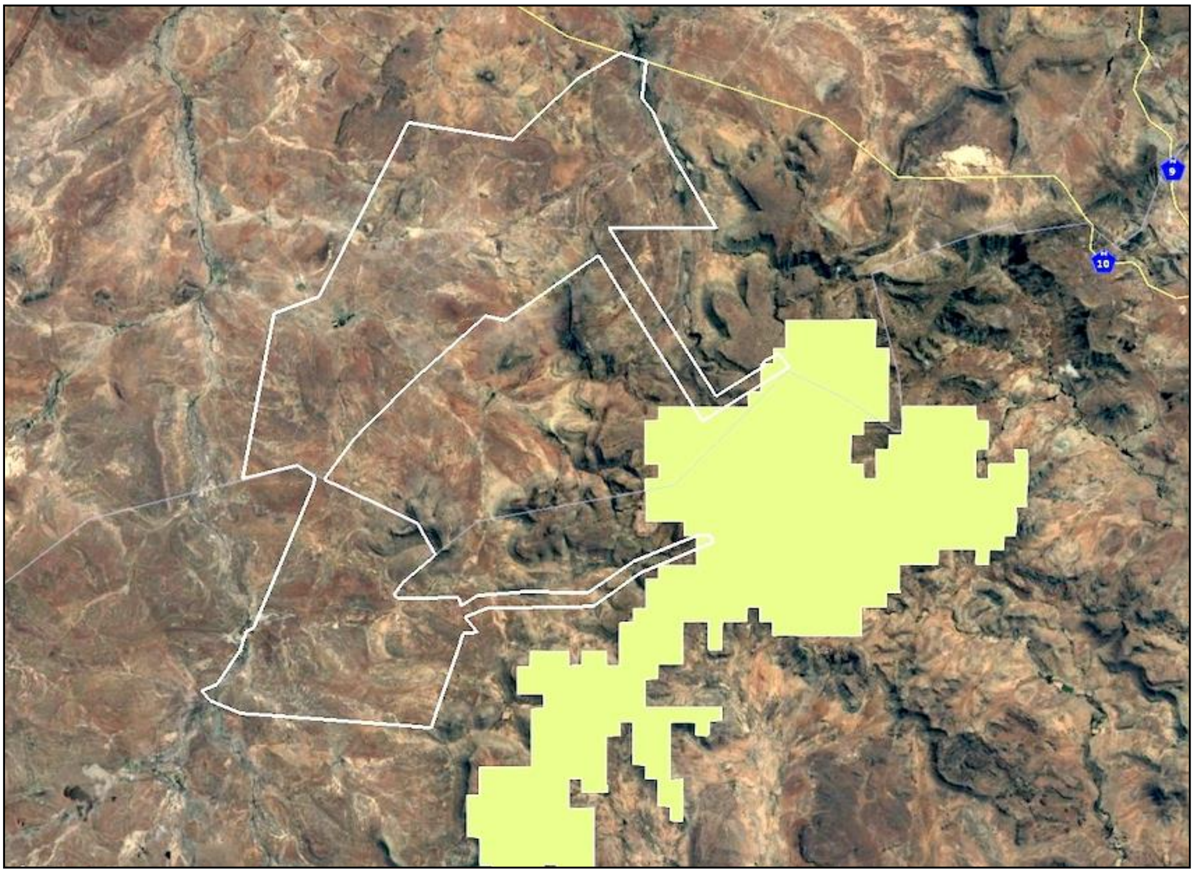

Figure 18: Proposed protected areas, according to the NPAES

6.7.5 *Red List Plant Species of the Study Area*

Lists of plant species previously recorded in the study area were obtained from the SANBI website (http://newposa.sanbi.org/). These are listed in Appendix 3 of the Terrestrial Ecology Impact Assessment Report. There are very few collection records for this part of the country so a much larger area was searched for potential species of concern. Despite this broader search, there are very few species that were identified of conservation concern that could potentially occur in the broad area that includes the project area.

The list contains two (2) species listed in an IUCN threat category (Critically Endangered, Endangered or Vulnerable - see Table 3 in Terrestrial Ecology Impact Assessment Report) of which two (2) have a moderate possibility of occurring in the general area and in the type of habitats available in the study area. This does not mean that they will occur there, only that the review has identified that these are species that should be assessed as possibly occurring in the area. None of these species were encountered on site. The first of the two (2) species, *Gnaphalium simii*, listed as Data Deficient: taxonomic problems (DDT), would only occur in calcareous vleis, which could occur in any of the drainage lines in the project area. The second species, *Trichodiadema rogersiae*, also listed as DDT, is found in mountain areas. Both power line corridor areas affect mountain areas, but none of the main project areas.

None of the species recorded on-site (see Appendix 3 of Terrestrial Ecology Impact Assessment Report) are listed in any threat category.

6.7.6 *Protected Plants (National Environmental Management: Biodiversity Act)*

Plant species protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) are listed in Appendix 6 of the Terrestrial Ecology Impact Assessment Report. None of the species on this list were encountered on-site and none are considered likely to occur there, because they do not have a geographical distribution that includes the study area.

6.7.7 *Protected Plants (Northern Cape Nature Conservation Act)*

Plant species protected under the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) are listed in Appendix 5 of the Terrestrial Ecology Impact Assessment Report. Several species were found on-site that are protected according to the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009). From the field survey, this includes the following: *Ruschia intricata* (Aizoaceae), *Ruschia* species (Aizoaceae), *Trichodiadema setulifera* (Aizoaceae), *Pelargonium abrotanifolium*, *Pelargonium exhibens*, *Cotyledon orbiculata* (Crassulaceae), *Erica* species (Ericaceae), *Deverra denudata* (Apiaceae), and *Aloe broomii* (Asphodolaceae). Despite not being threatened, any impacts on these species will require a permit from the relevant authorities. Note that many of these species are widespread and not of any conservation concern but protected due to the fact that the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) protects entire families of flowering plants irrespective of whether some members are rare or common. The implication is that a comprehensive list of species occurring within the footprint of the proposed infrastructure is required and a permit application submitted for any of those listed as protected. The current list is therefore not considered to be complete and must be supplemented by a comprehensive walk-through survey, once the final footprint of infrastructure has been decided.

6.7.8 *Protected Trees*

Tree species protected under the National Forest Act are listed in Appendix 2 of the Terrestrial Ecology Impact Assessment Report. There are none with a geographical distribution that includes the region in which the proposed development is located. There are two (2) species that have a geographical distribution that ends south of the study area, namely *Boscia albitrunca* and *Pittosporum viridiflorum*.

Boscia albitrunca

This is a small to medium-sized of up to 7m tall with a dense, roundish crown and smooth, white to greyish-white trunk. It is found in the drier parts of South Africa, as well as in the northern savanna parts of the country, but also extending some of the way down the eastern seaboard. There are scattered records of this species in the general area that includes the project site, although it's main area of occurrence is further north. It is therefore possible that it could occur in the study area. However, no trees of this species were seen on-site and it is considered unlikely that it occurs there. In the unlikely event that it is found to occur there, it is unlikely that any more than a few individuals would be found.

Pittosporum viridiflorum

This species occurs primarily in a band along the southern part of the country, extending up the east coast, where, from Lesotho northwards, it extends further inland. In the part of the country around the study area, the occurrence is generally south of the Great Escarpment, although there is one (1) record from Philipstown and two (2) from near Graaff-Reinet. It is considered unlikely that it occurs in the study area. In the unlikely event that it is found to occur there, it is unlikely that any more than a few individuals would be found.

In summary, no species of protected trees were found or are likely to occur in the geographical area that includes the project site.

6.7.9 Vertebrate Animal Species of the Study Area

Vertebrate species (mammals, reptiles and amphibians) with a geographical distribution that includes the study area are listed in Appendix 4 of the Terrestrial Ecology Impact Assessment Report. All threatened (Critically Endangered, Endangered or Vulnerable) or near threatened vertebrate animals that could occur in the study area and have habitat preference that includes habitats available in the study area, are discussed further below.

Mammals

There are 79 mammal species that have a geographical distribution that includes the study area, of which eleven (11) are listed in a conservation category of some level (see Appendix 3 of Terrestrial Ecology Impact Assessment Report). This is a relatively moderate diversity of mammals compared to other parts of South Africa. Based on the natural state of the study area and surrounding areas, it is considered likely that some of these species could occur on site. Listed species with a geographical range that includes the site are discussed in more detail below to evaluate the potential for them to occur on-site.

- Black Rhinoceros

The Black Rhinoceros (*Diceros bicornis bicornis*), listed as Endangered, has a geographical distribution that includes the study area. The species is confined to formal conservation areas as well as a few individuals held on private land. **Although the habitat on-site is suitable for this species, it does not occur there and would not be found there unless deliberately introduced.**

- Grey Rhebok

The Grey Rhebok (*Pelea capreolus*), listed as Near Threatened, is endemic to South Africa, Lesotho and parts of Swaziland. In the south and southwest, their distribution is associated with the rocky hills of mountain Fynbos and the Little Karoo (Taylor *et a*l., 2016). They are predominantly browsers, feeding on ground-hugging forbs, and largely water independent, obtaining most of their water requirements from their food (Taylor *et al*., 2016). Local declines in their population have been attributed to increased densities of natural predators, such as Black-backed Jackal, Caracals and Leopards. It has not been recorded in the grid in which the site is located but has been recorded in the grid to the north-east and many grids further to the south, so the site is within the overall distribution range of the species. There is therefore a moderate likelihood that it could occur on-site within any suitable habitat. However, it is a relatively mobile species and not necessarily dependent on any particular habitat. It is likely to move away from the path of any construction and development of parts of the study area. **The proposed development is therefore highly unlikely to have any negative effect on the species, even though it could possibly occur there.**

- Black-footed Cat

The Black-footed Cat (*Felis nigripes*), listed as Vulnerable, has been previously recorded in the grid in which the project is located, as well as in most surrounding grids. It's known distribution is on the inland part of most of South Africa, but seemingly not within the winter-rainfall part of the country. It also occurs in Botswana and Namibia. The current project area is within the core of the distribution range of the species and the species is therefore highly likely to occur in the area. The species is nocturnal and carnivorous, favouring any vegetation cover that is low and not too dense. They make use of dens in the daytime, which can be abandoned termite mounds, or dens dug by other animals, such as aardvark, springhares or cape ground squirrels. Local declines in their population have been attributed to increased densities of natural predators, such as Black-backed Jackal, Caracals and Leopards. They are highly vulnerable to domestic carnivores. The study area is definitely suited to this species and it probably occurs there. It is possible that it has interbred with cats on the farm – two (2) kittens seen on-site had colour characteristics of this species, such as black paws and markings similar to black-footed cats. **The proposed development may possibly have a negative effect on the species.**

- Leopard

The Leopard (*Panthera pardus*), listed as Vulnerable, has a wide habitat tolerance, but with a preference for densely wooded areas and rocky areas. In montane and rocky areas of the Eastern, Western and Northern Cape, they prey on dassies and klipspringers. They have large home ranges, but do not migrate easily, males having ranges of about 100km^2 and females 20km^2. It has not been recorded in any of the adjacent or nearby grids and the overall distribution shows a gap in its distribution that includes the current study area. There is therefore a low probability of this species occurring on site, and if it did occur there it would probably be at very low densities. **The proposed development could possibly displace individuals, in the unlikely event that they occur there, but is unlikely to have a significant effect on overall population densities.**

- Cape Clawless Otter

The Cape Clawless Otter (*Aonyx capensis*), listed as Near Threatened, is widely but patchily distributed throughout South Africa, and is also the most widely found otter in Africa. It is aquatic and seldom found far from permanent water, which needs to be fresh. They may be found in seasonal rivers in the Karoo, provided suitable-sized pools persist. The site is within the known distribution of this species and there are historical records for one (1) adjacent grid to the south, although not from the current grid. There is suitable habitat for this species on-site. Paw-prints in the mud adjacent to water on-site were identified as belonging to an otter and it is considered most likely that it would be this species. The area where it occurs is in the power line corridor associated with the Hydra D MTS, which is an option for the project. **It is therefore considered definite that it occurs on-site and that individuals could be affected by construction activities, if suitable habitat is damaged.**

- African Striped Weasel

The African Striped Weasel (*Poecilogale albinucha*), listed as Near Threatened, is found throughout most of South Africa, except for the arid interior, and into central Africa (excluding Namibia). It has not been recorded in the grid in which the site is located or any surrounding grid, but the site is within the overall distribution range for the species. It is found primarily in moist grasslands and fynbos, where adequate numbers of prey may be found. **It is considered unlikely to occur in the study area and the proposed development will therefore not affect this species**.

- Brown Hyaena

The Brown Hyaena (*Hyaena brunnea*), listed as Near Threatened, is found in a band running down the centre of the country, expanding into the entire northern parts of the country. There is a gap in the distribution around the current study area, but there is a possibility that vagrant individuals could extend into this area. The species is found in desert areas, particularly along the west coast, semi-desert, open scrub and open woodland savannah (Mills & Hes, 1997). It is a solitary scavenger that travels vast distances every day in search of food. It has a medium chance of occurring in the study area since the distribution range includes the study area, however there are no historical records from nearby. It is a mobile animal that is likely to move away from the path of any construction and development of parts of the site is therefore highly unlikely to have any negative effect on the species. **It is considered that there is a low likelihood of it occurring on-site or that individuals could be affected by construction activities.**

- South African Hedgehog

The South African Hedgehog (*Atelerix frontalis*), listed as Near Threatened, is found in a large part of the central part of South Africa, extending down to the south-eastern coast, and is also found in Namibia, Botswana, Zimbabwe, Lesotho and Swaziland. It requires ample ground cover for cover, nesting and foraging and prefers dense vegetation and rocky outcrops. The site is well within the known distribution of this species and there are historical records for nearby grids in all directions, and it has been recorded from the current grid. There is therefore a high probability of the study area being suitable for this species. **It is considered likely that it could occur on-site and individuals could be affected by construction activities, if suitable habitat is damaged.**

- White-tailed Rat

The White-tailed Rat (*Mystromys albicaudatus*), listed as Vulnerable, is endemic to South Africa and Lesotho, where it is found primarily in Highveld grasslands, but extending into adjacent Fynbos and Karoo areas. It is terrestrial, but never found in soft, sandy substrates, rocks, wetlands or river banks, and do not occur in transformed habitat. The study area is on the edge of the known distribution of this species, but there are historical records for the grid in which the projects are located, as well as two (2) adjacent grids. There is therefore a high probability of the study area being suitable for this species. **It is considered likely that it could occur on-site and individuals could be affected by construction activities, if suitable habitat is damaged.**

- Vlei Rat

The Vlei Rat (Grassland-type) (*Otomys auratus*), listed as Near Threatened, is near-endemic to South Africa, occurring in the north-eastern half of the country, associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions. It is likely to be associated with sedges and grasses in densely-vegetated wetlands with wet soils. The study area is on the very edge of the known distribution of this species and there are no historical records for grid in which the study area is located, not any adjacent grids. There is therefore a low probability of the study area being suitable for this species. **It is considered unlikely that it occurs on-site and the proposed development will therefore probably not affect this species.**

- Spectacled Dormouse

The Spectacled Dormouse (*Graphiurus ocularis*), listed as Near Threatened, is endemic to South Africa, where it is found in the Northern, Eastern and Western Cape Provinces. It is associated with rock piles, crevices, outcrops and stone kraals. They may be territorial. The study area is within the known distribution of this species and there are historical records for three (3) adjacent grids to the north, north-east and east, although not from the current grid. There is therefore a moderate probability of the study area being suitable for this species, including suitable habitat within the project area. **It is considered likely that it could occur on-site and individuals could be affected by construction activities, if suitable habitat is damaged.**

Of the species currently listed as threatened or protected (see Appendix 5 of Terrestrial Ecology Impact Assessment Report for list of protected species), those listed in **Table 12** below are considered to have a probability of occurring on-site and being potentially negatively affected by proposed activities associated with the proposed development.

Table 12: Mammal species of conservation concern with a likelihood of occurring on-site

Scientific name	Common name	Status	Likelihood of occurrence
Felis nigripes	Black-footed Cat	Vulnerable, protected	Very High
Aonyx capensis	Cape Clawless Otter	Near Threatened, protected	Very high
Atelerix frontalis	South African Hedgehog	Near Threatened, protected	High
Pelea capreolus	Grey Rhebok	Near Threatened, protected	Medium
Mystromys albicaudatus	White-tailed Rat	Vulnerable	Medium
Graphiurus ocularis	Spectacled dormouse	Near Threatened	Medium
Panthera pardus	Leopard	Vulnerable, protected	Low
Poecilogale albinucha	African Striped Weasel	Near Threatened	Low
Hyaena brunnea	Brown hyaena	Near Threatened	Low
Otomys auratus	Vlei Rat	Near Threatened	Low

Reptiles

A total of 55 reptile species have a geographical distribution that includes the study area in which the project site is found (Alexander & Marais 2007, Bates *et al*., 2014, Branch 1988, Marais 2004, Tolley &

Burger, 2007). This is a moderate diversity compared to average diversity in other parts of the country. Of the reptile species that could potentially occur in the study area, none have been listed in a threat category.

There are therefore no reptile species of conservation concern that could potentially occur in the study area and that may therefore be affected by the proposed development.

Amphibians

A total of only ten (10) frog species have a geographical distribution that includes the general study area in which the project site is found (Du Preez & Carruthers, 2009). Some of these species are only marginally present in the study area due to the fact that their distribution range ends close to the study area. Of the frog species that could potentially occur in the study area, none are listed in a threat category, but one (1) species is listed as protected, according to National legislation, the Giant Bullfrog.

- The Giant Bull Frog

The Giant Bull Frog (*Pyxicephalus adspersus*) previously listed as Near Threatened, is found in seasonal shallow grassy pans, vleis and other rain-filled depressions in open flat areas of grassland or savanna and, at the limits of its distribution, in Nama Karoo and thicket. For most of the year the species remains buried up to 1m underground. They emerge only during the peak of the rainy season to forage and breed. If conditions are extremely dry, they may remain cocooned underground for several years. Long distances often separate suitable breeding sites. In order to breed, they require shallow, rain-filled depressions that retain water long enough for the tadpoles to metamorphose. Before and after breeding, bullfrogs forage in open grassland, feeding mostly on insects, but also on other frogs, lizards, snakes, small birds and rodents. After breeding males generally bury themselves within 100m of the breeding site, but females may disperse up to 1km away. Based on habitat requirements, there is a medium probability that this species occurs in the study area.

It is concluded that the site contains habitat that is suitable for various frog species, although only one (1) species of conservation concern is likely to occur in the study area. One (1) frog species of concern is therefore potentially likely to be affected by development in the study area, including the proposed project, as shown in
Table 13 below.

Table 13: Amphibian species of conservation concern with a likelihood of occurring on-site

Scientific name	Common name	Status	Likelihood of occurrence
Pyxicephalus adspersus	Giant Bullfrog	Protected	Medium

6.7.10 Protected Animals

There are a number of animal species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004). According to this Act, '*a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7*'. Such activities include any that are '*of a nature that may negatively impact on the survival* *of a listed threatened or protected species*'. This implies that any negative impacts on habitats in which populations of protected species occur or are dependent upon would be restricted according to this Act.

Those species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) that have a geographical distribution that includes the site are listed in Appendix 6 of the Terrestrial Ecology Impact Assessment Report (**Appendix 6H**), marked with the letter 'N'. This includes the following species: Black Rhinoceros (does not occur on-site), Black-footed Cat, Leopard (probably does not occur on-site), Cape Clawless Otter, Cape Fox, South African Hedgehog, Brown Hyena and Giant Bullfrog.

Due to habitat and forage requirements, and the fact that some species are restricted to game farms and/or conservation areas, only the Black-footed Cat, Cape Clawless Otter, Cape Fox, South African Hedgehog, and Giant Bullfrog have any likelihood of occurring on-site. Most of these species are territorial with small home ranges or may be dependent on specific habitat to exist on-site. They could therefore be affected by the development of the proposed project.

6.7.11 Habitats On-site

It should be noted that transformed areas where no vegetation occurs were insignificant in area. This included roads, farm buildings and similar existing disturbances. The broad natural habitat units on-site are as follows:

1. Lowland plains vegetation (karroid dwarf shrubland);
2. Mountain vegetation (shrubland);
3. Low ridges (shrubland);
4. Broad drainage areas; and
5. Mountain stream.

Lowland plains vegetation

The general study area is characterised by a low succulent, dwarf shrubland, typical of the regional vegetation type, Eastern Upper Karoo, which is described as 'dwarf microphyllous shrubs, with 'white' grasses of the genera *Aristida* and *Eragrostis*' (Mucina & Rutherford, 2006). A typical view of this vegetation, as found on-site, is shown in **Figure 19** below. This was the most widespread vegetation community on-site, occurring on all the relatively flat plains areas.

Figure 19: Photo showing Nama-karoo vegetation on plains with steeper topography in background

The general floristic character of this vegetation on-site is fairly uniform across wide areas, often dominated by the same suite of species, including *Ruschia intricata*, *Aristida diffusa*, *Tragus koelerioides*, *Eragrostis lehmanniana*, *Amphiglossa triflora*, *Wahlenbergia nodosa*, *Lycium cinereum*, *Pteronia glomerata, Pteronia mucronata, Chrysocoma ciliata* and *Eriocephalus spinescens*. However, any local variation in topography can lead to localised increase in richness associated with a more diverse species composition.

Mountain vegetation

This vegetation is somewhat typical of Besemkaree Koppies Shrubland, described above, in terms of structure, species composition and location in the landscape, with the exception of having the common presence of the grass, *Tenaxia stricta*, which is more expected in Karoo Escarpment Grassland. The vegetation community is found in all the more significant mountains in the study area, with steep topography and higher elevation than the surrounding plains. At the time of the field survey, most of these mountain areas had been recently burnt, but unburnt patches showed a consistency in species composition and structure across the study area that suggested that observed patterns could be generally extrapolated to burnt areas. An example is shown in **Figure 20** below.

Figure 20: Shrubby vegetation in unburnt mountainous areas in the study area

This species composition and structure included a shrub layer dominated by woody species, such as *Searsia erosa*, *Euclea crispa*, *Felicia filifolia*, *Elytropappus rhinocerotis*, *Diospyros lycioides*, *Tarchonanthus minor*, and *Diospyros austro-africanus*, and a grass layer dominated by *Tenaxia stricta*, along with *Themeda triandra*, *Eriocephalus ericoides*, *Chrysocoma ciliata*, *Ehrharta calycina*, *Cheilanthes eckloniana* and *Cymbopogon pospischilii*. There is likely to be some ecological variation in structure and species composition in different parts of the landscape, although this could not be verified within burnt vegetation. The topography introduces variation in slope and aspect, with some slopes facing hotter northern or western directions and others facing cooler southern and eastern directions, all of which introduces ecological variation into the landscape, providing new habitats for different species. Due to the sedimentary origin of the substrates, there are often bands of more resistant rock layers at specific heights on the mountain slopes. These substrates manifest themselves as small cliffs and rocky outcrops. There is a known diversity relationship between increased surface rockiness and increased local floristic species richness, which is likely to be true for the current study area. This generalisation is supported by the fact that many of the rarer floristic sitings on-site were within rocky areas.

Low ridges and koppies

There are low ridges and koppies scattered throughout the plains area of the study area. They appear to mostly be associated with dolerite outcrops. The soils in these areas are mostly shallow and rocky, there are often more boulders and the vegetation consists of a distinct open shrub canopy with a sparse grassy understorey. The floristic diversity is slightly higher in these areas than in surrounding plains and the structure of the vegetation almost certainly provides shelter and refuge for animals. Common shrubs on these ridges include *Searsia erosa*, *Euclea crispa*, *Lycium cinereum*, *Diospyros austro-africana* and *Diospyros lycioides*. The species composition is not similar to any of the main vegetation units described for the study area and surrounding areas but is probably most similar to *Tarkastad Montane Shrubland*.

An example of typical vegetation found on low ridges is shown in **Figure 21** below.

Figure 21: Typical habitat on low ridges and koppies in the study area

Broad drainage areas

There is a network of shallow drainage areas throughout the lower-lying parts of the study area. These are sometimes indistinct from surrounding areas, but often resolve into channels, or include areas with woody shrubs. It also includes bare areas, erosion gullies, and empty farm dams (at the time of the survey). Most of the homesteads in the study area are built on or adjacent to drainage areas, including buildings, roads, camps and often stands of exotic trees, some of which are dense and fairly substantial in extent. The small amount of formal cultivation also occurs almost entirely within this unit.

The unit is equivalent to the vegetation unit, Southern Karoo Riviere, although there is considerable variation from one (1) part of the study area to another: in the wide open plains, the vegetation on-site is more in line with the description for Southern Karoo Riviere, but closer to hills, it becomes more grassy, but with the inclusion of typical wetland species, such as Afroscirpoides dioeca, *Pseudoschoenus inanis* and *Juncus rigidus*. Some areas where permanent channel formation had taken place were almost completely dominated by the robust grass, *Miscanthus ecklonii*, along with *Pennisetum sphacelatum* and *Searsia pyroides*. Where these channelled systems were larger and approaching being more perennial in terms of water presence, there was increasing dominance by woody species, such as *Diospyros lycioides, Helichrysum trilineatum*, *Melianthus comosus, Lycium cinereum*, *Deverra burchellii*, *Asparagus laricinus* and *Diospyros austro-africana.*

A typical view of this more structurally developed habitat is shown in **Figure 22** below.

Figure 22: Typical drainage line habitat in the study area

The drainage areas are important habitat for animals, providing refuge and shelter, water, when it is available, palatable vegetation, when surrounding areas are in drought, and softer and deeper soils for burrowing animals. The habitat is also an important flood-attenuation component of the landscape, and a reservoir for soil water. If it occurs on-site, this is the habitat in which the protected Giant Bullfrog would be found.

Mountain stream

Strictly, this is part of the broad drainage area in the study area, which varies from broad, wide areas with no aquatic characteristics, to semi-permanent pools, but is discussed separately due to the fact that they are within the mountains and have different characteristics to other parts of the landscape. The mountain stream map unit occurs only in the eastern part of the study area in the mountains, and is part of a valley that eventually exits into a wider drainage valley, as described in the previous section. Within the mountains, the stream is contained by the surrounding rocky mountain slopes, has a rocky bed with sandy banks in places, and consists of permanent wetlands, aquatic habitats, rocky slabs and other micro-habitats.

A typical view is shown in **Figure 23** below.

Figure 23: Mountain stream habitat

The riparian areas have a species composition and structure that is almost completely different to the surrounding landscape. The habitat contains a combination of bare rock and deeper sands, so it is able to support a flora that is adapted to these substrate conditions, in addition to the sporadic flooding and scouring that takes place in these habitats as a result of rare large rainfall events. Although not necessarily floristically sensitive, the habitat that is derived under these ecological conditions is critically important for fauna, providing food and shelter as well as corridors for undetected movement. In times of drought, riparian areas may offer the only slightly green vegetation as a source of food. The deeper sands are important for burrowing animals and the shrubs and low trees offer shelter and browse.

Riparian habitats are disproportionately important in terms of the proportion of the area that they occupy in the landscape – they provide a unique and important habitat for both flora and fauna in this arid part of the country. The plant species occurring within these habitats are not necessarily rare in a global sense, but the degradation of this interconnected system can cause floristic loss and change in areas far removed from any impact. For this reason, and for the utilitarian importance to fauna, the riparian vegetation is considered to be ecologically sensitive. In addition, this is the habitat in which the Near Threatened and nationally protected Cape Clawless Otter is found on-site.

6.7.12 Habitat Sensitivity

To determine ecological sensitivity in the study area, local and regional factors were taken into account. There are some habitats in the study area that have been described as sensitive in their own right, irrespective of regional assessments. This includes the stream beds and associated riparian zones and adjacent floodplains primarily. A detailed assessment of these areas has been undertaken by an aquatic specialist and they are only considered here in terms of being an important habitat for flora and fauna. Mountain areas and steep slopes, especially at higher elevations are more sensitive than surrounding areas, mainly due to higher floristic diversity and the likelihood of plant species with low local abundance occurring there.

At a regional level, the CBA map for Northern Cape indicates various parts of the study area as being important for conservation. There are two (2) small patches of CBA1 in the eastern and western parts of the study area. it is speculated that these are the location of species of concern, although this is not confirmed from any other information and the assumption is therefore speculative. Most of the remainder of the study area is CBA2, indicating regional importance for the entire escarpment region in which the study area is located. It should be assumed that, over and above the designation of CBAs in other parts of the study area, all high-lying areas should be treated as ESAs. This coincides with the areas mapped as Mountain Vegetation.

In terms of other species of concern, including both plants and animals (with the exception of the Cape Clawless Otter that has already been discussed in the Terrestrial Ecology Impact Assessment Report), there are no specific locations where conservation of habitat would benefit a specific species based on the existing data available. All mammal species of concern and all protected plant species described in the Terrestrial Ecology Impact Assessment Report could occur on any part of the site, whether in the mountains or on the lowlands, although it is probable that low ridges and drainage areas are of more importance than plains areas.

A summary of sensitivities that occur on-site and that may be vulnerable to damage from the proposed development are as follows:

1. Drainage areas;
2. Mountain stream;
3. High-lying areas (i.e. mountain vegetation); and
4. CBA areas, especially CBA1.

The main habitat sensitivity classes on-site are as follows:

1. MEDIUM-LOW for lowland plains vegetation outside of CBAs. In the absence of CBAs, all lowland plains on-site would be within this sensitivity class;
2. MEDIUM for all rocky ridges and drainage areas outside of CBAs. In the absence of CBAs, all rocky ridges and drainage areas would be within this sensitivity class;
3. MEDIUM-HIGH for mountain areas outside of CBAs;
4. HIGH for CBA1 areas, and mountain areas surrounding aquatic habitat where the Cape Clawless Otter occurs. The aquatic habitat and surrounding mountain slopes would be within this sensitivity class in the absence of the CBA1 classification; and
5. VERY HIGH for aquatic habitat where the Cape Clawless Otter occurs and a buffer, also inside a CBA1 area.

6.8 Avifaunal

The Avifaunal Specialist Study was conducted by Chris van Rooyen. The Avifaunal Specialist Study Report is included as **Appendix 6B**. A desktop investigation was conducted to source information on the impacts of the proposed development on avifauna. A visit to the site and general area was conducted on 15 and 16 January 2019, followed up by on-site surveys from 17 - 19 January and 9 -12 May 2019. Surveys were conducted according to the best practice guidelines for avifaunal impact studies at solar developments, compiled by BirdLife South Africa (BLSA) in 2017 (Jenkins *et al.,* 2017). Refer to Appendix 1 of the Avifaunal Specialist Study Report for the methodology used in the surveys.

6.8.1 Baseline Assessment

6.8.1.1 Important Bird Areas

The Platberg-Karoo Conservancy Important Bird Area (IBA) SA037 is located approximately 3-4km north-west of the proposed power line corridors. The Platberg–Karoo Conservancy IBA covers the entire districts of De Aar, Philipstown and Hanover, including suburban towns. The landscape consists of extensive flat to gently undulating plains that are broken by dolerite hills and flat-topped inselbergs. The ephemeral Brak River flows in an arc from south-east to north-west, eventually feeding into the Orange River basin. Other ephemeral rivers include the Hondeblaf, Seekoei, Elandsfontein and Ongers rivers with a network of tributaries. Vanderkloof Dam is on the north-eastern boundary (Marnewick *et al.,* 2015).

This IBA is in the Nama Karoo and Grassland Biomes. The eastern Nama Karoo has the highest rainfall of all the Nama Karoo vegetation types and is thus ecotonal to grassland, with a complex mix of grass- and shrub-dominated vegetation types. Eight (8) broad vegetation types are present; seven (7) are Least Threatened and the Upper Gariep Alluvial Vegetation type is classified as Vulnerable (Marnewick *et al*., 2015).

The land is used primarily for grazing and agriculture. Commercial livestock farming is mostly extensive wool and mutton production, with some cattle and game farming. Less than 5% of this IBA is cultivated under dry-land or irrigated conditions and includes Lucerne and prickly pear (*Opuntia ficus-indica*) orchards (Marnewick *et al.*, 2015).

This IBA contributes significantly to the conservation of large terrestrial birds and raptors. These include Blue Crane (*Anthropoides paradiseus*), Ludwig's Bustard (*Neotis ludwigii*), Kori Bustard (*Ardeotis kori*), Blue Korhaan (*Eupodotis caerulescens*), Black Stork (*Ciconia nigra*), Secretarybird (*Sagittarius serpentarius*), Martial Eagle (*Polemaetus bellicosus*), Verreauxs' Eagle (*Aquila verreauxii*) and Tawny Eagle (*A. rapax*) (Marnewick *et al.*, 2015).

In summer, close to 10% of the global population of Lesser Kestrels (*Falco naumanni*) roost in this IBA. Amur Falcons (*F. amurensis*) are also abundant and forage and roost with Lesser Kestrels. This IBA is seasonally important for White Stork (*Ciconia ciconia*), with high numbers of this species recorded during outbreaks of brown locusts (*Locustana pardalina*) and armoured ground crickets (*Acanthoplus discoidalis*) (Marnewick *et al.*, 2015).

IBA trigger species are the globally threatened Blue Crane, Ludwig's Bustard, Kori Bustard, Secretarybird, Martial Eagle, Blue Korhaan, Black Harrier (*Circus maurus*) and Denham's Bustard

(*Neotis denhami*). Regionally threatened species are Black Stork, Lanner Falcon (*Falco biarmicus*), Tawny Eagle, Karoo Korhaan and Verreaux's' Eagle (Marnewick *et al*., 2015).

Biome-restricted species include Karoo Lark (*Calendulauda albescens*), Karoo Long-billed Lark (*Certhilauda subcoronata*), Karoo Chat (*Cercomela* schlegelii), Tractrac Chat (*C. tractrac*), Sickle-winged Chat (*C. sinuate*), Namaqua Warbler (*Phragmacia substriata*), Layard's Tit-Babbler (*Sylvia layardi*), Pale-winged Starling (*Onychognathus nabouroup*) and Black-headed Canary (*Serinus alario*). Congregatory species include Lesser Kestrel and Amur Falcon.

Due to the proximity of the IBA to the study area, it is possible that the proposed development could impact on some of the trigger species in the IBA. Far-ranging birds that move in and out of the IBA could be impacted, namely power line sensitive species such as Blue Crane, Ludwig's Bustard, Kori Bustard, Black Stork, Secretarybird, Martial Eagle, Verreaux's Eagle and Tawny Eagle, which could be at risk of electrocutions on and/or collisions with the proposed 132kV grid connection.

6.8.1.2 Habitat Classes

Vegetation structure, rather than the actual plant species, is more significant for bird species distribution and abundance (Harrison *et al.*, 1997). The description of the vegetation types occurring in the study area largely follows the classification system presented in the Atlas of southern African birds (SABAP1) (Harrison *et al*., 1997). The criteria used to amalgamate botanically defined vegetation units, or to keep them separate were (1) the existence of clear differences in vegetation structure, likely to be relevant to birds, and (2) the results of published community studies on bird/vegetation associations. It is important to note that no new vegetation unit boundaries were created, with use being made only of previously published data. The description of vegetation presented in this study therefore concentrates on factors relevant to the bird species present and is not an exhaustive list of plant species present.

Whilst the distribution and abundance of the priority bird species in the study area are closely tied to natural features e.g. vegetation structure and topography / relief, it is also necessary to examine external modifications to the environment that might have relevance for priority species. Anthropogenic avifaunal-relevant habitat modifications which could potentially influence the avifaunal community that were recorded in or close to the study area are dams and water reservoirs, high voltage transmission lines, agriculture, fences and alien trees. The habitat classes are discussed in more detail below.

The power line priority species associated with each habitat class are listed in **Table 14** below.

Table 14: Power line priority species potentially occurring at the site, conservation status, priority criteria, SABAP reporting rates, probability of occurrence, habitat use and potential impacts

Species	Taxonomic name	SABAP2 Average reporting rate: full protocol	Red Data status: International	Red Data status: Regional	Endemic - South Africa	Endemic - Southern Africa	Possibility of occurrence	Recorded during surveys	Grassy Karoo	Surface water	Alien trees	Cliffs	Power lines	Agriculture	Fences	Collisions	Displacement - disturbance	Displacement - habitat loss	Electrocution (substations)
Bustard, Ludwig's	*Neotis ludwigii*	25.67	EN	EN		Near-endemic	High	x	x					x		x	x		
Buzzard, Jackal	*Buteo rufofuscus*	22.22			Near endemic	Endemic	High	x	x	x	x	x	x	x	x	x	x		
Buzzard, Steppe	*Buteo vulpinus*	10.59					Medium		x	x	x		x	x	x	x	x		
Coot, Red-knobbed	*Fulica cristata*	14.41					Low			x						x			
Cormorant, Reed	*Phalacrocorax africanus*	13.49					Low			x						x			
Crane, Blue	*Anthropoides paradiseus*	73.41	VU	NT		Endemic	Low	x	x	x				x		x	x		
Crow, Pied	*Corvus albus*	88.89					High	x	x		x		x	x	x				x
Duck, African Black	*Anas sparsa*	8.33					Low			x						x			
Duck, Maccoa	*Oxyura maccoa*	1.59	NT	NT			Low			x						x			
Duck, White-faced	*Dendrocygna viduata*	2.78					Low			x						x			
Duck, Yellow-billed	*Anas undulata*	50.92					Low			x						x			
Eagle, Booted	*Aquila pennatus*	16.67					High	x	x	x	x	x	x			x	x		
Eagle, Martial	*Polemaetus bellicosus*	7.14	VU	EN			Medium		x	x	x		x	x		x	x		
Eagle, Verreaux's	*Aquila verreauxii*	18.26	LC	VU			High	x		x	x	x	x			x	x		
Eagle-owl, Spotted	*Bubo africanus*	12.43					High	x	x		x	x		x	x	x	x		
Egret, Great	*Egretta alba*	0.00					Low			x						x			

Species	Taxonomic name	SABAP2 Average reporting rate: full protocol	Red Data status: International	Red Data status: Regional	Endemic - South Africa	Endemic - Southern Africa	Possibility of occurrence	Recorded during surveys	Grassy Karoo	Surface water	Alien trees	Cliffs	Power lines	Agriculture	Fences	Collisions	Displacement - disturbance	Displacement - habitat loss	Electrocution (substations)
Falcon, Lanner	*Falco biarmicus*	2.78	LC	VU			Low		x	x	x	x	x	x	x	x	x		x
Falcon, Peregrine	*Falco peregrinus*	1.59					Low				x	x	x			x			
Fish-eagle, African	*Haliaeetus vocifer*	3.18					Low			x						x			
Flamingo, Greater	*Phoenicopterus ruber*	3.18	LC	NT			Low			x						x			
Goose, Egyptian	*Alopochen aegyptiacus*	77.78					High	x		x			x	x		x			x
Goose, Spur-winged	*Plectropterus gambensis*	34.79					High	x		x				x		x			
Goshawk, Southern Pale Chanting	*Melierax canorus*	34.66				Near-endemic	High	x	x	x	x		x	x	x	x	x		x
Grebe, Black-necked	*Podiceps nigricollis*	0.00					Low			x						x			
Grebe, Great Crested	*Podiceps cristatus*	1.59					Low			x						x			
Guineafowl, Helmeted	*Numida meleagris*	63.22					Low	x	x		x		x	x	x	x			x
Hamerkop	*Scopus umbretta*	1.86					Low			x	x	x				x			
Harrier, Black	*Circus maurus*	2.78	VU	EN	Near endemic	Endemic	Low		x	x					x	x			
Harrier-Hawk, African	*Polyboroides typus*	1.59					Low		x	x	x	x			x	x			x
Heron, Black-headed	*Ardea melanocephala*	17.33					Medium		x	x	x		x	x		x			
Heron, Grey	*Ardea cinerea*	23.93					Low			x						x			
Ibis, African Sacred	*Threskiornis aethiopicus*	20.23					Low			x						x			
Ibis, Hadeda	*Bostrychia hagedash*	51.46					Medium				x			x		x			x

Species	Taxonomic name	SABAP2 Average reporting rate: full protocol	Red Data status: International	Red Data status: Regional	Endemic - South Africa	Endemic - Southern Africa	Possibility of occurrence	Recorded during surveys	Grassy Karoo	Surface water	Alien trees	Cliffs	Power lines	Agriculture	Fences	Collisions	Displacement - disturbance	Displacement - habitat loss	Electrocution (substations)
Korhaan, Blue	*Eupodotis caerulescens*	56.34	NT	LC	Endemic (SA, Lesotho, Swaziland)	Endemic	High	x	x							x			
Korhaan, Karoo	*Eupodotis vigorsii*	13.10	LC	NT		Endemic	High	x	x							x			
Korhaan, Northern Black	*Afrotis afraoides*	74.21				Endemic	High	x	x							x			
Night-Heron, Black-crowned	*Nycticorax nycticorax*	0.00					Low			x									
Pochard, Southern	*Netta erythrophthalma*	1.59					Low			x						x			
Raven, White-necked	*Corvus albicollis*	19.18					Medium					x				x			x
Sandgrouse, Namaqua	*Pterocles namaqua*	34.52				Near-endemic	High	x	x	x				x		x			
Secretarybird	*Sagittarius serpentarius*	19.44	VU	VU			High	x	x	x						x			
Shelduck, South African	*Tadorna cana*	51.86				Endemic	Medium			x						x			
Shoveler, Cape	*Anas smithii*	7.14				Near-endemic	Low			x						x			
Snake-eagle, Black-chested	*Circaetus pectoralis*	1.86					High	x	x				x	x		x			
Spoonbill, African	*Platalea alba*	5.96					Low			x						x			
Stork, Black	*Ciconia nigra*	0.00	LC	VU			Low			x		x				x			
Stork, White	*Ciconia ciconia*	0.00					Medium		x	x				x		x			
Teal, Cape	*Anas capensis*	8.73					Low			x						x			
Teal, Red-billed	*Anas erythrorhyncha*	13.37					Low			x						x			

Species	Taxonomic name	SABAP2 Average reporting rate: full protocol	Red Data status: International	Red Data status: Regional	Endemic - South Africa	Endemic - Southern Africa	Possibility of occurrence	Recorded during surveys	Grassy Karoo	Surface water	Alien trees	Cliffs	Power lines	Agriculture	Fences	Collisions	Displacement - disturbance	Displacement - habitat loss	Electrocution (substations)
Vulture, Cape	*Gyps coprotheres*	2.78	EN	EN		Near-endemic	Low		x							x			x (power line)

- **Grassy Karoo**

The study area lies at the intersection between Nama Karoo and Grassland biomes (Mucina & Rutherford, 2006), described by Harrison *et al*., (1997) as Grassy Karoo. The dominant vegetation type in the study area is Eastern Upper Karoo, which occurs on the plains where all of the PV assessment areas are located, and is dominated by dwarf microphyllous shrubs, with 'white' grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). Rainfall occurs mainly in autumn and summer, peaking in March. The mean annual precipitation ranges from about 180mm to 430mm. Incidence of frost is relatively high. Mean maximum and minimum monthly temperatures in Middelburg (Grootfontein) are 36.1°C and –7.2°C for January and July, respectively (Mucina & Rutherford, 2006). Small sections of some of the proposed power line corridors are located in Besemkaree Koppies Shrubland, which occurs on slopes of koppies, butts and tafelbergs covered by two-layered karroid shrubland. The lower (closed-canopy) layer is dominated by dwarf small-leaved shrubs and, especially in precipitation-rich years, also by abundant grasses, while the upper (loose canopy) layer is dominated by tall shrubs (Mucina & Rutherford, 2006).

Figure 24: Example of Eastern Upper Karoo (Grassy Karoo) occurring on plains where the proposed development is located

Figure 25: Example of Besemkaree Koppies Shrubland which occurs on slopes

- **Surface Water**

Surface water is of specific importance to avifauna in this semi-arid environment. The study area contains many boreholes with open water troughs that provide drinking water to livestock. Open water troughs are important sources of surface water and could potentially be used extensively by various bird species, including large raptors, to drink and bath. There are also a number of dams and natural water bodies in the study area, which are located in drainage lines (see **Figure 26** below). The dams and water bodies were mostly dry when the surveys were conducted, but it could hold water after good rains, when it could be attractive to various bird species, including large raptors, to drink and bath. It could also serve as an attraction to water birds when it contains water.

Figure 26: A dam in study area

- **Cliffs**

The south-eastern part of the broader area contains several cliffs which is utilised by a number of cliff-nesting raptors for breeding, including Booted Eagle, Verreaux's Eagle (see **Figure 27** below) and possibly Jackal Buzzard. **Figure 28** below shows the location of known nests in the study area.

Figure 27: Verreaux's Eagle nest on a cliff in study area

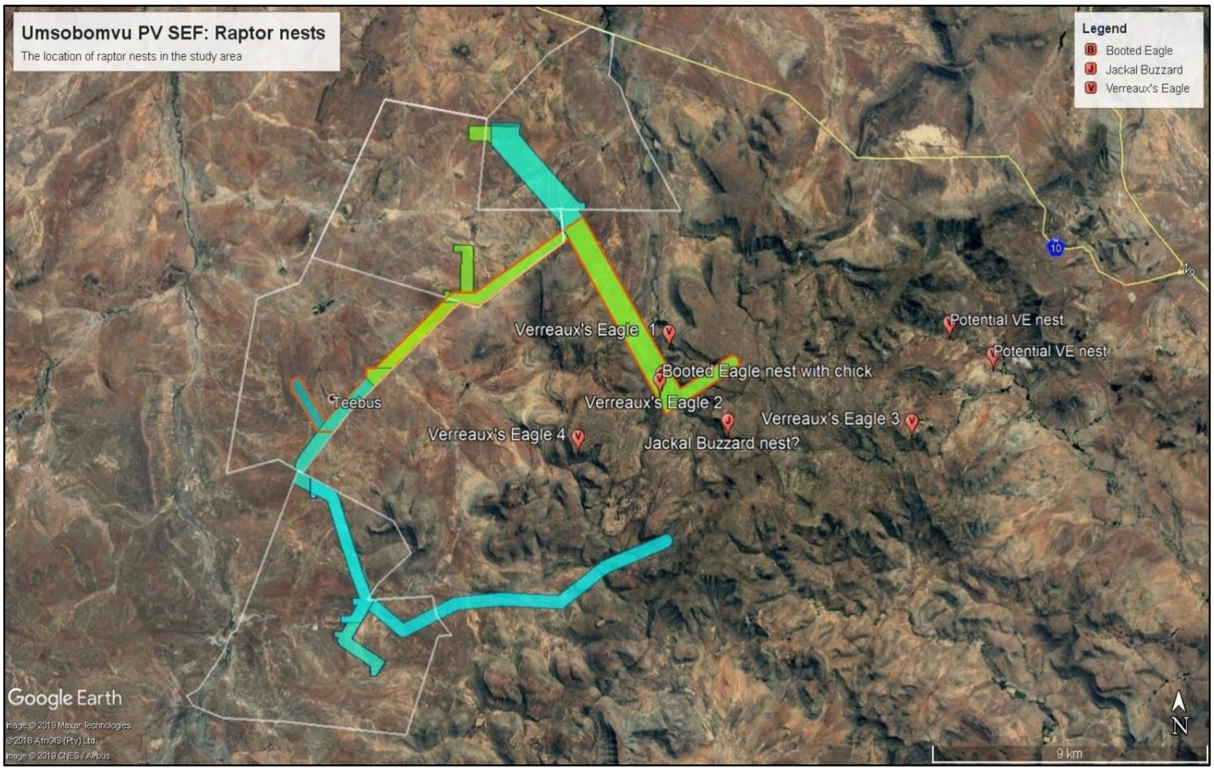

Figure 28: Location of raptor nests in study area

- **High Voltage Lines**

High voltage lines are an important roosting and breeding substrate for large raptors in the tree-less Karoo habitat (Jenkins *et al.*, 2006). There are two (2) 400kV transmission lines running through the study area, namely the Hydra-Poseidon 400kV 1 and 2 (see **Figure 29** below). No raptor nests were recorded on the transmission lines.

Figure 29: Hydra-Poseidon 400kV 1 high voltage line running through the study area

- **Fences**

The study area is fenced off into grazing camps (see **Figure 30** below). Farm fences provide important perching substrate for a wide range of birds in this treeless environment where natural perches are scarce, as a staging post for territorial displays by small birds and also for perch hunting for raptors such as Greater Kestrel, Rock Kestrel, Black-winged Kite and Southern pale Chanting Goshawk.

Figure 30: One (1) of many fences found within study area

- **Agriculture**

The study area contains a number of agricultural clearings and irrigated pivots (see **Figure 31** below). These areas may attract several solar and power line priority species, including Ludwig's Bustard, Blue Crane, Spurwing Goose, Egyptian Goose, Helmeted Guineafowl, White Stork and Blue Korhaan.

Figure 31: Irrigated fields in study area

- **Alien Trees**

Large indigenous trees are rare in the Karoo, therefore alien trees of the genus *Pinus*, *Populus* and *Eucalyptus* have been introduced in many areas, often around homesteads, but also at boreholes (see **Figure 32** below). In some places, these alien species have become an invasive threat in drainage lines. Many solar and power line priority species use alien trees for nesting and roosting.

Figure 32: Alien trees in study area

6.8.1.3 Avifauna

- **Southern African Bird Atlas 2**

The SABAP2 data indicate that a total of 185 bird species could potentially occur in the broader area – Appendix 2 of the Avifaunal Specialist Study Report provides a comprehensive list of all the species, including those recorded during the pre-construction monitoring. Of these, 78 species are classified as priority solar species, and 50 as power line priority species (see section 4 of Avifaunal Specialist Study Report for the definition of a priority species). The probability of a priority species occurring in the study area is indicated in **Table 14**.

Table 14 lists all the power line sensitive species and the possible impact on the respective species by the proposed power line infrastructure. The following abbreviations and acronyms are used:

EN = Endangered
VU = Vulnerable
NT = Near-threatened

- **Pre-Construction Surveys**

A visit to the study area was conducted on 15 and 16 January 2019, followed up by on-site surveys from 17 - 19 January and 9 – 12 May 2019. Surveys were conducted according to the best practice guidelines for avifaunal impact studies at solar developments, compiled by BirdLife South Africa (BLSA) in 2017 (Jenkins *et al.,* 2017). See Appendix 1 of the Avifaunal Specialist Study Report (**Appendix 6B**) for the methodology used in the surveys.

- **Priority Species Abundance**

The abundance of solar priority species (birds/km) recorded during the first of two (2) seasonal surveys are displayed in **Figure 33** below.

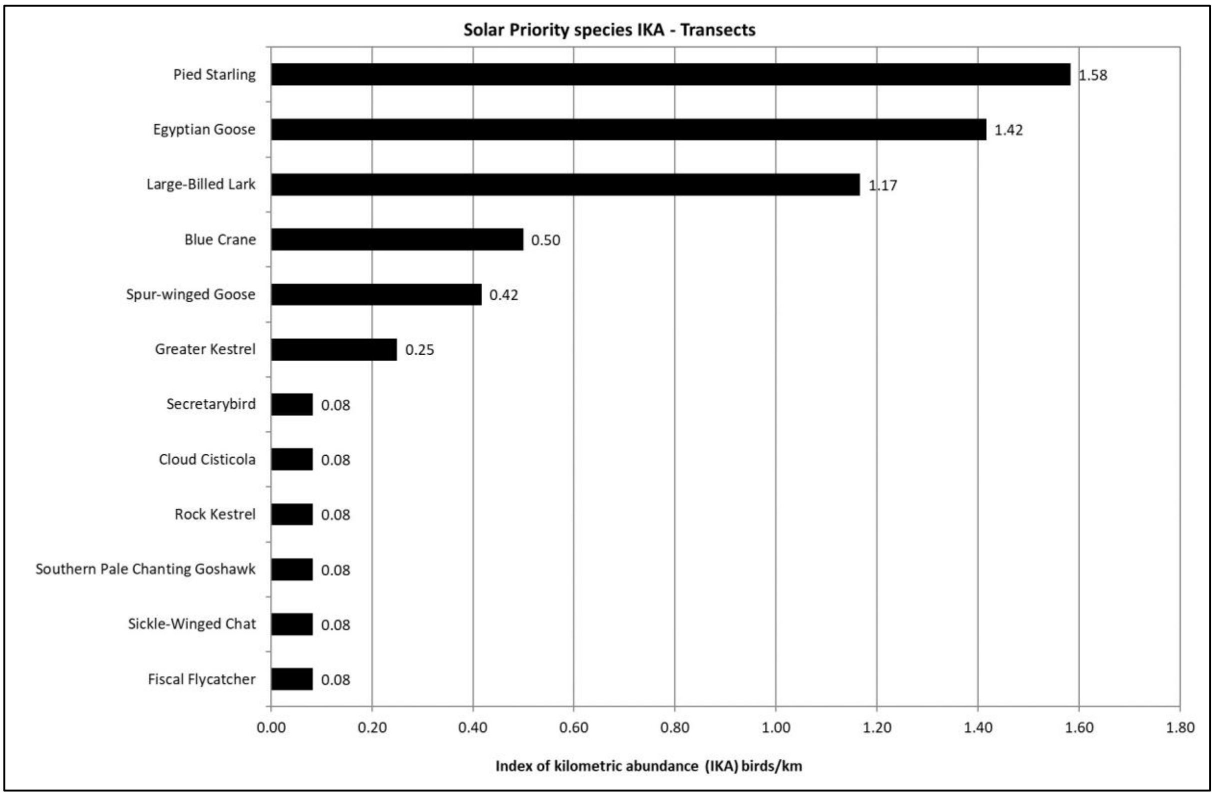

Figure 33: Abundance of solar priority species recorded during first round of surveys

- **Discussion**

The overall abundance of solar priority species at the site was moderate, with an average of 2.83 birds/km being recorded during the two (2) surveys. For all birds combined, the index of kilometric abundance (IKA) for summer was 15.85 birds/km, which is quite high. This indicates that the impact of human activities on the natural habitat has been limited.

6.9 Surface Water

The Surface Water Impact Assessment was conducted by Stephen Burton of SiVEST. The full Surface Water Impact Assessment Report is included in **Appendix 6G**. The Surface Water Impact Assessment has been externally reviewed by a suitably qualified external specialist (refer to **Table 2** in **section 1.4** of this report for details of specialist who undertook external review). The study commenced as a desktop assessment, followed by a site visit which was undertaken from the 5th to the 7th of February 2019.

The environmental baseline from a surface water perspective is presented below.

6.9.1 *Desktop Findings*

In terms of the Environmental Potential Atlas (ENPAT) (2002) national database, from a catchment perspective, the study site is located within the Orange Primary Catchment. More specifically, the study area is situated within the quaternary catchments D32C and D32B. The study site falls within the newly defined Water Management Areas (WMAs) of South Africa, as stated in Government Notice No. 1056 (16th of September 2016), within the Upper Orange WMA.

Three (3) rivers are shown within the study area according to the National Freshwater Ecosystem Priority Areas (NFEPA) (2011) database, while a number of small wetlands are shown to occur at points associated with farm dams. The closest main river, the Klein-Seekoei River, as contained in the NFEPA (2011) database, is approximately 3 700m west of the Mooi Plaats PV (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) study site. The site drains towards the Klein-Seekoei River to the West of the site. The topography of the site indicates the potential presence of watercourses running east to west, and north to south, across the site. Two (2) perennial rivers are present on the site. Both perennial rivers are tributaries of the Klein-Seekoei River, and both have a class C rating, meaning they are moderately modified. No other conservation sensitive areas were identified on the study site.

6.9.2 *In-Field Findings and Delineations*

The in-field wetland delineation assessment took place between the 5th and 7th of February 2019. Conditions were hot and sunny with partial cloud cover. The study site has historically been used for grazing by sheep, and most of the palatable plants have been selectively grazed out, with many of the remaining plants being poisonous for livestock. It was noted that the first decent rain (50mm) in a number of years had fallen just prior to the site visit, and as such, a number of inundated areas were present that would normally be dry.

The fieldwork ground-truthing, verification and delineation assessment was undertaken to scrutinise the results of the desktop assessment, as well as to identify any potentially overlooked wetlands and/or riparian habitat in the field within the study site (refer to Figure 7 in the Surface Water Impact Assessment Report for the delineation results).

The fieldwork investigation confirmed that there are a number of non-perennial drainage channels which can be found flowing through the study site in an east to west direction, and south to north direction. In addition, a number of tributaries of the Klein-Seekoei River flows from within the site to the actual Klein-Seekoei River, which runs adjacent to the western boundary of the study area.

Aside from the non-perennial watercourses, a number of man-made farm dams are present on the property, but many of these appear to have been dry for an extended period.

Overall from the above, the following water resources were identified in the field on the study site:

- A number of non-perennial watercourses without associated Riparian Habitat.
- A number of perennial watercourses with associated Riparian Habitat.

The biophysical characteristics and indicators of the above-mentioned water resources are provided in the Sub-sections below.

6.9.2.1 Non-Perennial Watercourses without Riparian Habitat

- **Topography Associated with a Watercourse**

The watercourses are shaped by a poorly to moderately developed channel which varies along the length of the watercourses within the study site. Some parts of the channel are better defined than other areas where the channel becomes more diffuse. For example, some of the mid-sections of the watercourse are well defined, whereas the lower reaches of the watercourses are much more diffuse. Overall, a macro-channel is present with a smaller defined active (when in flow) channel (**Figure 34**). The width of the macro-channel therefore varies. The macro-channel can be as little as 15m at the narrowest areas and up to 250m at the widest point on the study site.

Figure 34: Photo of typical channel structure. The Broad macro-channel section of watercourses is evident, but may have a number of smaller channels and flow paths within macro-channel

In terms of flow, as previously mentioned, the watercourses are non-perennial and flow from an east to west direction, or a south to north direction. The watercourse can be classified as an A-Section watercourse. The watercourse is above the zone of saturation, although relatively minimal soil depth (ranging from approximately 50mm to 600mm) along some sections of the active channel means that during the wet season, stormwater run-off / overland flow can be expected for a relatively brief period (hours to days). This is especially so where bedrock can be found extruding from the watercourses in the channel, as well as in eroded areas.

- **Alluvial Soils and Deposited Materials**

Deposited alluvial soils were clearly evident within the active channel as well as within the greater macro-channel bank (**Figure 35**). Sediments were sandy in texture ranging from fine to sandy sized grains. Detrital deposits were also observed in the form of leaves and small twigs.

Soil samples were taken where possible to determine whether soil wetness or wetland soil forms could be identified. Most areas were subject to soil augur restrictions due to the presence of exposed and/or deposited bedrock. Soils that have been deposited via wind or run-off from the surrounding area have however provided some substrate for which vegetation has established.

Soil samples that were taken showed no signs of mottling (which are typically associated with wetlands). The soils did not indicate hydromorphism which typically takes place in wetlands indicating that soil conditions are not favourable to wetland conditions.

Figure 35: Alluvial sand deposits within active channel of watercourses

- **Vegetation**

There are no riparian vegetation zones along any of the watercourses across the site (**Figure 36**). Of the vegetation species identified, none can be described as specifically hydrophytic. Presumably, this is a consequence of the semi-arid climate and other environmental constraints (including soil type and depth) limiting the study site.

Figure 36: There is no riparian vegetation associated with the Watercourses

6.9.2.2 Perennial Watercourses with Riparian Habitat

- **Topography Associated with a Watercourse**

The perennial watercourses are shaped by a well-developed channel which varies along the length of the watercourses within the study site. Most parts of the channel are well defined, with only a few areas where the channel becomes more diffuse (**Figure 37**).

Figure 37: Perennial Watercourses have well-defined channels

- **Vegetation**

There is a distinct riparian vegetation zone along the perennial watercourses on-site (**Figure 38**). Of the vegetation species identified, many can be described as specifically hydrophytic.

Figure 38: Perennial Watercourses have distinct riparian vegetation

6.9.3 Ecological Condition

6.9.3.1 Non-Perennial Watercourses without Riparian Habitat

Since no riparian or wetland habitat is present along the watercourses over most of the site, it is difficult to apply a quantitative assessment of the present ecological state of the systems. As such, the assessment is qualitative in nature, and appropriate reference conditions have been estimated from the level of disturbance that was obvious on the site.

- **<u>Present Ecological Condition</u>**

The results of the Present Ecological State assessment for the watercourses are as follows:

- Watercourse Ecological Condition – C Moderately Modified.

From the above, existing impacts are moderately affecting the current state of the watercourses. The factors affecting the various systems are explained below.

The area is semi-arid to arid, and the vegetation on-site should be dominated by a range of drought tolerant succulent species, with a limited graminoid component. Minimal encroachment of alien species was noted. Overgrazing impacts were extremely apparent along with associated onset of erosion due to animal movement and vegetation removal. Overall, cover was not high and the habitat could be described as open scrubland.

Overall the impacts identified to be affecting vegetation cover, abundance and composition includes overgrazing due to sheep, erosion due to sheep trampling and the excavation of the dams. Water quantity impacts are mainly indirect because of run-off impacts due to infrastructure (dirt roads, tar roads, rail etc.) and decreased vegetation cover due to overgrazing. Water quality impacts affecting the watercourse mainly relate to sedimentation originating from run-off from the surrounding areas and roads. In general, however, the sedimentation impacts are a relatively moderate factor affecting water quality (and geomorphology) which in turn contributes to the current perceived change in state.

6.9.3.2 Perennial Watercourse with Riparian Habitat

In order to apply the Vegetation Response Assessment Index (VEGRAI), it is essential to qualify the reference conditions (Kleynhans *et al.,* 2007). The reference conditions are essentially a determination of the state of the riparian habitat that is completely natural and unmodified / affected by existing impacts. When assessing the state of the riparian habitat, the habitat can be broken down into two components including, the marginal zone and non-marginal zone. The marginal zone includes the area from the water level at low flow, if present, to those features that are hydrologically activated for the greater part of the year (Kleynhans *et al.,* 2007). The non-marginal zone collectively includes the lower and upper zone. The lower zone extends from the marginal zone and ends where a marked increase occurs in lateral elevation, whilst the upper zone extends from the end of the lower zone to the end of the riparian corridor which is usually characterised by steeper slopes and the presence of both riparian and terrestrial vegetation species (Kleynhans *et al.*, 2007).

- **Present Ecological Condition**

The results of the VEGRAI assessment for the Klein-Seekoei River, and its tributaries, riparian habitat are as follows:

- Klein-Seekoei River, and tributaries, Riparian Habitat Ecological Condition – C Moderately Modified (67.5% of the reference condition).

From the above, existing impacts are moderately affecting the current state of the riparian habitats on-site. The factors affecting the various systems are explained below.

Currently the marginal zone appears to be in a graminoid dominated state. Few tree species were present in this zone. This contrasts with what the reference state would be. The reference state should ideally be tree dominated. Nonetheless, the graminoid cover was estimated at approximately 50%, whilst few sub-adult tree species were also observed making up approximately 30% of the vegetation cover. The remaining area directly in the channel was bare owing to scouring effect from flows. Extensive overgrazing, and recent frosts affected the percentage of cover observed during the assessment. Otherwise, minimal encroachment of alien species was noted. Overgrazing impacts were also apparent along with the associated onset of erosion due to animal movement and vegetation removal. Overall, cover was not high, and the habitat could be described as open grassland to open woodland.

The non-marginal zone generally contains a mixture of tree, shrub and graminoid species. The overall state of the non-marginal zone appears to be in transition to a graminoid dominated state. Like the marginal zone, the reference state should be tree dominated. As such, the degree of vegetation cover is somewhat reduced with less vegetation cover from tree species. Removal for firewood is also likely to contribute to decreased tree occurrence. Finally, overgrazing by cattle is similarly affecting general vegetation cover. It is estimated that tree cover percentage is approximately 30%, whilst herbaceous cover is approximately 20% and graminoid cover is approximately 45%. The remaining is bare soils. Abundance of vegetation in the general non-marginal zone was higher in species diversity, compared to adjacent areas. The moderately higher abundance owes mostly to the increased occurrence of tree and shrub species. Despite the increased tree and shrub occurrence, the current state differs from what should be a tree dominated state.

Overall the impacts identified to be affecting vegetation cover, abundance and composition include overgrazing due to sheep and cattle, removal of vegetation of firewood, and erosion due to animal trampling. Water quantity impacts are mainly indirect because of run-off impacts due to infrastructure (dirt roads) and decreased vegetation cover due to overgrazing. Water quality impacts affecting the watercourse mainly relate to sedimentation originating from run-off from the surrounding areas and roads. In general, however, the sedimentation impacts are a relatively moderate factor affecting water quality (and geomorphology) which in turn contributes to the current perceived change in state from a tree dominated reference state to a graminoid dominated current state.

6.9.4 *Ecological Importance and Sensitivity Categorisation*

The environmental importance and sensitivity of the watercourses was assessed. A detailed description and reasons for the scoring of the Ecological Importance and Sensitivity Categorisation (EISC) results are displayed in **Table 15** below.

Considering conditions on-site, a fair amount of disturbance has affected the study site. Despite this disturbance avifaunal species of conservation concern (Blue Cranes) were observed within the watercourses, riparian zones. The disturbance caused by sheep grazing may influence the potential occurrence of sensitive species. Nonetheless, this does not preclude the occurrence of protected species that were noted on site, and other species of conservation significance that may occur during other times of the year as seasonal fluctuations may also have a bearing on the potential occurrence.

Table 15: Environmental Importance and Sensitivity Category (EISC) for biotic and habitat determinants associated with identified watercourses, riparian zones

Determinant	Score	Confidence	Reason
Primary Determinants			
1. Rare & Endangered Species	3	2	No specific red data flora species of conservation importance associated with the watercourses were noted during the field assessment. There is a possibility that red data species may grow in the study area at different times

Determinant	Score	Confidence	Reason
Primary Determinants			
			of the year and were simply not noticed however during the field assessment.
2. Populations of Unique Species	3	2	No populations of unique species were observed during the site visit. However, Blue Cranes were noted to be feeding within the study sites. This elevates the importance and sensitivity of the watercourses.
3. Species/taxon Richness	2	2	Species and taxon richness was moderate in terms of vegetation species. Disturbance due to sheep grazing is an important factor deterring the possible occurrence of indigenous faunal species.
4. Diversity of Habitat Types or Features	2	3	The diversity of habitat types is relatively homogenous.
5. Migration route/breeding and feeding site for water-dependent species	3	3	The watercourses have small crossing points for access, which should therefore not act as barriers for species using the watercourses as migration route / breeding and feeding sites. In addition, the watercourses potentially act as a link between river systems.
6. Sensitivity to Changes in the Natural Hydrological Regime	2	3	The watercourses are highly sensitive to changes in the natural hydrological regime as little or no vegetation is present within the watercourses and they are sand based, thus leading to increased risk of erosion.
7. Sensitivity to Water Quality Changes	2	3	The watercourses are moderately sensitive to water quality changes, this is evident due to current sedimentation impacts within the affected watercourse.
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	2	3	One (1) of the main potential watercourse ecosystem services / functions provided is the ability to provide flood attenuation. The watercourses are therefore regarded as relatively significant in terms of the role it performs in the greater landscape.
Modifying Determinants			
9. Protected Status	3	4	Portions of the study site are classified as CBA areas required for conservation.
10. Ecological Integrity	2	4	The overall EC of the watercourses are classified as C - Moderately Modified.
TOTAL	24	29	
MEDIAN	2,4	2,9	

Determinant	Score	Confidence	Reason
Primary Determinants			
OVERALL ECOLOGICAL SENSITIVITY AND IMPORTANCE	**B**		

Given the presence of Blue Cranes within numerous watercourses and the riparian zones, the importance and sensitivity of the watercourse habitat is elevated.

Whilst the condition of the vegetation surrounding the watercourses identified on the study site is somewhat disturbed, the habitat is moderately intact and does not contain any highly sensitive species. The sensitivity is therefore reduced to a limited extent in this regard. However, the potential presence of conservation worthy species within the watercourses across the site leads to an increase in sensitivity.

Taking the above into account, as well as the EC and ecosystem services results, the EISC for the Watercourses, riparian zones and wetland was categorised as a Class B (High).

6.9.5 Ecological Buffer Zones

An adequate buffer zone is required that is suitable for the type of construction to be undertaken for the proposed development in provision of anticipated impacts. In consideration of this, limited clearance of vegetation will take place in the footprint of the internal roads and lay-down areas. Shallow excavations can also be expected for underground cabling and other services that will be required.

Potential impacts to be expected include construction disturbance, habitat edge effects, indirect increased run-off and consequent sedimentation and erosion impacts. These are identified as the main threats to the watercourse drivers (flow, water quality, geomorphology).

From an operation phase perspective, increased surface area characterised by hard impermeable structures (i.e. foundations, road infrastructure etc.) are expected to contribute to increased run-off rates. For the operation phase, a critical factor is the duration of potential impacts that may take place for the lifecycle of the proposed development. A consideration that was accordingly factored into the assessment. Accelerated flow resulting in increased run-off may pose an erosion and sedimentation risk to the watercourses given the shallow soil profile and characteristics of the study site. The increased flow rates are also likely to have flow alteration effects on the watercourses if not managed properly. Therefore, adequate protection of the watercourses will assist in minimising potential impacts downstream. With the implementation of mitigation measures, the identified potential impacts can be minimised.

It must be noted that the buffer zone has been determined bearing in mind that a number of mitigation measures have been proposed in **Table 21** in **section 7** to reduce the potential impact to the delineated watercourses. The buffer zones that were determined include the following:

- All watercourses and rivers Aquatic Buffer
  - Construction Phase Buffer: 15m; and
  - Operation Phase Buffer: 15m.

6.9.6 Risk Assessment

A risk assessment undertaken as per Government Notice 509 of 2016 (No. 40229) needs to consider the '*regulated area of a watercourse*'. The outer edge of the delineated riparian habitat in addition to the 1:100-year flood line delineation (whichever is greatest) have therefore been taken as the full '*extent of the watercourses*'.

Importantly, the regulated area of the watercourse has been regarded as an exclusion zone for the building components of the plant (operation and maintenance buildings etc.) and underground cabling infrastructure given the sensitivity of the features. The only component that will be within the extent of the watercourse will be the proposed access roads that will make use of existing crossing points to minimise potential increased disturbance.

Given the above, as it is assumed that the proposed development will not directly encroach on the extent of the watercourse, the completion of the risk assessment protocol matrix in terms of Government Notice 509 of 2016 (No. 40229) has been undertaken to show the low-risk values and to ascertain the applicability of a general authorisation process, if required.

The detailed results of the risk protocol assessment are provided in Appendix D of the Surface Water Impact Assessment Report (**Appendix 6G**).

Overall, the findings show that the risk of potential impacts on the watercourse was assessed to be in the LOW-risk class. Where risks were identified, a number of control measures have been stipulated which will assist in maintaining this low level of risk. In accordance with the implementation of control measures, all potential risks are classed as LOW. Importantly, only minor impacts will take place on the identified watercourses, and within the surrounding catchment. Therefore, registration for General Authorisation (GA) can be undertaken, where required and agreed with the Department of Water and Sanitation (DWS).

6.10 Agricultural and Soil

The Agricultural and Soils Impact Assessment was conducted by Johann Lanz. The full Agricultural and Soils Impact Assessment Report is included in **Appendix 6A**. It should be noted that a field investigation was not considered necessary. The assessment was based on a desktop analysis of existing soil and potential agricultural data and other data for the site, which is considered entirely adequate for a thorough assessment of all the agricultural impacts of the proposed development (refer to section 4.1 of Agricultural and Soils Impact Assessment Report for further explanation).

The environmental baseline from an agricultural and soils perspective is presented below.

6.10.1 Soils

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climatic conditions into different land types. The proposed development is located on predominantly two (2) similar land types, namely Da6 and Da77. Soils on these land types are fairly similar and are predominantly shallow, loamy sands on underlying rock or less commonly clay. Dominant soil forms are Swartland, Hutton, Mispah, and Valsrivier. The soils would fall into the Duplex and Lithic soil groups according to the classification of Fey (2010). A summary detailing soil data for the land types is provided in Table A1 in Appendix 1 of the Agricultural and Soils Impact Assessment Report.

6.10.2 Agricultural capability

Land capability is defined as the combination of soil, climate and terrain suitability factors for supporting rainfed agricultural production. It is an indication of what level and type of agricultural production can sustainably be achieved on any land. The higher land capability classes are suitable as arable land for the production of cultivated crops, while the lower suitability classes are only suitable as non-arable grazing land, or at the lowest extreme, not even suitable for grazing. In 2017 the Department of Agriculture, Forestry and Fisheries (DAFF) released updated and refined land capability mapping across the whole of South Africa. This has greatly improved the accuracy of the land capability rating for any particular piece of land anywhere in the country. The new land capability mapping divides land capability into 15 different categories with 1 being the lowest and 15 being the highest. Values of below 8 are generally not suitable for the production of cultivated crops. Detail of this land capability scale is shown in **Table 16** below.

The project area is classified with land capability evaluation values that range from 1 to 7, with 6 being the predominant land capability. The land capability is limited by the very low climatic moisture availability, the rugged terrain, and the shallow, rocky soils.

Table 16: Details of the 2017 Land Capability classification for South Africa

Land capability evaluation value	Description
1	Very Low
2	
3	Very Low to Low
4	

<table>
<tr><th>Land capability evaluation value</th><th>Description</th></tr>
<tr><td>5</td><td>Low</td></tr>
<tr><td>6</td><td rowspan="2">Low to Moderate</td></tr>
<tr><td>7</td></tr>
<tr><td>8</td><td>Moderate</td></tr>
<tr><td>9</td><td rowspan="2">Moderate to High</td></tr>
<tr><td>10</td></tr>
<tr><td>11</td><td>High</td></tr>
<tr><td>12</td><td rowspan="2">High to Very High</td></tr>
<tr><td>13</td></tr>
<tr><td>14</td><td rowspan="2">Very High</td></tr>
<tr><td>15</td></tr>
</table>

Due to the land capability constraints, agricultural land use is restricted to grazing only. The natural grazing capacity is given on Cape Farm Mapper as reasonable, at 16 to 17ha per large stock unit.

6.10.3 Land use and development on and surrounding the site

The area is a sheep farming area. The climate does not support any cultivation, except for small patches of irrigation associated with farm dams. Low-intensity natural grazing is the dominant agricultural activity. There are several farmsteads (that is a residential and administrative node of buildings and infrastructure from which a farm is managed) within the study area. There is often agricultural infrastructure, including some irrigation in the proximity of the farmsteads. The only agricultural infrastructure away from the small patches of cultivation, are wind pumps, stock watering points and fencing surrounding grazing camps.

6.10.4 Possible land use options for the site

The low climatic moisture availability means that natural grazing is the only viable agricultural land use for most of the area, except for the small patches of irrigation.

6.10.5 Agricultural sensitivity

Agricultural sensitivity is directly related to the capability of the land for agricultural production. This is because a negative impact on land of higher agricultural capability is more detrimental to agriculture than the same impact on land of low agricultural capability. A general assessment of agricultural sensitivity, in terms of loss of agricultural land in South Africa, considers arable land that can support viable production of cultivated crops, to have high sensitivity. This is because there is a scarcity of such land in South Africa, in terms of how much is required for food security. However, there is not a scarcity of land that is only suitable as grazing land in the country and such land is therefore not considered to have high agricultural sensitivity.

Agricultural sensitivity of a particular development is also a function of the severity of the impact which that type of development poses to agriculture. In the case of PV, fairly large areas of land are excluded from agricultural use, so in terms of that aspect, there is sensitivity.

The majority of the study area has low agricultural potential and therefore low agricultural sensitivity to development and consequent loss of agricultural land use. The only exception are the small patches of irrigation. These have a higher sensitivity, because of their agricultural value, and should be considered 'no-go' areas for any footprint of development that will exclude cultivation. 'No-go' areas require no buffers.

Apart from the cultivated 'no-go' areas, agricultural potential and conditions are very uniform across the rest of the study area and the choice of placement of facility infrastructure therefore has minimal influence on the significance of agricultural impacts.

6.11 Geotechnical

The Geotechnical Impact Assessment was conducted by Cecilia Canahai of JG Afrika (Pty) Ltd. The full Geotechnical Impact Assessment Report is included in Appendix 6C. The Geotechnical Impact Assessment was undertaken via a high-level desktop study.

The geotechnical characteristics present over the area in which the site is situated are presented below.

6.11.1 Geotechnical Characteristics and Potential Constraints

From the 1:250 000 Geology map, the following near surface conditions may be encountered on site:

6.11.1.1 Beaufort Group

The Beaufort Group, which forms part of the Karoo Supergroup, is represented by the Adelaide Subgroup across the site. The Adelaide Formation is comprised of mudstone with subordinate sandstone. The geotechnical characteristics of these rock types are discussed below.

- **Sandstone**

The sandstones of the Karoo Supergroup are closely intercalated with mudrock. The sandstones usually poorly sorted (often containing rock fragments) and have a matrix comprised of clay or iron oxide, and occasionally calcite.

Due to the local climatic conditions, mechanical disintegration is the predominant form of weathering. This typically results in the formation of a relatively thin residual soil mantle overlying the bedrock.

Brink (1983) highlights this variability in the Beaufort Group, where similarly aged thick quartz-rich (more resistant to weathering) sandstones are found adjacent to thin, poorly sorted sandstone.

Karoo Sandstone is also noted to have a non-uniform weathering pattern. Dense competent layers are sometimes underlain by less competent layers of lower consistency, therefore, founding conditions in feldspathic sandstones may not always improve with depth (Brink, 1983).

Slope instability may also be encountered in the Karoo sandstones. Brink (1983) notes four (4) main instability types, namely Disintegration of intercalated mudrock, Pore water pressures on intercalated siltstone, Erosion of underlying strata and Block and wedge failures. Slope instability will be assessed during the detailed site investigation; however, weathering and erosion of the intercalated mudstone and block / wedge failures are anticipated to be the primary instability types.

- **Mudrock**

The mudrocks of the Karoo Supergroup are known to break down upon exposure. The mechanisms of breakdown are still unclear, however, changes in temperature, humidity, moisture content and stress relief are believed to be possible causes. Three (3) main responses to the breakdown are highlighted by Brink (1983), namely very little break down of the rock, disintegration of the rock into pieces of various sizes and shapes and lastly, slaking into silt and clay-sized particles.

Brink (1983) also noted moisture content related volumetric changes in the Karoo mudrock. Fresh mudrock samples from the Beaufort group were observed to swell upon exposure to water. This property should be considered when founding any structures in or in close proximity to flood plains.

Slope instability may also be encountered in the Karoo mudrock. Brink (1983) highlight two (2) main types of instability, namely the movement of completely weathered / colluvial material and the sliding of rock on bedding planes. Although these instability events were predominantly noted in KwaZulu-Natal, care should be taken when working with cuttings and long / deep excavations. Mudrock is closely intercalated with sandstone. Undercutting of more weathering resistant sandstone may also occur, which could cause slope instability.

Due to the dry climate, a deep weathering profile / thick residual soils are not expected on site. Residual mudrock soils are also known to be potentially expansive and laboratory tests will need to be undertaken to confirm this.

- **Dolerite**

The Karoo Supergroup contains many Jurassic aged dolerite intrusions. The magma predominantly intruded into the weaker argillaceous horizons in the form of sills and occasionally dykes (Brink, 1983).

Fresh / solid dolerite typically forms boulder / fractured dolerite during the initial stages of weathering. Due to mechanical breakdown being the predominant form of weathering in this region, further weathering results in the formation of gravel and/or granular dolerite with sandy soils (Brink, 1983).

Founding conditions on residual dolerite are generally non-problematic in areas with a dry climate. Care should be taken in areas with calcrete, as calcrete powder has been noted to increase the Plasticity Index of the residual dolerite (Brink, 1983).

Dolerite boulders will cause difficult excavation conditions due to their size and scattered occurrences. Hard excavation conditions are also expected in areas with shallow bedrock. Additional site clearing may be required to remove boulders from potential development sites. Potentially unstable talus deposits formed from dolerite corestones may be encountered on slopes.

Weathered dolerite may be targeted for use during construction of internal roads etc. The identification of potential borrow pits and the usage of the dolerite for construction material will need to be confirmed during a more comprehensive site investigation with laboratory testing.

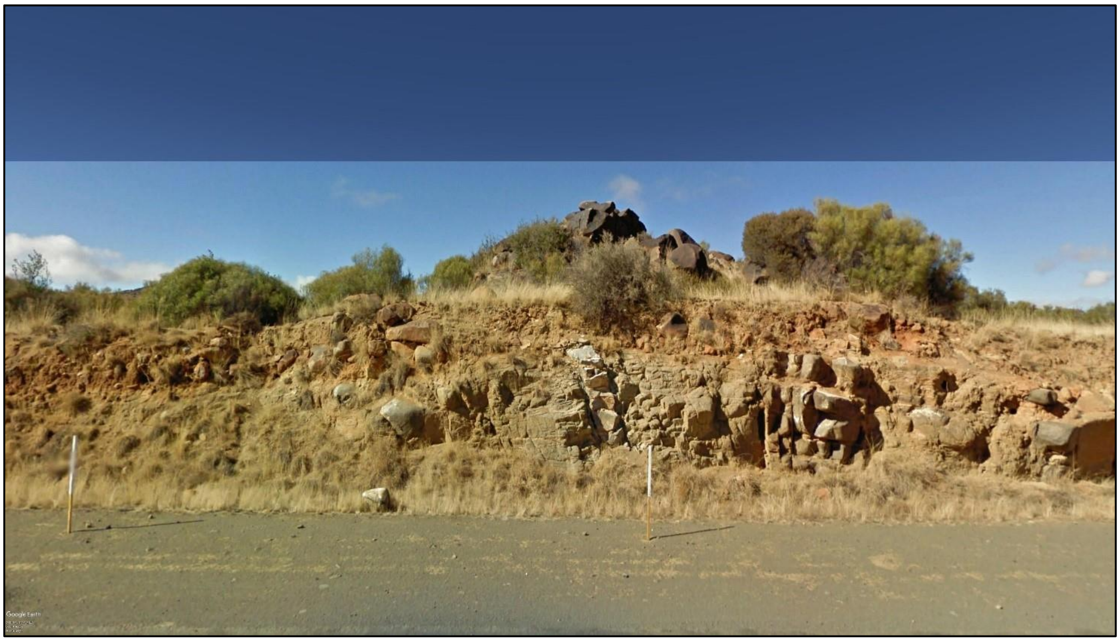

Figure 39: Dolerite weathering profile with corestones and surface boulders (N10 near Mooi Plaats site – Google Earth)

Figure 40: Dolerite profile with boulders on surface (N10 near Mooi Plaats site – Google Earth)

Figure 41: Dolerite Ridge with Boulders on surface (N10 near Mooi Plaats site – Google Earth)

- **Quarternary Deposits**

Alluvium / Colluvium / Talus

Alluvial deposits are created when sediments are transported and deposited by water. Alluvial deposits may be quite thick, variable in composition and be prone to settlement.

Colluvial deposits are created when sediments are transported and deposited by gravity. As mentioned above, talus deposits are a type of colluvial deposits that accumulate on talus element of slopes. Talus deposits generally occur where there are steep slopes below a stronger caprock. The caprock on this site is expected to be dolerite and/or sandstone. Talus deposits accumulate at their natural angle of repose and the upper part of talus slopes have a factor of safety that is close to 1.0. Due to weathering and colluvial action, talus deposits are generally poorly sorted, with large / coarse particles occurring with a finer matrix. The finer matrix has less strength than the surrounding unweathered rock fragments / debris, therefore the properties of this matrix influence the stability of the slope. With time, deterioration and weathering of the talus deposits results in instability. In addition to potential slope instability, difficult excavation conditions may be expected due to the large unweathered boulders.

Calcrete
According to the geology map, calcrete underlies a small portion of the proposed grid options.

Calcrete is a deposit formed when soils have been cemented and/or replaced by carbonates. Calcretes are either formed by percolating groundwater or by pedogenic methods. Calcrete deposits may have thicknesses of over 30m, however they are usually not continuous over depths exceeding 1 – 2m (Brink, 1979).

Caution should be exercised when founding heavy structures on pedocretes (calcrete) as hard calcrete layers may be underlain by less competent material. Calcretes may also be laterally discontinuous over short distances (in occurrence, composition and degree of development / cementation).

Brink (1979) notes that a collapsible fabric has been suspected in some powder and nodular calcrete and cemented soils. Small scale karst structures and evidence of small sinkholes have also been observed in weathered calcretes.

Hard excavation conditions are expected in well developed, cemented, calcretes.

Calcrete may be used for wearing course and all layers within the road prism for unpaved roads.

6.12 Visual

The Visual Assessment (VIA) was conducted by Kerry Schwartz of SiVEST. The full VIA Report is included in **Appendix 6I**. The VIA has been externally reviewed by a suitably qualified external specialist (refer to **Table 2** in **section 1.4** of this report for details of specialist who undertook external review). The VIA has been based on a desktop-level assessment supported by field-based observation. Fieldwork involved a four (4) day site visit was undertaken between the 4^{th} and the 7^{th} of February 2019 (mid to late summer).

The environmental baseline from a visual perspective and the physical and land-use related characteristics are outlined below as they are important factors contributing to the visual character of the study area. Defining the visual character of an area is an important factor in the assessment of visual impacts as it establishes the visual baseline or existing visual environment in which the development would be constructed. The visual impact of a development is measured by establishing the degree to which the development would contrast with, or conform to, the visual character of the surrounding area. The inherent sensitivity of the area to visual impacts or visual sensitivity is thereafter determined, based on the visual character, the economic importance of the scenic quality of the area, inherent cultural value of the area and the presence of visual receptors.

6.12.1 Topography

Areas of flat relief, including the flat plains and the higher-lying plateaus, are characterised by wide-ranging vistas (**Figure 42**), although views eastwards will be somewhat constrained by the hilly terrain in the western sector of the study area (**Figure 43**). In the hillier and higher-lying terrain, the vistas will depend on the position of the viewer. Viewers located within some of the more incised valleys for example, would have limited vistas, whereas a much wider vista would be experienced by viewers on higher-lying ridge tops or slopes. Importantly in the context of this study, the same is true of objects placed at different elevations and within different landscape settings. Objects placed on high-elevation slopes or ridge tops would be highly visible, while those placed in valleys or enclosed plateaus would be far less visible.

With little to no topographic shielding, the steel structures of the proposed substations at a maximum height of 25m are likely to be visible from many of the locally occurring receptor locations.

Maps showing the topography and slopes within and in the immediate vicinity of the proposed development are provided in **Figure 12** and **Figure 13** respectively (**section 6.3**).

Figure 42: View northwards across the study showing area wide-ranging vistas

Figure 43: Hilly terrain constraining views east and south-east

6.12.2 Vegetation

As discussed in **section 6.7**, vegetation cover across the study area is predominantly short and sparse and thus will not provide any visual screening. In some instances, however, tall exotic trees planted around farmhouses will restrict views from receptor locations (**Figure 44**).

Figure 44: Screening vegetation around farmhouses

6.12.3 Land Use

Sparse human habitation and the predominance of natural vegetation cover across much of the study area would give the viewer the general impression of a largely natural setting with some pastoral elements. In addition, there are no towns or settlements in the study area and thus, there are very low levels of human transformation and visual degradation across much of the study area.

The short, scrubby or grassy vegetation that occurs over the entire study area offers no visual screening in itself, and thus terrain / topography is the most important factor in limiting vistas. Exceptions to this situation occur at some local farmsteads where trees and shrubs have been established around the farmstead, providing effective screening from the surrounding areas.

The influence of the level of human transformation on the visual character of the area is described in more detail below.

6.12.4 Visual Character and Cultural Value

The above physical and land use-related characteristics of the study area contribute to its overall visual character. Visual character largely depends on the level of change or transformation from a natural baseline in which there is little evidence of human transformation of the landscape. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial landscape being at the opposite end of the scale to a largely natural undisturbed landscape. Visual character is also influenced by the presence of built infrastructure such as buildings, roads and other objects such as telephone or electrical infrastructure. The visual character of an area largely determines the sense of place relevant to the area. This is the unique quality or character of a place, whether natural, rural or urban which results in a uniqueness, distinctiveness or strong identity.

As mentioned, much of the study area is characterised by natural landscapes with some pastoral elements and low densities of human settlement. Livestock grazing is the dominant land use. These activities have not transformed the natural landscape to any significant degree and as such a large portion of the study area has retained its natural character and is dominated by largely natural views.

There are no towns or built-up areas in the study area influencing the overall visual character and thus there are very low levels of human transformation and visual degradation across much of the study area. Built form is largely dominated by isolated farmsteads, gravel access roads, telephone lines, low voltage power lines, fences and windmills, although the N10 national route and existing high voltage power lines form significant anthropogenic elements in the study area. The presence of this infrastructure is an important factor in this context, as the introduction of a development such as a SEF would result in less visual contrast where other anthropogenic elements are already present, especially where the scale of those elements is similar to that of the proposed development.

The greater area surrounding the development site is an important component when assessing visual character. The area can be considered to be typical of a Karoo or ‘platteland’ landscape that would characteristically be encountered across the high-lying dry western and central interior of South Africa. Much of South Africa’s dry Karoo interior consists of wide open, uninhabited spaces sparsely punctuated by scattered farmsteads and small towns. Over the last couple of decades an increasing number of tourism routes have been established in the Karoo and in a context of increasing urbanisation in South Africa’s major centres, the Karoo is being marketed as an undisturbed getaway. Examples of this may be found in the ‘*Getaway Guide to Karoo, Namaqualand and Kalahari*’ (Moseley and Naude-Moseley, 2008).

The typical Karoo landscape can be considered a valuable ‘cultural landscape’ in the South African context. Although the cultural landscape concept is relatively new, it is becoming an increasingly important concept in terms of the preservation and management of rural and urban settings across the world (Breedlove, 2002).

Cultural Landscapes can fall into three (3) categories (according to the Committee's Operational Guidelines):

- ‘*a landscape designed and created intentionally by man*’;
- an ‘*organically evolved landscape’* which may be a ‘*relict (or fossil) landscape*’ or a ‘*continuing landscape*’; and
- an ‘*associative cultural landscape*’ which may be valued because of the ‘*religious, artistic or cultural associations of the natural element*’.

The typical Karoo landscape consisting of wide-open plains, and isolated relief, interspersed with isolated farmsteads, windmills and stock holding pens, is an important part of the cultural matrix of the South African environment. The Karoo farmstead is also a representation of how the harsh arid nature of the environment in this part of the country has shaped the predominant land use and economic activity practised in the area, as well as the patterns of human habitation and interaction. The presence of small towns, such as Noupoort, engulfed by an otherwise rural, almost barren environment, form an integral part of the wider Karoo landscape. As such, the Karoo landscape as it exists today has value as a cultural landscape in the South African context. In terms of the types of cultural landscape listed above, the Karoo cultural landscape would fall into the second category, that of an organically evolved, 'continuing' landscape.

In light of this, it is important to assess whether the introduction of grid connection infrastructure into the study area would be a degrading factor in the context of the natural Karoo character of the landscape. However, considering the fact that a number of SEFs and WEFs have been developed or are likely to be developed across the Karoo, it is possible that renewable energy facilities may in the future become an integral part of the typical Karoo cultural landscape.

In this instance, visual impacts on the cultural landscape would be reduced by the fact that the area is relatively remote and there are relatively few tourism or nature-based leisure facilities in the study area. In addition, although the northern portion of the proposed Mooi Plaats PV (part of separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/11343) application is visible from the N10 national route, the section of this route that traverses the study area does not form part of a designated tourism route and is not expected to experience heavy volumes of tourist traffic.

6.12.5 Visual Sensitivity

Visual sensitivity can be defined as the inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (i.e. topography, landform and land cover), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development (Oberholzer, 2005). A viewer's perception is usually based on the perceived aesthetic appeal of an area and on the presence of economic activities (such as recreational tourism) which may be based on this aesthetic appeal.

In order to assess the visual sensitivity of the area, SiVEST has developed a matrix based on the characteristics of the receiving environment which, according to the Guidelines for Involving Visual and Aesthetic Specialists in the EIA Processes, indicate that visibility and aesthetics are likely to be 'key issues' (Oberholzer, 2005).

Based on the criteria in the matrix (**Table 17**), the visual sensitivity of the area is broken up into a number of categories, as described below:

i) **High -** The introduction of a new development would be likely to be perceived negatively by receptors in this area; it would be considered to be a visual intrusion and may elicit opposition from these receptors.

ii) **Moderate –** Receptors are present, but due to the nature of the existing visual character of the area and likely value judgements of receptors, there would be limited negative perception towards the new development as a source of visual impact.

iii) **Low -** The introduction of a new development would not be perceived to be negative, there would be little opposition or negative perception towards it.

The table below outlines the factors used to rate the visual sensitivity of the study area. The ratings are specific to the visual context of the receiving environment within the study area.

Table 17: Environmental factors used to define visual sensitivity of study area

FACTORS	DESCRIPTION	RATING									
		1	2	3	4	5	6	7	8	9	10
Pristine / natural / scenic character of the environment	Study area is largely natural with areas of scenic value and some pastoral elements.										
Presence of sensitive visual receptors	Relatively few sensitive receptors have been identified in the study area.										
Aesthetic sense of place / visual character	Visual character is typical of Karoo Cultural landscape.										
Irreplaceability / uniqueness / scarcity value	Although there are areas of scenic value within the study area, these are not rated as highly unique.										
Cultural or symbolic meaning	Much of the area is typical of a Karoo Cultural landscape.										
Protected / conservation areas in the study area	No protected or conservation areas were identified in the study area.										
Sites of special interest present in the study area	No sites of special interest were identified in the study area.										
Economic dependency on scenic quality	Few tourism/leisure based facilities in the area										
International / regional / local status of the environment	Study area is typical of Karoo landscapes										
**Scenic quality under threat / at risk of change	Introduction of an SEF will alter the visual character and sense of place. In addition, the development of other renewable energy facilities in the broader area as planned will introduce an increasingly industrial character, giving rise to significant cumulative impacts										

**Any rating above '5' for this specific aspect will trigger the need to undertake an assessment of cumulative visual impacts.

Low				Moderate				High	
10	20	30	40	50	60	70	80	90	100

Based on the above factors, the total score for the study area is 42, which according to the scale above, would result in the area being rated as having a low to moderate visual sensitivity. It should be stressed however that the concept of visual sensitivity has been utilised indicatively to provide a broad-scale indication of whether the landscape is likely to be sensitive to visual impacts, and is based on the physical characteristics of the study area, economic activities and land use that predominates. An important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs.

No formal protected areas were identified in the study area, and only one (1) tourism facility was identified. In addition, relatively few sensitive or potentially sensitive receptors were found to be present.

6.12.6 Visual Absorption Capacity

Visual absorption capacity is the ability of the landscape to absorb a new development without any significant change in the visual character and quality of the landscape. The level of absorption capacity is largely based on the physical characteristics of the landscape (topography and vegetation cover) and the level of transformation present in the landscape.

The relatively flat topography in the study area and the relative lack of vegetation to provide screening would reduce the visual absorption capacity across much of the area. This would be offset to some degree where the landscape has already undergone significant transformation as a result of the N10 national route and the 400kV power lines, thus increasing the overall visual absorption capacity of the landscape.

Visual absorption capacity in the study area is therefore rated as low to moderate.

6.12.7 Sensitive Visual Receptors

A sensitive visual receptor location is defined as a location from where receptors would potentially be impacted by a proposed development. Adverse impacts often arise where a new development is seen as an intrusion which alters the visual character of the area and affects the 'sense of place'. The degree of visual impact experienced will however vary from one receptor to another, as it is largely based on the viewer's perception.

A distinction must be made between a receptor location and a sensitive receptor location. A receptor location is a site from where the proposed development may be visible, but the receptor may not necessarily be adversely affected by any visual intrusion associated with the development. Less sensitive receptor locations include locations of commercial activities and certain movement corridors, such as roads that are not tourism routes. More sensitive receptor locations typically include sites that are likely to be adversely affected by the visual intrusion of the proposed development. They include tourism facilities, scenic sites and residential dwellings in natural settings.

The identification of sensitive receptors is typically based on a number of factors which include:

- the visual character of the area, especially taking into account visually scenic areas and areas of visual sensitivity;
- the presence of leisure-based (especially nature-based) tourism in an area;
- the presence of sites or routes that are valued for their scenic quality and sense of place;
- the presence of homesteads / farmsteads in a largely natural setting where the development may influence the typical character of their views; and
- feedback from interested and affected parties, as raised during the public participation process conducted as part of the study.

As the visibility of the development would diminish exponentially over distance (refer to section 2.4 of VIA Report), receptor locations which are closer to the power line corridor would experience greater adverse visual impacts than those located further away. During the project, zones of visual impact for each of the grid connection infrastructure were delineated based on distance bands measured from the outer boundary of each power line corridor. These zones were refined to reflect distance bands measured from the amended power line corridors.

The degree of visual impact experienced will however vary from one (1) inhabitant to another, as it is largely based on the viewer's perception. Factors influencing the degree of visual impact experienced by the viewer include the following:

- Value placed by the viewer on the natural scenic characteristics of the area;
- The viewer's sentiments toward the proposed structures. These may be positive (a symbol of progression toward a less polluted future) or negative (foreign objects degrading the natural landscape); and
- Degree to which the viewer will accept a change in the typical Karoo character of the surrounding area.

6.12.7.1 Receptor Identification

Preliminary desktop assessment of the study area identified 34 potentially sensitive visual receptor locations, most of which appear to be existing farmsteads or farmhouses. These dwellings are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although sentiments toward the proposed development are unknown.

This assessment was refined according to the findings of the field visit conducted in February 2019 and eight (8) of the identified locations were removed from the list of potentially sensitive receptors. Some of these eight (8) locations were found to be abandoned dwellings while others were identified as structures not considered to be visual receptors. As previously mentioned, due to access limitations during the time of the field investigation, it was not possible to fully investigate all of the identified potentially sensitive visual receptor locations from a visual perspective. Notwithstanding this limitation, these receptor locations were still regarded as being potentially sensitive to the visual impacts associated with the proposed development and were assessed as part of the VIA, via desktop means where required.

Three (3) of the identified receptor locations were confirmed to be sensitive receptors, as they are linked to leisure or nature-based activities within the study area. These three (3) receptors are all component facilities of Transkaroo Adventures, a nature based tourism undertaking providing secluded accommodation facilities, hiking trails and 4 x 4 routes in the scenic eastern sector of the assessment area.

In many cases, roads along which people travel, are regarded as sensitive receptors. The primary thoroughfare in the study area is the N10 national route which links Port Elizabeth on the Eastern Cape coast with Upington and the Namibian border to the west. In the local context, the N10 is the primary access route to Hanover and the N1 to the north-west and also to the N9 in the east which links Noupoort and Middelburg.

Thus, although the section of the N10 traversing the study area does not form part of a designated tourism route, it is possible that the road is utilised, to some extent, for its tourism potential and as a result it is considered to be a potentially sensitive receptor road (i.e. a road being used by motorists who may object to the potential visual intrusion of the proposed development).

Other thoroughfares in the study area are primarily used as local access roads and do not form part of any scenic tourist routes. These roads are not specifically valued or utilised for their scenic or tourism potential and are therefore not regarded as visually sensitive.

A total of fourteen (14) potentially sensitive receptors were found to be within 5km of the amended grid connection infrastructure. In this instance, three (3) of the receptor locations, namely SR1, SR2 and SR3, are considered to be sensitive receptors as they are linked to leisure or nature-based activities, while the remaining eleven (11) receptors are regarded as potentially sensitive visual receptors. These receptor locations are indicated in **Figure 45** below.

Sections of the N10 receptor road are within 5km of the proposed grid connection infrastructure.

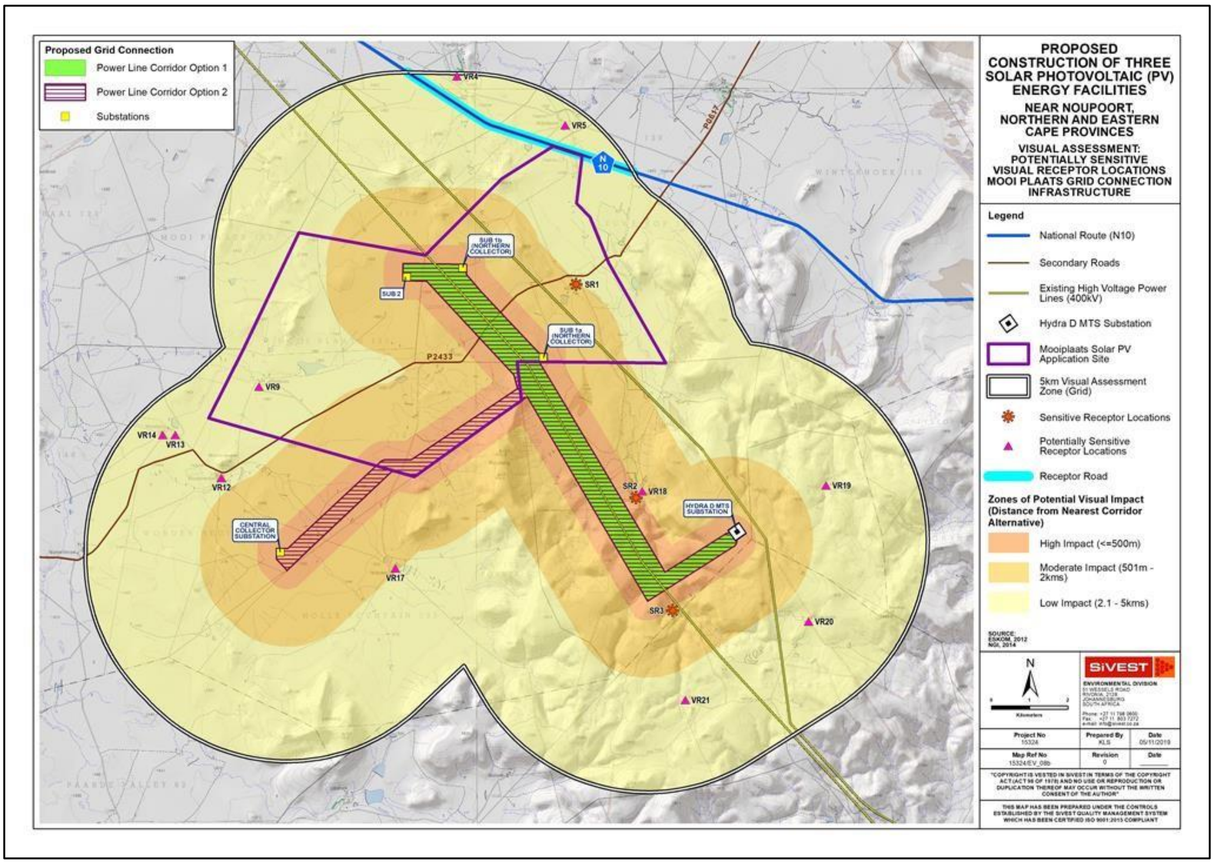

Figure 45: Potentially sensitive receptor locations within 5km of grid connection infrastructure

6.13 Heritage

The Heritage Impact Assessment (HIA) was conducted by Wouter Fourie of PGS Heritage (Pty) Ltd. The full HIA Report is included in **Appendix 6D**. Due to the prohibitive size of the application area, it was agreed that fieldwork related to the heritage assessment will only be done when the footprint areas had been determined and significantly reduced, based on environmental sensitive areas determined by the other specialists.

The HIA thus commenced as a desktop assessment, followed by fieldwork which was subsequently undertaken from the 26th – 30th of August 2019. A physical survey was conducted on foot and by vehicle through the proposed project area by two (2) qualified archaeologists and two (2) field assistants, which aimed at locating and documenting sites falling within and adjacent to the proposed development footprint. The results of the fieldwork have been incorporated into this DBAR, as well as the updated HIA Report.

The environmental baseline from a heritage perspective is presented below.

6.13.1 Previous Studies

Researching the SAHRA Archaeology, Palaeontology and Meteorites (APM) Report Mapping Project records and the SAHRIS online database (http://www.sahra.org.za/sahris), it was determined that a number of other archaeological or historical studies have been performed within the wider vicinity of the study area. Previous studies listed for the area in the APM Report Mapping Project included a number of surveys within the area listed in chronological order below:

- Binneman, Booth & Higgitt (2010). A phase 1 Archaeological Impact Assessment (AIA) for the proposed Skietkuil quarries 1 and 2 on the farm Skietkuil no. 3, Victoria West, central Karoo District, Western Cape Province ≈20 kms SW of study area. This study located stone artefacts as well as a lower grind stone, ceramics as well as kraals.
- Booth (2011) A phase 1 archaeological impact assessment (AIA) for the proposed Kleinfontein solar energy facility on the farm Kleinfontein, portion 4 of 167, situated near Noupoort, Northern Cape Province ≈130 kms E from study area. Isolated occurrences of very weathered and patinated Middle Stone Age (MSA) stone artefacts were observed within the proposed area.
- Booth, 2011 (b) A phase 1 Archaeological Impact Assessment (AIA) for the proposed solar facility on the farm Toitdale, portion 1 of 167, situated near Noupoort, Northern Cape Province ≈ 130 kms from the study area. MSA scatters.
- Fourie (2010) Phase 2 Heritage Impact Assessment for the Gamma-Kappa 765kV Transmission line. Various heritage resources were identified including rock engravings 5km south of the Kappa substation.
- Fourie (2016) Basic Assessment for the proposed construction of supporting electrical infrastructure for the Victoria West wind farm, Victoria West, Northern Cape Province ≈Kim form the study area. A MSA scatter was located as well as a colonial structure / farmstead.
- Hart (2015) Heritage Impact Assessment for the proposed Umsinde Emoyeni wind energy facility. ≈40 kms from study area. This study located ESA, MSA and LSA scatters, ceramics, rock paintings and rock engravings pre-colonial kraals and historic buildings and graves.
- Halkett & Webley (2011) Heritage Impact Assessment: proposed Victoria West mini renewable energy facility on the farm Bultfontein 217, northern cape province. ≈30 kms W of the study area. The author found a wide scatter of stone artefactual material including some concentrations, which suggest spatial integrity. Most of the material observed can be ascribed to the Middle Stone Age (MSA).
- Morris (2012) Wildebeest Vlakte Karoo PV solar energy project. Specialist input for the Environmental Impact Assessment for the proposed Wildebeest Vakte Karoo PV solar energy project, Richmond registration division, Northern Cape Province ≈30 kms NW of the study area. Small scatter of MSA artefacts were located as well as two (2) colonial structures of interest, a ruin of a stone dwelling with included ash heap containing porcelain and a small dry stone fortification, part of a blockhouse line developed to defend the railway during the Anglo Boer war.
- Murimbika (2014) Proposed Gamma-Kappa 2nd 765kv Eskom Transmission Power line and Substations Upgrade Development in Western Cape, Phase 1 heritage impact assessment study. This study runs west of the study area through Victoria West. Findings include ESA, MSA and LSA scatters.
- Van Schalkwyk & Wahl (2007). Heritage Impact Assessment of the Gamma Grassridge Power lines and substation, Eastern, Western, and Northern Cape Provinces South Africa. Numerous

heritage resources were identified, including buildings and structures; a historical settlement; the landscape of the Camdeboo Karoo and the Springbokvlakte, archaeological sites, graves and traditional building techniques.

6.13.2 Findings from the studies

The aim of a desktop study is to create a compendium of the heritage resources in a selected area. These processes provide a good indication of the type of heritage sites to be expected in the area of concern. The area of concern in this case is between Victoria West and Richmond in the upper Karoo area of the Northern Cape, South Africa.

Sources of data include scientific literature on the topic, scientific journals and previous heritage reports that have been conducted in the surrounding area.

People have occupied the Karoo for hundreds of thousands of years (Hart, 2015). This information is borne out by solid scientific studies by researchers both local and international that have worked in the central interior of the country since the early years of the 20th century. Virtually the entire full range of material evidence of human evolution is manifested in the archaeological sites of this area (Hart, 2015).

The available data indicates that heritage resources are varied and widely distributed throughout the general vicinity. The heritage features include Stone Age sites, rock art sites, historical buildings associated with villages and farmsteads, cemeteries, and potential cultural landscapes (Prins, 2011).

One (1) of the most complete archaeological research surveys in South Africa was conducted by Professor Garth Sampson over a 30-year period, in the Agter Sneeuberg region (northern side of the Sneeuberg) in the central and upper Seacow River Area that covered an area of 734 square kilometres (sq. kms) between Hanover, Richmond and Noupoort in the Northern Cape (Sampson, 1985; Booth, 2011). Sampson (1985) stated that one (1) of the many reasons for him choosing to undertake archaeological research into the Karoo was that it was that the heritage was intact and untouched by ploughing and recent intervention (Hart, 2015). The pre-colonial archaeology of the Karoo was not only visible, but also prolific and in exceptionally good condition.

The valley occurs north east to south-east of the present study area and has revealed the presence of some 10 000 archaeological sites representing a history of human occupation that dates back at least 250 000 years (Hart, 2015). Since 1980 the headwaters of the Seacow River have been the focus of intensive archaeological survey where more than 16 000 Stone Age sites were recorded during this period (Sampson, 1985) and in depth ceramic distributional studies were conducted where later Stone Age Lithics and rare Khoekhoe pottery sherds were uncovered during systematic surveys of the area (Sadr & Sampson, 1999)

The Seacow River Valley covers an area of about 2000 sq. kms and was formerly known to its first trek-boer settlers as the Agter-Sneeuberg (Van der Merwe, 1937). Prior to the arrival of the trek-boers in the 1760's Bushman hunter-foragers who were believed to have been without livestock inhabited the area. Sampson (1989) describes the environment of the upper valley as large, flat, treeless basins on shale bedrock with thin topsoil. Dolerite ridges separate them and hill swarms supporting sparse bushes together with the typical Karoo scrub that also covers the flats (Sampson, 1989:3). It is believed that the carrying capacity of the area was high and was swarming with game at the time of colonial contact with the Bushman. Key resources for hunter-forager survival, such as springs, firewood, hyrax colonies, plant foods, hornfels for stone tools and rare rock shelters were all concentrated on dolerites.

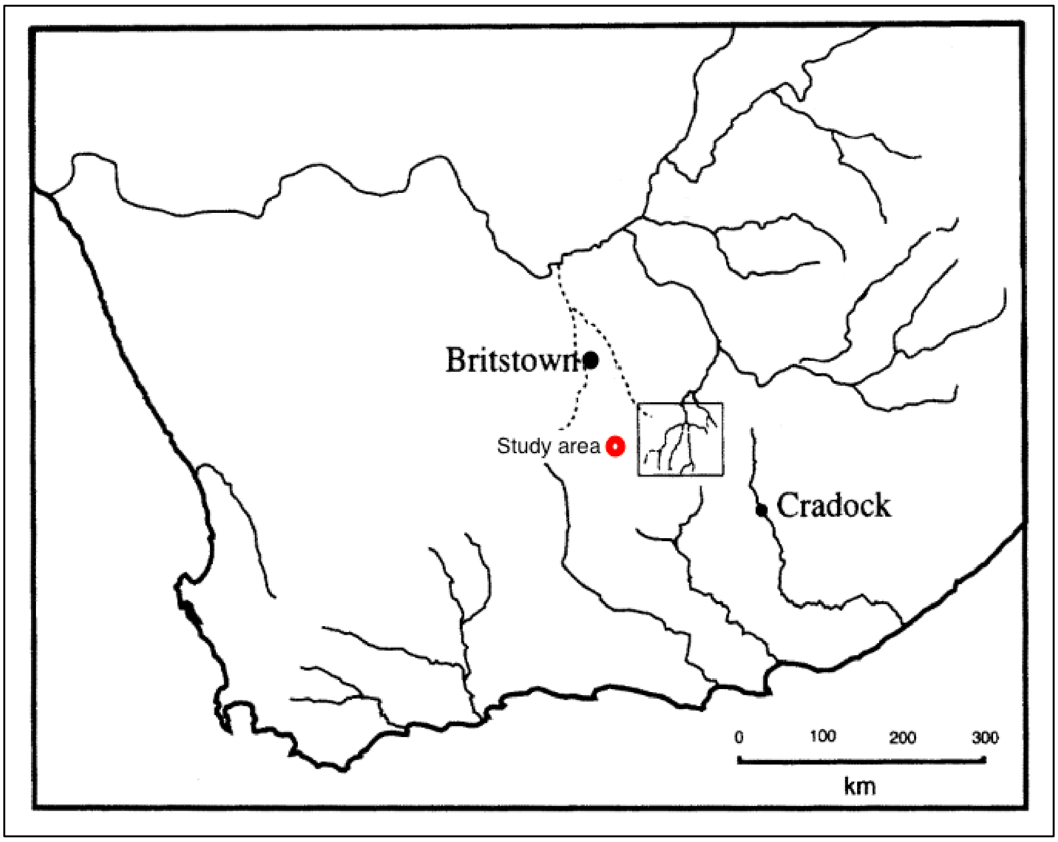

Figure 46: Position of the Seacow River Valley. Adapted from Close & Sampson, 1999

Prins (2011) and Sampson (1985) state that at about 1200 0 1400 AD, a global climatic fluctuation (The Little Ice Age) may well have caused an increase in rainfall in the central Karoo resulting in the area being more suitable than at present for the grazing by cattle and occupation by Khoekhoen pastoralists. It is further stated that archaeology of pastoralist occupation of vast areas in the Karoo are indicated by various stone kraal complexes of which several hundred have been recorded in the Seacow River Valley.

- **Pre-Colonial Past**
    - *Early Stone Age: 2.5 million to 250 000 years ago*

Early Stone Age stone artefacts endure for long periods and generally occur as open-air surface scatters either as isolated occurrences or in large quantities and very rarely in association with other archaeological heritage, plant and material remains (Booth, 2011).

The Earlier Stone Age is the first and oldest phase identified in South Africa's archaeological history and comprises two (2) 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 Acheulean and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulean dates back to approximately 1.5 million years ago.

The Albany Museum database includes records of occurrences of Acheulean handaxes between Middelburg and the Kamdeboo National Park near Graaff Reinet, as well as a collection of stone artefacts from the Cradock area. Sampson (1985) located a large number of sites within the Seacow River Valley (Booth, 2011).

Victoria West lent its name to the so-called Victoria West Industry, a component of the Early Stone Age period (ESA), of which distinctive prepared cores are the most recognizable element (Inskeep, 1978 in Mitchell, 2002), this is considered a transitional between the ESA and MSA. Binneman *et al.* (2010) mentions that during the 1920's, A.H.J. Goodwin (1926, 1946) identified the Victoria West Industry which occurred in the Karoo and along the Vaal River, It is was thought that the Victoria West cores are the 'evolutionary step' before the Levallois or the prepared core industry, indicating an outward spread of this technological change (Lycett, 2009: 175).

- *Middle Stone Age: 250 000 to 40 000 years ago*

The Middle Stone Age is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique.

The MSA focuses on the emergence of modern humans by the change in technology, behaviour, physical appearance, art, and symbolism (Booth, 2011). Surface scatters of these flake and blade industries occur widespread across southern Africa although rarely with any associated botanical and faunal remains (Booth, 2011). It is also common for these stone artefacts to be found between the surface and approximately 50-80cm below ground. Fossil bone may be associated with Middle Stone Age occurrences. According to Booth (2011), the Albany Museum database holds records of the occurrence of Middle Stone Age stone artefacts around the Cradock area. Sampson has reported many open-air MSA sites which he assigned to the Orangian Industry (dating between 128 000 - 75 000 years old), Florisbad and Zeekoegat Industries dating between 64 000 and 32 000 years old (Booth, 2011).

- *Late Stone Age: 40 000 years ago to the historic past*

The Later Stone Age is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths, and is associated with the archaeology of San hunter-gatherers. It is a very important layer on the Karoo landscape as this represents the heritage of the Khoekhoen (historically known as 'Hottentot' by early writers) and San (popularly known as Bushman) people of South Africa (Hart, 2015). The direct descendants of these groups make up a significant proportion of the population today. This heritage is represented by two industries (phases). These are the Interior Wilton which is characterised by a microlithic stone artefact industry characterised by lightly patinated hornfels (indurated shale stone) and the later Smithfield industry characterised by specific classes of stone artefacts and the presence of grass tempered ceramics (Hart, 2015).

The majority of archaeological sites date from the past 10 000 years where San hunter-gatherers inhabited the landscape living in rock shelters and caves as well as on the open landscape, inland and along the coast (Booth, 2011). Booth (2011) mentions that the open sites are difficult to locate because they are in the open veld. The preservation of these sites is poor and it is not always possible to date them (Deacon & Deacon, 1999; Booth, 2011). Caves and rock shelters, however, in most cases, provide a more substantial preservation record of pre-colonial human occupation (Booth, 2011).

The Later Stone Age archaeology of the Karoo region is described as rich and varied. Various studies (Beaumont & Morris, 1990; Beaumont & Vogel, 1984, and Sampson, 1985) have shown that the general area has been relatively marginal regarding pre-colonial human settlement, but is in fact exceptionally rich in archaeological sites and rock art (Booth, 2011). Bifacial and tanged barbed arrowheads made on very fine-grained dark or black chalcedony are distributed over the Kimberly area in the west, Lesotho in the east and as far south as Britstown and Steynsburg (Humphreys, 1991).

About 2 000 years ago Khoekhoen pastoralists entered into the region and lived mainly in small settlements. They were the first food producers in South Africa and introduced domesticated animals (sheep, goats and cattle) and ceramic vessels to southern Africa (Booth, 2011). Often, these archaeological sites are found close to the banks of large streams and rivers and along the coast. Large piles of freshwater mussel shell (called freshwater middens) usually mark the large stream and river sites and large piles of marine shellfish middens mark the coastal sites.

According to Hart (2015), it was after 1000 years BP people who were herding sheep / goats and possibly cattle, made an incursion into Karoo and established a new economic order based on transhumant pastoralism (Hart, 1989; Sampson *et al.*, 1989; Sampson, 2010). The presence of herding people is represented by stone walled structures that occur throughout the Karoo. They have been recorded within the Zeekoei River Valley, between De Aar and Victoria West and even in the inhospitable high Karoo near Sutherland (Hart, 2005) and on the West Coast (Sadr, 2007).

The spatial distribution of Late Stone Archaeological sites in the Karoo is quite patterned. People needed to be close to water so rivers, pans and springs played an important role in influencing where people lived. As previously mentioned the climate of the Karoo also played a key role. The winters can be extremely cold with temperatures dropping well below zero, made worse by freezing winds (Hart, 2015).

- *Ceramics*

A study done by Sampson *et al.* (1989) discusses to importance of ceramic studies. Eight shallow rock shelters deposits were excavated in the headwaters of the Seacow River. In this case it is explained how depositional sequences can be reconstructed from rare, diagnostic potsherds used as fossil markers. The sherd contexts were examined on a case by case basis, revealing a valley-wide sequence.

Sampson *et al.* (1989) discuss the findings; Grass-tempered plain wares first appear in the area at AD 900 together with rare Khoi vessels. The latter disappears from the record for c. 500 years, and then reappear in numbers. Various stamp-decorated wares, forming localized concentrations on the landscape, which suggest social groupings, then replace Khoi ceramics. Following this, these are replaced, apparently abruptly, by a single, valley-wide ubiquitous rocker-stamp wares again rapidly replace motif of double puncture rows, and this. Sampson *et al.* (1989) suggest that this final motif appears at the same time as the first European items, therefor suggesting that its arrival must date close to AD 1770. Rocker-stamp motifs continued to be made by the parahistoric Bushmen well into the post-contact era. This research presents evidence of at least five (5) stylistic upheavals in a single millennium.

Sadr & Sampson (1999) conducted a further study on the ceramics in the Upper Seacow Valley area, they stated that Khoekhoe pottery on surface sites in the upper Seacow River Valley is remarkably like the more abundant, well- stratified Later Stone Age ceramics found some 500-600km away in the south-western Western Cape Province. They believe that pastoralists introduced both. Sadr and Sampson (1999) further state that there appears to have been a steadily expanding herder presence in the upper Seacow Valley with the expansion front moving from north-west to south-east across the study area. Whether this means that some later phases have their origins in the regions between the two (2) areas compared here, remains to be seen.

- *Rock Art*

Heritage resources such as rock art have been identified by Van Schalkwyk and Wahl (2007) in the Kamdeboo mountains, which occur near Graaff Reinet (≈ 115Km from the study area). Rock engravings are known to exist on dolerite koppies in the region, and occur in hills along the Ongers River (Morris, 2012). Such koppies occur as a major feature in the area (Morris, 2012)

The South African Rock Art Digital Archive (SARADA) database of rock art indicates that rock paintings and engravings occur sporadically within the surrounding area. These include rock art found on four farms near Beaufort West (≈118 kms SW from study area), sixteen localities in the Richmond area (≈35 kms NE from study area), two farms near Murraysburg (≈50 kms S from study area), two farms near Nieu Bethesda (≈100 kms SE from study area) and one near Victoria west (≈40 kms NW from study area)(Van Riet-Lowe, 1941). Some of the most well-known rock engraving site occurs at Nelspoort, at near Beaufort West (Prins, 2011).

- **Colonial Archaeology**

Hart (2015) states that the indigenous people of Karoo waged a bitter war against colonial expansion as they gradually lost control of their traditional land. Penn (2005) notes the most determined indigenous resistance to trekboer expansion occurred when they entered the harsh environment of the escarpment of the interior plateau (namely Hantam, Roggeveld and Nieuweveld Mountains).

During the first quarter of the nineteenth century the Seacow River valley, between the Sneeuberg range and the Orange River, was on the far north-eastern border of the Cape Colony. Dutch stock farmers (trekboers) were present in small numbers from the 1770s and rapidly filled up the valley between 1800-1820 (Neville *et al.*, 1994).

The frontier history of the Upper Seacow Valley is one (1) on changing interactions between resident Bushman, Hunter-Gatherers and Dutch trekboer pastoralists (Saitowitz & Sampson, 1992). The early direct contact phase spans from 1765-1770 and their direct contact phase is covered by the Bushman / Boer war for the Sneeuberg between 1770-1800. It was believed that the San launched an almost successful campaign to drive the trekboers out. Numerous place names throughout the Karoo such as Oorlogspoort and Oorlogskloof are testimony the skirmishes of the late 18th century (Hart, 2015). The situation became so desperate that the colonists fought back by establishing the ‘Kommando’ system – the ‘hunting’ of San was officially sanctioned in 1777 (Dooling, 2007) and in some instances bounties were obtainable from the local landrost (on presentation of body parts). The Drosdy of Graaff Reinett played a significant role in this long and bitter war, which eventually saw the almost complete destruction of the Karoo San.

The settlement phase covers Earl Macartney’s pacification programme of 1800-1825 (Saitowitz & Sampson, 1992; Thompson & Lamar, 1981). There was also an advanced settlement sub-phase during 1826-1850 where surviving pockets of ‘wild’ Bushmen suffered increasing ecological and social stress. During the Consolidation phase 1850-1890, the upper valley was surrounded by towns and entered the cash economy, with most remaining Bushman becoming servants (Sampson, 1993).

- *Glass Beads*

Sampson (1993) discusses how surviving documents indicate that among the first European items acquired by the Seacow River Bushmen were glass beads, clay pipes and copper wire. During the pacification programme, Bushmen were encouraged to settle at the farmsteads, flint-and-steel sets, tinderboxes and knives were handed out during this time. Muskets were also given to Bushmen shepherds and farm guards. Other items such as household utensils and European clothing only became common among farm Bushmen in early Consolidation times (Saitowitz & Sampson, 1992). Increased use of building materials like window glass, nails, screws, box strapping and especially fencing wire by the Bushman occurred after 1880.

Saitowitz & Sampson (1992) excavated eight (8) rock shelters in the upper Seacow valley, the superficial deposits contained fragments of nearly all the above-mentioned items among dwindling numbers of indigenous Smithfield artefacts. In six (6) of these excavations, small assemblages of glass beads were found in association with other European items, many of which have can be dated to the nearest quarter century (Saitowitz & Sampson, 1992). Although very small samples, these bead assemblages, together with those from three (3) shelters in the adjacent middle Orange River, offer rare insights into glass bead chronology for the semi-arid interior of South Africa.

Saitowitz & Sampson (1992) state that although all the upper Karoo rock shelters were still in use at the end of the nineteenth century, glass beads were not found reliably associated with any of these dated superficial deposits. Presumably the farm Bushmen responsible for such residues had by this time adopted European dress, and glass beads no longer played any part in the frontier exchange system.

- *Guns*

Westbury and Sampson (1993) conducted a study, which observed the acquisition of guns by Bushman in the Seacow Valley, the purpose being to provide a timetable of changes in firearm technology throughout the valley. They state that records suggest that Bushman began to use firearms as early as 1770, however material traces only appear from 1825. According to Westbury & Sampson (1993) the earliest that musketry could have been introduced to the upper Seacow Valley would have been the 1770s. During that decade firearms and ammunition were supplied heavily into what was to become the Graaff-Reinet region, and particularly into the Sneeuberg Mountains immediately to the south of the upper valley. The newly arrived Dutch farmers in the area were believed to be arming themselves and their Khoi servants against marauding Bushman, also mentioned above (Westbury & Sampson, 1993).

The Dutch authorities at the Cape heavily supplemented Trekboer weaponry, as shown by a resolution of the Governor's Council dated 1774, in which an ammunition wagon was ordered to be sent to the Sneeuberg with '*90 firelocks, 900 lbs of gunpowder, 1,800 lbs of lead, 3,000 flints*' (Moodie, 1960). In 1977 the situation got more severe between farmers and Bushman, and more ammunition was requested. By 1779 a further request to the Cape authorities, this time for 1000 lbs gunpowder and 2000 lbs lead (Westbury & Sampson, 1993). During these years there were many opportunities for ammunition to be stolen from farmers or acquired by run-away servants.
By 1809 Strife had substantially subsided after the enforcement of Earl Macartney's pacification programme by the Landdrost, and guns had become common throughout the landscape. Farmers and herders were using the weapons at this stage alike, for protection against wild animals.

The introduction of weapons by expanding colonization had an impact on the archaeological record. Westbury & Sampson excavated nine rock shelters in the Upper Seacow valley of which all revealed shallow post-Contact horizons containing a wide variety of European items found among dwindling numbers of artefacts, fauna and indigenous pottery.

- **Findings from the Studies**
    - *Palaeontology*

The following is extracted from the Palaeontological Impact Assessment (PIA) completed by Elize Butler of Banzai Environmental (Pty) Ltd for PGS Heritage. The full PIA Report can be viewed in **Appendix 6E**.

'The proposed development is underlain by the continental sediments of the Latest Permian sediments of the Balfour Formation (Upper Beaufort Group, Adelaide Subgroup) and earliest Triassic sediments of the Katberg Formation (Upper Beaufort Group, Tarkastad Subgroup, Karoo Supergroup) as well as Jurassic Karoo Dolerite. These sediments are generally mantled by a thick layer of Quaternary to Recent colluvium and alluvium. The uppermost Balfour and Katberg Formations are of extraordinary interest in that they provide some of the best existing information on ecologically-complex terrestrial ecosystems during the catastrophic end-Permian mass extinction. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS), the Palaeontological Sensitivity of the Tarkastad and Adelaide Subgroups has a Very High Palaeontological Sensitivity, while that of the Quaternary superficial deposits of the Central interior is high and the Karoo dolerite (igneous rocks) is insignificant and rated as zero'.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle from the 24th – 28th January 2019. Elsewhere in the Karoo Basin numerous fossils have been uncovered in these geological sediments but only two (2) sites on koppies with fossiliferous outcrops were identified. These fossiliferous sites have been identified as Highly Sensitive and 'No-go' areas. It is recommended that a 50m buffer will be placed around these areas. In the event that construction is necessary in these sensitive areas it is recommended that the fossils will be collected by a professional palaeontologist. Preceding excavation of any 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.

6.13.3 Heritage Sensitivities

The evaluation of the possible heritage resource finds, and their heritage significance linked to mitigation requirements was linked to types of landscape. The heritage sensitivity rating does not indicate ‘no-go’ areas but the possibility of finding heritage significant site that could require mitigation work.

6.13.4 Possible Finds

Evaluation of aerial photography has indicated that certain areas may be sensitive from an archaeological perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix in **Table 18** below.

Table 18: Landform to heritage matrix

LAND FROM TYPE	**HERITAGE TYPE**
Crest and foot hill	LSA and MSA scatters
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Pans	Dense LSA sites
Outcrops	Occupation sites dating to LSA
Farmsteads	Historical archaeological material

6.13.5 Fieldwork Findings

Due to the nature of cultural remains, a systematic controlled-exclusive surface survey was conducted on foot and in a vehicle, over a period of four (4) days by an archaeologist and archaeological technician from PGS. The fieldwork was conducted from the 26th - 29th of August 2019.

The area is characterised by typical Karoo landscape with low vegetation cover and vast open spaces. The substation sites are situated in the flat low lying areas, while the southern power line corridors traverse mountainous areas.

The Mooi Plaats corridor areas revealed a single heritage resource point (UMS007) within the development footprint (refer to **Table 19** below). As noted in section 1.2 of the HIA Report (**Appendix 6D**), the focus of the fieldwork was on the sites proposed for the substations as well as the power line corridor centre lines.

Table 19: Heritage resources

Site[12] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
UMS007	S 31,28607	E 24,74903°	A small, circular shaped, stone walled enclosure was identified at this location. The enclosure measures approximately 4m x 5m in size and the walls were approximately 1m high and approximately 0.75m wide. It was overgrown and collapsed in several places. The small enclosure was most probably used during the herding of sheep and goats on the farm.	Medium	IIIB

View of stone packed wall at site UMS007

View of stone packed wall at site UMS007

[12] Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.

6.14 Palaeontology

As mentioned, the Palaeontological Impact Assessment (PIA) was completed by Elize Butler of Banzai Environmental (Pty) Ltd for PGS Heritage. The full PIA Report can be viewed in **Appendix 6E**. A site-specific field survey of the development footprint was conducted on foot and by motor vehicle from the 24th – 28th of January 2019 to assess the potential risk to palaeontological material (fossil and trace fossils) in the proposed footprint of the development.

The environmental baseline from a palaeontological perspective is presented below.

6.14.1 Geological and Palaeontological History

The proposed development is underlain by the continental sediments of the Latest Permian sediments of the Balfour Formation (Upper Beaufort Group, Adelaide Subgroup) and earliest Triassic sediments of the Katberg Formation (Upper Beaufort Group, Tarkastad Subgroup, Karoo Supergroup) as well as Jurassic Karoo Dolerite. These sediments are generally mantled by a thick layer of Quaternary to Recent colluvium and alluvium. The uppermost Balfour and Katberg Formations are of extraordinary interest in that they provide some of the best existing information on ecologically complex terrestrial ecosystems during the catastrophic end-Permian mass extinction (Mc Carthy *et al.,* 2005).

6.14.1.1 Geology

The development area is underlain by a series of Karoo sandstones, mudstones and shales, deposited under fluvial environments of the Adelaide Subgroup that forms part of the Beaufort Group. 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 000km^2 in South Africa and is the first fully continental sequence in the Karoo Supergroup. The Beaufort Group is divided into the Adelaide subgroup and the overlying Tarkastad subgroup (Johnson *et al.,* 2006).

The Adelaide subgroup rocks were 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 Balfour Formation forms the upper part of the Adelaide Subgroup and part of what was called lower to middle Beaufort. 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 cross-bedding as well as current ripple lamination. The bases of the sandstone units are massive beds, while ripple lamination is usually confined to thin sandstones towards the top of the thicker units.

The mudrocks of the Adelaide Subgroup usually has massive and blocky weathering apart from in the Normandien and Daggaboersnek Member. Sometimes desiccation cracks and impressions of raindrops are present. In the mudstones of the Beaufort Group calcareous nodules and concretions occur throughout.

The arenaceous Katberg Sandstone Formation of the Tarkastad Subgroup comprise of fine to medium-grained pinkish-grey sandstone with subordinate greenish-grey mudstone. The Katberg tabular sheet sandstones are vertically superimposed and divided by erosion surfaces lined with intraformational mud-pebble conglomerates. A maximum thickness of 1000m has been measured (Hiller and Stavrakis, 1984). At the end of the Permian the rivers changed from a meandering river system in the Balfour Formation to a large sand braided fan system in the Katberg Sandstone Formation (Johnson *et al.,* 2006, Smith *et al.,* 2006)

During Jurassic times the subcontinent was inundated with basaltic lava to form the capping basalts of the Jurassic aged Drakensberg Group. During the Jurassic the volcanic Drakensberg were formed and cracks in the earth's crust were filled with molten lava that cooled to form dolerite dykes. Magma injected horizontally between sediments, cooled down and formed horizontal stills of dolerite.

The Beaufort Group is subdivided into a series of biostratigraphic units on the basis of its faunal content, namely the *Daptocephalus* Assemblage Zone (Balfour Formation) and the *Lystrosaurus* Assemblage (Katberg Formation) (**Figure 47** below) (Groenewald *et al.,* 1995; Groenewald, 1996).

The Tertiary to Quaternary Cenozoic superficial deposits consist of aeolian sand, alluvium (clay, silt and sand deposited by flowing floodwater in a river valley / delta producing fertile soil), colluvium (material collecting at the foot if a steep slope), spring tufa / tuff (a porous rock composed of calcium carbonate and formed by precipitation from water, for example, around mineral springs) and lake deposits, peats, pedocretes or duricrusts (calcrete, ferricrete), soils and gravels (Partridge *et al.,* 2006).

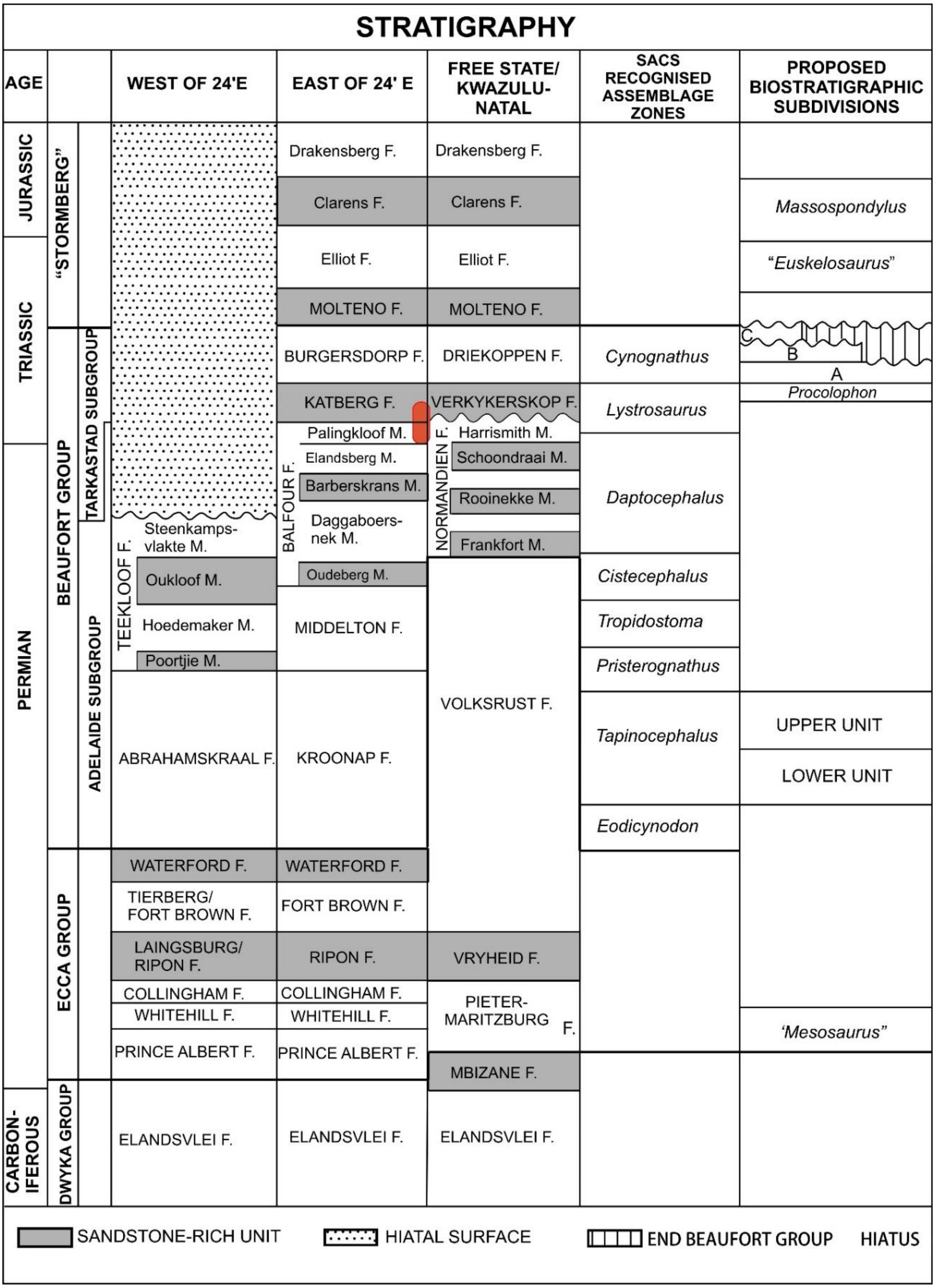

Figure 47: Lithostratigraphic (rock-based) and biostratigraphic (fossil-based) subdivisions Beaufort Group of the Karoo Supergroup with rock units and fossil assemblage zones relevant to the present study marked in red (Modified from Rubidge, 1995). Abbreviations: F. = Formation, M. = Member

6.14.1.2 Palaeontology

Sediments of the Beaufort Group are relatively rich in fossils, especially vertebrate fossils. The *Daptocephalus* Assemblage Zone is characterised by the occurrence of the two (2) therapsids namely *Dicynodon* and *Theriognathus*. The *Daptocephalus* Assemblage Zone expands into the lower Palingkloof Member of the Upper Balfour Formation. This Zone is characterised by the occurrence of the two (2) therapsids namely *Dicynodon* and *Theriognathus*. The *Daptocephalus* Zone shows the greatest vertebrate diversity and includes numerous well-preserved genera and species of dicynodonts, biarmosuchians, gorgonopsian, therocephalian and cynodont therapsid Synapsida as well as captorhinid Reptilia and less well-represented eosuchian Reptilia, Amphibia and Pisces (Kitching, 1977; National Palaeontology Museum databases). Trace fossils of vertebrates and invertebrates as well as *Glossopteris* flora plants have also been described (Bamford, 2004).

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 (Bamford, 2004).

The lower *Lystrosaurus* Assemblage Zone 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* Assemblage Zone is characterised by the dicynodont, *Lystrosaurus*, and captorhinid reptile, *Procolophon*. The biarmosuchian and gorgonopsian Therapsida did not survive into the *Lystrosaurus* Assemblage Zone although the therocephalian and cynodont Therapsida are present in moderate quantities. Captorhinid Reptilia are reduced, but this interval is characterised by a unique diversity of oversize amphibians. Fossil fish, millipedes and diverse trace fossils have also been recorded.

Quaternary fossil assemblages are generally rare and low in diversity and is spread out over a wide geographic area. These fossil assemblages may sometimes occur in extensive alluvial and colluvial deposits cut by dongas. In the past palaeontologists did not concentrate their research on Cenozoic superficial deposits although they sometimes comprise of important fossil biotas. Fossil assemblages may comprise of bones, horn corns, fragments of ostrich eggs and mammalian teeth, as well as reptile skeletons. Microfossils, non-marine mollusc shells and freshwater stromatolites are also known from Quaternary deposits. Plant material such as foliage, pollens peats and wood are recovered as well as trace fossils like vertebrate tracks, burrows, termitaria (termite heaps / mounds) and rhizoliths (root casts).

6.15 Social

The Social Impact Assessment was conducted by Dr Neville Bews & Associates. The full Social Impact Assessment Report is included in **Appendix 6F**. The Social Impact Assessment was undertaken via desktop means.

The environmental baseline from a social perspective is presented below.

6.15.1 Description of the Affected Environment

The proposed development falls within the Northern Cape Province. In the Northern Cape the Pixley ka Seme (DC7) district and Umsobomvu (NC072) local municipalities are affected by the proposed development. The closest towns to the proposed development are Noupoort and Hanover in the Northern Cape, all of which fall within the Karoo Region. The demographics pertaining to these areas, as sourced from Statistics South Africa Census 2011, are described below.

6.15.1.1 Provincial

The Northern Cape Province covers an area of 372 889.36km² and, over the same period, had a population of 1 145 861 people giving it a population density of 3.07 people per kmIn respect of age structure, the figures pertaining to the Northern Cape are as follows: below 16 years = 30.1%, between 15 and 64 years = 64.2% and above 64 years = 5.7%.

According to the 2018 Mid-year population estimates (Statistics South Africa, 2018a), the Northern Cape Province has the smallest population with an estimated population of 1 225 600 in 2018. As the Mid-year population estimates remain at a provincial level and are not projected to the district and local municipal levels, for comparative purposes, data gathered during Census 2011, will be used where appropriate, notwithstanding it being somewhat outdated.

On this basis, the dominant population group of the Northern Cape, at 50.35%, is black African people. At 53.8%, Afrikaans is the dominant home language spoken across the province.

The dependency ratio of the Northern Cape, which indicates the burden placed on the population of working age, between 15 and 64 years, who support children under 15 years and people over 65 years, is 55.7. The sex ratio, which measures the proportion of males to females, in the Northern Cape is 97.3, indicating a higher number of females in the province. The population growth rate for the Northern Cape was -0.40 between 1996 and 2001 and 1.44 between 2001 and 2011.

In 2011, the official unemployment rate in the Northern Cape was 27.4% with the official unemployment rate amongst the youth, aged between 15 and 34 years, being 34.5%. In the 4th Quarter of 2018 the official unemployment rate in the Northern Cape had dropped to 25%. These figures must, however, be considered with caution as the official unemployment rate is defined by Stats SA as follows:

'Unemployed persons are those (aged 15–64 years) who:

a) *Were not employed in the reference week and;*
b) *Actively looked for work or tried to start a business in the four weeks preceding the survey interview and;*
c) *Were available for work (i.e. would have been able to start work or a business in the reference week) or;*

d) *Had not actively looked for work in the past four weeks but had a job or business to start at a definite date in the future and were available.'* (Statistics South Africa, 2018b, p. 17).

Considering this in the 4th Quarter of 2018, the expanded unemployment rate in the Northern Cape stood at 38.6%. During this period the labour absorption rate in the Northern Cape was 40.3% and the labour force participation rate was 53.8%.

In respect of households, the 2011 Census indicated that there were 301 405 households in the Northern Cape with an average household size of 3.8. Of the households in the Northern Cape, 38.8% were female-headed households with 82.4% living in formal dwellings and 55.1% having either owned or were paying off their dwelling.

Regarding household services in 2011, 60.1% of households in the Northern Cape had flush toilets connected to the sewerage system. In respect of refuse removal 64% of households in the Northern Cape had their refuse removed on a weekly basis. Piped water was delivered to 45.8% of households in the Northern Cape while 85.4% of households in the Northern Cape used electricity as a means of energy for lighting.

Concerning HIV prevalence amongst prenatal women in the Northern Cape Province, in 2013 the Northern Cape had the lowest prevalence rate across South Africa at 17.5% followed by the Western Cape at 18.7%. At the same point the highest level of HIV prevalence amongst antenatal women was in KwaZulu-Natal with a prevalence rate of 40.1% while the national rate was 29.7%.

The 2013 National Antenatal Sentinel HIV Prevalence Survey extended to the district level which indicated that the Namaqua District Municipality had the lowest level of HIV prevalence across the country at 2.3% followed by the Central Karoo District at 6.9%. Of the 52 districts surveyed the Pixley Ka Seme district had the seventh lowest level of HIV prevalence at 15.0%. It is well documented that the spread of HIV is associated with transport corridors (Singh & Malaviya, 1994; Ramjee & Gouws, 2002; Djemai, 2018; Strauss, *et al*., 2018).

6.15.1.2 Municipal

The proposed development impacts the district municipality of Pixley ka Seme as well its local municipality of Umsobomvu. On a district level Pixley ka Seme covers the greatest land area and has the lowest population density at 1.80/km^2. In respect of population grouping, at 93.35% black African people are the dominant population group across all districts and the Umsobomvu Local Municipality. The coloured population group dominates within the Pixley ka Seme Local Municipality. isiXhosa is the dominant home language spoken across all municipalities except Pixley ka Seme where Afrikaans is the dominant home language.

The Pixley ka Seme region is primarily a sheep farming area, also renown for stud farms where high-quality race horses are bred. The towns of Colesberg, Norvalspont and Noupoort all fall within the Umsobomvu Local Municipality. The economy of the area revolves around agriculture, the services industry, tourism and hospitality.

In the Pixley ka Seme district 31.6% of the population, which amounted to 186 351 people in 2011, were under 16 years of age while 62.4% were between 15 and 64 years and 6.1% were over the age of 64.

In the Umsobomvu Local Municipality 31.4% of the population of 28 376 people were under 16 years of age, while 62.8% fell between 15 and 64 years and 5.8% were over the age of 64.

In respect of sex ratio Pixley ka Seme has a higher proportion of males to females in the population at 97.6. / In respect of sex ratio, at 89.9, the Chris Hani has the highest proportion of females to males. Between 2001 and 2011 the Umsobomvu LM had the highest population growth rate at 1.83%.

The unemployment rate in the area is highest in the Umsobomvu local municipality at 33%. In respect of education, the Umsobomvu local municipality has the highest percentage with no schooling at 16.31%. Surprisingly Umsobomvu has the highest percentage of the population having a matric level of education at 23.2%.

In respect of the local municipalities associated with the proposed development, the Umsobomvu local municipality has the fewest number of households at 7 841. The average household size across the local municipality is 3.6. The percentage of female-headed households in Umsobomvu is 41.5%. A relatively low number of households across the study region ranging, between 60.3 and 46.7 percent, either own or are paying off their dwellings.

6.15.2 Project Footprint

At a project footprint specific level the proposed development falls within the Umsobomvu non-urban (NU) area, Sub Place 370003002 according to Census 2011, which is sparsely populated with a population density of 0.38 people per square kilometre.

The closest urban area to the proposed development is the town of:

- Noupoort and satellite settlement of Kwazamuxolo; and
- Hanover.

<u>Noupoort and Kwazamuxolo</u>

Calculated in a straight line, the proposed development is located about 19km south-west of the town of Noupoort and the adjoining settlement of Kwazamuxolo, which are situated in the Umsobomvu Local Municipality and Pixley ka Seme District Municipality in the Northern Cape Province. Attaining municipal status in 1942, Noupoort functioned as a traction changeover facility on the Noupoort-Bloemfontein railway line and was commercially dependent on rail activity. A decline in demand for rail services resulted in an economic decline and the degradation of the town. The satellite settlement of Kwazamuxolo is located alongside Noupoort.

Hanover

Calculated along a straight line, the proposed development lies some 35km south-west of Hanover, which is situated in the Emthanjeni Local Municipality and Pixley ka Seme District Municipality in the Northern Cape Province. The town was established in 1854 and served as an administrative, educational and religious centre for the surrounding area. Hanover was named after Hanover in Germany and is now situated on the N1, virtually halfway between Cape Town and Johannesburg. Prior to 1884 and due to its central position Hanover also served as a central point for travellers travelling to the various towns and cities across South Africa. However, with the arrival of the railway, this function was to diminish changing the fortunes of the town and its inhabitants. Today the town has a certain tourist attraction with a natural spring, Anglo Boer War history, its central position and location along the N1 and within the Karoo.

7 ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Methodology for Assessing Impacts

The Impact Assessment Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining the significance of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact.

7.1.1 Determination of Significance of Impacts

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 20** 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.

7.1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- 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 has also been included.

The significance of Cumulative Impacts has also been rated.

7.1.2.1 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one

(1) rating. In assessing the significance of each issue, the following criteria (including an allocated point system) is used:

Table 20: Rating of Impacts Criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water feature).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
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 (P)		
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).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter 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 (L)		
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.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects 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 and its effects 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 – 50 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 transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
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 (system collapse). Rehabilitation and remediation often impossible. If possible, rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE (S)

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. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.

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
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	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'.
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

SiVEST's Impact Rating Methodology which was used to assess the potential impacts is set-out in detail in **Appendix 9E**.

7.2 Environmental Impact Assessment

Specialist studies have been conducted in terms of the stipulations contained within Appendix 6 of the EIA Regulations, 2014 (as amended).

The following assessments were conducted to identify and assess the issues associated with the proposed development:

- Terrestrial Ecology Impact Assessment;
- Avifauna Impact Assessment (incl. pre-construction monitoring);
- Surface Water Impact Assessment;
- Desktop Agricultural and Soils Impact Assessment;
- Desktop Geotechnical Impact Assessment;
- Visual Impact Assessment;
- Heritage Impact Assessment;
- Palaeontology Impact Assessment; and
- Desktop Social Impact Assessment.

These above-mentioned specialist assessments have been used to identify issues at a BA level. These assessments were also undertaken to inform the impact assessment of the proposed development.

As mentioned, a desktop investigation was initially conducted for the Avifaunal Specialist Study to source information on the impacts of the proposed development on avifauna. A visit to the site and general area was then conducted on 15 and 16 January 2019, followed up by on-site surveys from 17 - 19 January and 9 -12 May 2019. The results from the most recent round of surveys for the Avifaunal Specialist Study (undertaken from 9 - 12 May 2019) have been presented in the updated Avifaunal Specialist Study Report (**Appendix 6B**). The Avifaunal Specialist Study has thus been supplemented with site-specific information and impact ratings. In addition, field truthing for the HIA was undertaken in August 2019, through an archaeological walk-down and palaeontological study covering the site[13], and the results have been incorporated into this DBAR as well as the updated HIA Report (**Appendix 6D**).

The identified impacts, thus far, are elaborated on in the sub-sections below.

7.2.1 Terrestrial Ecological Impacts

Potential issues relevant to impacts on the ecology of the study area include the following:

- <u>Impacts on biodiversity:</u> this includes any impacts on populations of individual species of concern (flora and fauna), including protected species, and on overall species richness. This includes impacts on genetic variability, population dynamics, overall species existence or health and on habitats important for species of concern.

[13] Aim was to compile a comprehensive database of heritage sites within the development area, with the aim of developing a heritage management plan for inclusion in the EMPr.

- Impacts on sensitive habitats: this includes impacts on any sensitive or protected habitats, including indigenous grassland and wetland vegetation that leads to direct or indirect loss of such habitat.
- Impacts on ecosystem function: this includes impacts on any processes or factors that maintain ecosystem health and character, including the following:
    - disruption to nutrient-flow dynamics;
    - impedance of movement of material or water;
    - habitat fragmentation;
    - changes to abiotic environmental conditions;
    - changes to disturbance regimes (e.g. increased or decreased incidence of fire);
    - changes to successional processes;
    - effects on pollinators; and
    - increased invasion by alien plants.

Changes to factors such as these may lead to a reduction in the resilience of plant communities and ecosystems or loss or change in ecosystem function.

- Secondary and cumulative impacts on ecology: this includes an assessment of the impacts of the proposed development taken in combination with the impacts of other known developments for the area or secondary impacts that may arise from changes in the social, economic or ecological environment.
- Impacts on the economic use of vegetation: this includes any impacts that affect the productivity or function of ecosystems in such a way as to reduce the economic value to users (e.g. reduction in grazing capacity, loss of harvestable products.) It is a general consideration of the impact of a proposed development on the supply of so-called ecosystem goods and services.

7.2.1.1 Potential Sensitive Receptors in the General Study Area

A summary of the potential ecological issues for the study area is as follows (issues assessed by other specialists, e.g. on birds and on wetland and hydrological function, are not included here):

- Presence of natural vegetation on site, much of which has high conservation value due to being within Critical Biodiversity Areas (CBA1 and CBA2). Although in CBAs, the vegetation types are not nationally transformed to a high degree and none are listed;
- Presence of shallow drainage valleys and associated vegetation on site, assessed as being sensitive to impacts associated with development as well as being important habitat for various plant and animal species;
- Presence of various plant species protected according to the Northern Cape Nature Conservation Act (Act Mo. 9 of 2009). The identity of such species requires detailed floristic surveys within the footprint of the proposed development;
- Potential presence of one (1) protected frog species, namely the Giant Bullfrog, not listed, but protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004);
- Presence of two (2) mammal species of concern, the Black-footed Cat (Vulnerable), and Cape Clawless Otter (Near Threatened), both protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004);

- Potential presence of other mammal species of concern, the South African Hedgehog (Near Threatened), Grey Rhebok, White-tailed Rat (Vulnerable) and Spectacled Dormouse (Near Threatened), the first three (3) also protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004); and
- Potential invasion of natural habitats by alien invasive plants, thus causing additional impacts on biodiversity features. There are a large number of alien invasive species present on-site or in neighbouring areas, all of which have the potential to invade more widely, given the right circumstances.

7.2.1.2 Construction Phase Impacts

Direct impacts

1. Loss and/or fragmentation of indigenous natural vegetation due to clearing;
2. Loss of individuals of plant species of conservation concern and/or protected plants;
3. Loss of faunal habitat and refugia;
4. Direct mortality of fauna due to machinery, construction and increased traffic;
5. Displacement and/or disturbance of fauna due to increased activity and noise levels; and
6. Increased poaching and/or illegal collecting due to increased access to the area.

7.2.1.3 Operational Phase Impacts

On-going Direct impacts

1. Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure.

Indirect impacts

1. Establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors; and
2. Runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape.

7.2.1.4 Decommissioning Phase Impacts

Direct impacts

These will include the following:

1. Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites;
2. Direct mortality of fauna due to machinery, construction and increased traffic; and
3. Displacement and/or disturbance of fauna due to increased activity and noise levels.

Indirect impacts due to renewed disturbance due to decommissioning activities

These will occur due to renewed disturbance due to decommissioning activities, as follows:

1. Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors; and

2. Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape.

7.2.1.5 Assessment of Impacts

All assessed impacts have a low significance after the application of mitigation measures.

Please refer to **Table 21** on **page 206** for the results of the assessment of significance of ecological impacts for the proposed development.

7.2.2 Avifaunal Impacts

7.2.2.1 Impacts of Solar PV Facilities and Associated Infrastructure on Avifauna

Increasingly, human-induced climate change is recognised as a fundamental driver of biological processes and patterns. Historic climate change is known to have caused shifts in the geographic ranges of many plants and animals, and future climate change is expected to result in even greater redistributions of species (National Audubon Society, 2015). In 2006, the World Wildlife Fund (WWF) Australia produced a report on the envisaged impact of climate change on birds worldwide (Wormworth, J. & Mallon, K., 2006). The report found that:

- Climate change now affects bird species' behaviour, ranges and population dynamics;
- Some bird species are already experiencing strong negative impacts from climate change; and
- In future, subject to greenhouse gas emissions levels and climatic response, climate change will put large numbers bird species at risk of extinction, with estimates of extinction rates varying from 2 to 72%, depending on the region, climate scenario and potential for birds to shift to new habitat.

Using statistical models based on the North American Breeding Bird Survey and Audubon Christmas Bird Count datasets, the National Audubon Society assessed geographic range shifts through the end of the century for 588 North American bird species during both the summer and winter seasons under a range of future climate change scenarios (National Audubon Society, 2015). Their analysis showed the following:

- 314 of 588 species modelled (53%) lose more than half of their current geographic range in all three (3) modelled scenarios;
- For 126 species, loss occurs without accompanying range expansion; and
- For 188 species, loss is coupled with the potential to colonise new areas.

Climate sensitivity is an important piece of information to incorporate into conservation planning and adaptive management strategies. The persistence of many birds will depend on their ability to colonise climatically suitable areas outside of current ranges and management actions that target climate change adaptation.

South Africa is among the world's top ten (10) developing countries required to significantly reduce their carbon emissions (Seymore *et al.*, 2014), and the introduction of low-carbon technologies into the country's complement of power generation will greatly assist with achieving this important objective (Walwyn & Brent, 2015). Given that South Africa receives among the highest levels of solar radiation on earth (Fluri, 2009; Munzhedi *et al*., 2009), it is clear that solar power generation should feature prominently in future efforts to convert to a more sustainable energy mix in order to combat climate change, also from an avifaunal impact perspective. However, while the expansion of solar power generation is undoubtedly a positive development for avifauna in the longer term in that it will help reduce the effect of climate change and thus habitat transformation, it must also be acknowledged that renewable energy facilities, including solar PV facilities, in themselves have some potential for negative impacts on avifauna.

A literature review reveals a scarcity of published, scientifically examined information regarding large-scale PV plants and birds. The reason for this is mainly that large-scale PV plants are a relatively recent phenomenon. The main source of information for these types of impacts are from compliance reports and a few government-sponsored studies relating to recently constructed solar plants in the south-west United States. In South Africa, only one (1) published scientific study has been completed on the impacts of PV plants in a South African context (Visser *et al.*, 2019).

In summary, the potential impacts of PV plants and associated infrastructure (such as substations and power lines) on avifauna which have emerged so far include the following:

- Displacement due to disturbance and habitat transformation associated with the construction of the solar PV plant and associated infrastructure;
- Collisions with the solar panels;
- Entrapment in perimeter fences;
- Collisions with the associated power lines; and
- Electrocutions on the associated power lines.

Impacts associated with Power Lines

Negative impacts on birds by electricity infrastructure generally take two (2) principal forms, namely electrocution and collisions (Ledger & Annegarn, 1981; Ledger 1983; Ledger, 1984; Hobbs and Ledger, 1986a; Hobbs & Ledger, 1986b; Ledger, Hobbs & Smith, 1992; Verdoorn, 1996; Kruger & Van Rooyen, 1998; Van Rooyen, 1998; Kruger, 1999; Van Rooyen, 1999; Van Rooyen, 2000; Van Rooyen, 2004; Jenkins *et al.,* 2010). Birds also impact on the infrastructure through nesting and streamers, which can cause interruptions in the electricity supply (Van Rooyen *et al.,* 2002). During the construction phase of power lines and substations, displacement of birds can also happen due to disturbance and habitat transformation.

- *Electrocutions*

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen, 2004). The electrocution risk is largely determined by the design of the electrical hardware.

- *Collisions*

Collision mortality is the biggest threat posed by transmission lines to birds in southern Africa (Van Rooyen, 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with transmission lines (Van Rooyen, 2004; Anderson 2001). In her PhD study, Shaw (2013) provides a concise summary of the phenomenon of avian collisions with transmission lines:

'The collision risk posed by power lines is complex and problems are often localised. While any bird flying near a power line is at risk of collision, this risk varies greatly between different groups of birds, and depends on the interplay of a wide range of factors (APLIC 1994). Bevanger (1994) described these factors in four (4) main groups – biological, topographical, meteorological and technical. Birds at highest risk are those that are both susceptible to collisions and frequently exposed to power lines, with waterbirds, gamebirds, rails, cranes and bustards usually the most numerous reported victims (Bevanger, 1998; Rubolini et al., 2005; Jenkins et al., 2010).

The proliferation of man-made structures in the landscape is relatively recent, and birds are not evolved to avoid them. Body size and morphology are key predictive factors of collision risk, with large-bodied birds with high wing loadings (the ratio of body weight to wing area) most at risk (Bevanger, 1998; Janss, 2000). These birds must fly fast to remain airborne, and do not have sufficient manoeuvrability to avoid unexpected obstacles. Vision is another key biological factor, with many collision-prone birds principally using lateral vision to navigate in flight, when it is the lower-resolution, and often restricted, forward vision that is useful to detect obstacles (Martin & Shaw, 2010; Martin, 2011; Martin et al., 2012). Behaviour is important, with birds flying in flocks, at low levels and in crepuscular or nocturnal conditions at higher risk of collision (Bevanger, 1994). Experience affects risk, with migratory and nomadic species that spend much of their time in unfamiliar locations also expected to collide more often (Anderson, 1978; Anderson, 2002). Juvenile birds have often been reported as being more collision-prone than adults (e.g. Brown et al., 1987; Henderson et al., 1996).

Topography and weather conditions affect how birds use the landscape. Power lines in sensitive bird areas (e.g. those that separate feeding and roosting areas, or cross flyways) can be very dangerous (APLIC, 1994; Bevanger, 1994). Lines crossing the prevailing wind conditions can pose a problem for large birds that use the wind to aid take-off and landing (Bevanger, 1994). Inclement weather can disorient birds and reduce their flight altitude, and strong winds can result in birds colliding with power lines that they can see but do not have enough flight control to avoid (Brown et al., 1987; APLIC, 2012). The technical aspects of power line design and siting also play a big part in collision risk. Grouping similar power lines on a common servitude, or locating them along other features such as tree lines, are both approaches thought to reduce risk (Bevanger, 1994). In general, low lines with short span lengths (i.e. the distance between two adjacent pylons) and flat conductor configurations are thought to be the least dangerous (Bevanger, 1994; Jenkins et al., 2010). On many higher voltage lines, there is a thin earth (or ground) wire above the conductors, protecting the system from lightning strikes. Earth wires are widely accepted to cause the majority of collisions on power lines with this configuration because they are difficult to see, and birds flaring to avoid hitting the conductors often put themselves directly in the path of these wires (Brown et al., 1987; Faanes, 1987; Alonso et al., 1994a; Bevanger, 1994).'

From incidental record keeping by the Endangered Wildlife Trust (EWT), it is possible to give a measure of what species are generally susceptible to power line collisions in South Africa (see **Figure 48** below – EWT unpublished data).

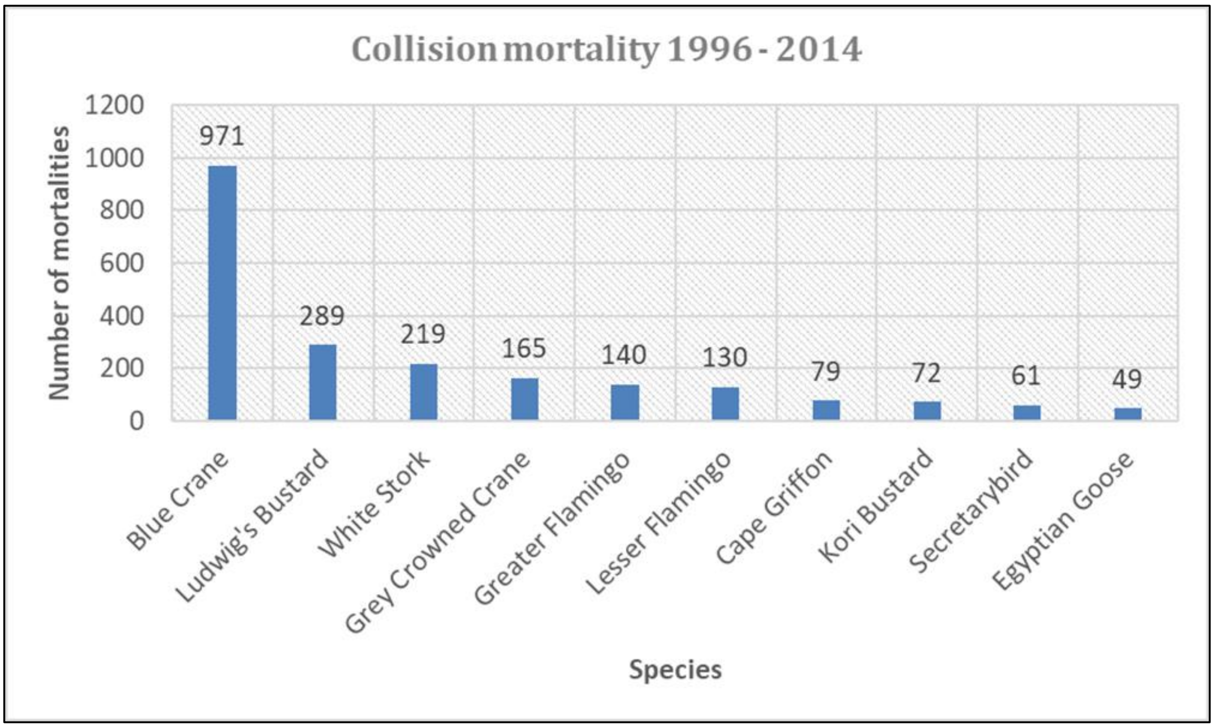

Figure 48: Top 10 collision prone bird species in South Africa, in terms of reported incidents contained in Eskom / EWT Strategic Partnership central incident register 1996 - 2014 (EWT unpublished data)

Power line collisions are generally accepted as a key threat to bustards (Raab *et al.,* 2009; Raab *et al.,* 2010; Jenkins & Smallie, 2009; Barrientos *et al.,* 2012; Shaw, 2013). In a comprehensive study, carcass surveys were performed under high voltage transmission lines in the Karoo for two (2) years, and low voltage distribution lines for one (1) year (Shaw, 2013). Ludwig's Bustard was the most common collision victim (69% of carcasses), with bustards generally comprising 87% of mortalities recovered. Total annual mortality was estimated at 41% of the Ludwig's Bustard population, with Kori Bustards also dying in large numbers (at least 14% of the South African population killed in the Karoo alone). Karoo Korhaan was also recorded, but to a much lesser extent than Ludwig's Bustard. The reasons for the relatively low collision risk of this species probably include their smaller size (and hence greater agility in flight) as well as their more sedentary lifestyles, as local birds are familiar with their territory and are less likely to collide with power lines (Shaw, 2013).

Several factors are thought to influence avian collisions, including the manoeuvrability of the bird, topography, weather conditions and power line configuration. An important additional factor that previously has received little attention is the visual capacity of birds; i.e. whether they are able to see obstacles such as power lines, and whether they are looking ahead to see obstacles with enough time to avoid a collision. In addition to helping explain the susceptibility of some species to collision, this factor is key to planning effective mitigation measures. Recent research provides the first evidence that birds can render themselves blind in the direction of travel during flight through voluntary head movements (Martin & Shaw, 2010). Visual fields were determined in three (3) bird species representative of families known to be subject to high levels of mortality associated with power lines (i.e. Kori Bustards, Blue Cranes *Anthropoides paradiseus* and White Storks *Ciconia ciconia*). In all species the frontal visual fields showed narrow and vertically long binocular fields typical of birds that take food items directly in the bill under visual guidance. However, these species differed markedly in the vertical extent of their binocular fields and in the extent of the blind areas which project above and below the binocular fields in the forward-facing hemisphere. The importance of these blind areas is that when in flight, head movements in the vertical plane (pitching the head to look downwards) will render the bird blind in the direction of travel. Such movements may frequently occur when birds are scanning below them (for foraging or roost sites, or for conspecifics). In bustards and cranes pitch movements of only 25° and 35°, respectively, are sufficient to render the birds blind in the direction of travel; in storks, head movements of 55° are necessary. That flying birds can render themselves blind in the direction of travel has not been previously recognised and has important implications for the effective mitigation of collisions with human artefacts including wind turbines and power lines. These findings have applicability to species outside of these families especially raptors (Accipitridae) which are known to have small binocular fields and large blind areas similar to those of bustards and cranes, and are also known to be vulnerable to power line collisions.

Despite doubts about the efficacy of line marking to reduce the collision risk for bustards (Jenkins *et al.,* 2010; Martin *et al.,* 2010), there are numerous studies which prove that marking a line with PVC spiral type Bird Flight Diverters (BFDs) generally reduce mortality rates (e.g. Bernardino *et al.,* 2019; Sporer *et al.,* 2013; Barrientos *et al.,* 2011; Jenkins *et al.,* 2010; Alonso & Alonso, 1999; Koops & De Jong, 1982), including to some extent for bustards (Barrientos *et al.,* 2012; Hoogstad, 2018 pers.comm). Beaulaurier (1981) summarised the results of 17 studies that involved the marking of earth wires and found an average reduction in mortality of 45%. Barrientos *et al.* (2011) reviewed the results of 15 wire marking experiments in which transmission or distribution wires were marked to examine the effectiveness of flight diverters in reducing bird mortality. The presence of flight diverters was associated with a decrease of 55–94% in bird mortalities. Koops and De Jong (1982) found that the spacing of the BFDs was critical in reducing the mortality rates - mortality rates are reduced up to 86% with a spacing of 5m, whereas using the same devices at 10m intervals only reduces the mortality by 57%. Barrientos *et al.* (2012) found that larger BFDs were more effective in reducing Great Bustard collisions than smaller ones. Line markers should be as large as possible, and highly contrasting with the background. Colour is probably less important as during the day the background will be brighter than the obstacle with the reverse true at lower light levels (e.g. at twilight, or during overcast conditions). Black and white interspersed patterns are likely to maximise the probability of detection (Martin *et al.,* 2010).

The use of BFDs to reduce collision mortality on power lines in South Africa has also been tested scientifically. Using a controlled experiment spanning a period of nearly eight (8) years (2008 to 2016), the effectiveness of two (2) types of line markers, namely the EBM Bird Flapper and EBM helical BFD in reducing power line collision mortalities of large birds were tested on three (3) 400kV transmission lines near Hydra substation in the Karoo. Marking was highly effective for Blue Cranes, resulting in a 92% reduction in mortality. Large birds in general also benefited from the marking, with a 56% reduction in mortality. Unfortunately, the marking did not prove to be effective for Ludwig's Bustard. The two (2) different marking devices were approximately equally effective (Shaw *et al.,* 2017).

- *Displacement due to habitat destruction and disturbance associated with the construction of the power lines and substation*

During the construction phase and maintenance of power lines and substations, some habitat destruction and transformation inevitably takes place. This happens with the construction of access roads, the clearing of servitudes and the levelling of substation yards. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the substation and power line servitudes through transformation of habitat, which could result in temporary or permanent displacement.

Apart from direct habitat destruction, the above-mentioned construction and maintenance activities also impact on birds through disturbance; this could lead to breeding failure if the disturbance happens during a critical part of the breeding cycle. Construction activities in close proximity to breeding locations could be a source of disturbance and could lead to temporary breeding failure or even permanent abandonment of nests.

7.2.2.2 Discussion of Impacts: Mooi Plaats Grid Connections

The section below provides an overview of the envisaged impacts of the proposed grid connections on power line priority species.

Electrocutions

Clearance between phases on the same side of the DT 7611 132kV mono-pole structure is approximately 2.2m for this type of design, and the clearance on strain structures is 1.8m. This clearance should be sufficient to reduce the risk of phase – phase electrocutions of most birds on the poles to negligible. The length of the stand-off insulators is approximately 1.6m. If a very large species attempts to perch on the stand-off insulators, they are potentially able to touch both the conductor and the earthed pole simultaneously potentially resulting in a phase – earth electrocution. This is particularly likely when more than one (1) bird attempts to sit on the same pole, which is an unlikely occurrence, except occasionally with vultures. Vultures are likely to occur very sporadically within the study core areas, but due to the presence of the two (2) Hydra-Poseidon 400kV perch-friendly transmission lines in the study area, the chances of the birds perching on the steel monopoles of the new grid connection line are relatively low. However, it cannot be entirely ruled out, therefore it would be preferable if a 100% vulture friendly structure is used. To eliminate the risk of vulture electrocutions the 7649 steel monopole structure is proposed with suspended insulators and diagonal supporting cross arms, which would make perching impossible while ensuring that birds are clear of the live phases (see Appendix 5 of Avifaunal Specialist Study – **Appendix 6B**).

Electrocutions within the proposed substation yards are possible but should not affect the majority of the more sensitive Red Data and power line sensitive bird species as these species are unlikely to use the infrastructure within the substation yards for perching or roosting, except possibly Spotted Eagle-Owl and Barn Owl. Other species which could potentially be exposed to electrocution risks in the proposed substations are corvids, Egyptian Geese, Hadeda Ibis, Helmeted Guineafowl and a few medium-sized raptors (see **Table 14**).

Collisions
See **Table 14** for potential candidates for collision mortality in the Nama Karoo habitat on the proposed power line. The species most at risk will be Blue Crane, Ludwig's Bustard, Secretarybird and Karoo Korhaan. The risk will be exacerbated if the line is positioned near a large water body, as the larger dams are most likely used by Blue Crane and possibly White Storks for roosting, when water levels are higher. These dams could also attract a variety of collision-prone waterbirds, including Greater Flamingo, when full. Other areas of heightened risk are agricultural clearings, particularly irrigated fields, which attract Blue Crane, Ludwig's Bustard, Egyptian Goose, Spurwing Goose, Hadeda Ibis and Sacred Ibis.

Displacement due to the habitat transformation in the proposed substations
In the present instance, the risk of permanent displacement of priority species due to habitat transformation in the footprint of the proposed substations and power line servitudes is likely to be very limited given the small size of the footprint. The displacement is likely to only affect small, locally common species and should have a negligible impact on local populations.

Please refer to **Table 21** on **page 206** for the results of the assessment of significance of avifauna impacts for the proposed development.

7.2.3 Surface Water Impacts

As mentioned, a site visit was undertaken from the 5th to the 7th of February 2019. The following surface water-related impacts are discussed in detail below.

From a watercourse perspective, this section will identify and contextualise the potential impacts within the context of the proposed development and the identified watercourses. This section will rate the impacts according to an impact rating system (see **Appendix 9D** for a full methodology and description of SiVEST's Impact Rating Methodology), determine the effect of the environmental impact, and provide recommendations towards mitigating the anticipated impact. The identification and rating of impacts will be undertaken (where applicable) for the construction and operation phases of the proposed development. It must be noted that the impact assessment determines a pre-mitigation rating (impacts based on current layout as is) and post-mitigation impact rating (impacts based on implementation of mitigation measures). Therefore, the impact assessment assumes automatic implementation of mitigation measures for the post-mitigation ratings.

7.2.3.1 Construction Phase Potential Impacts

Impacts to the Watercourses
During the construction phase, watercourses may be disturbed due to nearby construction. Note that no direct clearance of watercourses will take place, as the development footprint has been positioned outside of the extent of the delineated watercourse. Limited clearance of vegetation in the terrestrial area will be undertaken where the power lines and internal roads are to be constructed. It is expected that vegetation clearance will only take place potentially up to the edge of the watercourses. Edge

effects afford opportunities to alien vegetation to colonise the Watercourses. Additionally, the disturbance may result in temporary displacement of the biota inhabiting the watercourses during construction. However, these biota may well return following the construction phase, assuming strict adherence to mitigation measures.

Impacts to the Hydrology of the Watercourse

With the clearance of vegetation and increased run-off potential, the alteration of the hydrology of the watercourses can be expected. Increased flood peaks during and following rainfall events are likely whilst surfaces remain exposed following clearance and compaction during construction. However, it must be noted that the region is semi-arid and the watercourses are non-perennial systems. Hence, flows are fairly infrequent and the impacts to the hydrology will be temporary / short lived. Should adequate measures be implemented, the potential impacts can be successfully mitigated.

Impacts to Water Quality

During the construction process, potential contamination impacts can be expected as a result of stored oils, fuels, and other hazardous substances or materials being transported via stormwater run-off and/or direct leaks from construction vehicles and machinery. Should this occur, contamination impacts are likely to occur.

Water quality impacts can also result from workers using the watercourses for various purposes (such as for sanitation). Usage of sanitary substances (for example, soap) in the watercourses can alter the chemical balance or water quality thereby causing pollution to these hydrological systems. Additionally, usage of watercourses for urine and faecal waste is another potential negative water quality impact. Use of water for building purposes can also lead to impaired water quality.

Mixing cement and cleaning construction tools in the watercourses can furthermore affect the water quality. Impacts to the water quality may affect any organisms or vegetation inhabiting these systems via contamination impacts.

Lastly, water quality can be impaired as a result of sedimentation. Additional sediment loads emanating from construction areas that are contained in run-off entering watercourses can be regarded as pollution in accordance with the NWA, and therefore requires mitigation.

7.2.3.2 Operational Phase Potential Impacts

Impacts to the Hydrology of the Watercourse

Once the proposed development is in operation, increased run-off, associated erosion and sedimentation impacts from stormwater is likely. The impact of stormwater run-off is primarily related to the types of structures and surfaces that will need to be established for the proposed development. Hard impermeable surfaces will be associated with the internal access roads and substations. In general, flat and hard surfaces aid with the generation and acceleration of run-off which can impact on the watercourses through the alteration of flood peaks as well as other knock-on effects including onset of erosion and increased sedimentation. The increase in hardened surfaces is likely to cause a reduction in the groundwater recharge, and the drainage is likely to be high energy, and thus pose an erosion risk to the area directly below.

7.2.3.3 Decommissioning Phase Potential Impacts

Decommissioning Impacts

Should the proposed development need to be decommissioned, the same impacts as identified for the construction phase of the proposed development can be anticipated. Similar potential impacts can therefore be expected to occur and the stipulated mitigation measures (where relevant) must be employed as appropriate to minimise impacts.

The significance of the surface water-related impacts associated with the proposed development are detailed in **Table 21** on **page 206**.

7.2.4 Agricultural and Soils Impacts

7.2.4.1 Identification and Assessment of Impacts on Agriculture

The focus and defining question of an agricultural impact assessment is to determine to what extent a proposed development will compromise (negative impacts) or enhance (positive impacts) current and/or future agricultural production. The significance of an impact is therefore a direct function of the degree to which that impact will affect current or future agricultural production. If there will be no impact on production, then there is no agricultural impact. Impacts that degrade the agricultural resource base pose a threat to production and therefore are within the scope of an agricultural impact assessment. Lifestyle impacts on the resident farming community, for example visual impacts, do not necessarily impact agricultural production and, if they do not, are not relevant to and within the scope of an agricultural impact assessment. Such impacts are better addressed within the impact assessments of other disciplines included in the BA process.

For agricultural impacts, the exact nature of the different infrastructure has very little bearing on the significance of impacts. What is of most relevance is simply the occupation of the land, and whether it is being occupied by a solar array, a road, a building or a substation makes no difference. What is of most relevance therefore is simply the total footprint of the proposed development.

The ways in which the proposed development can impact on soils, agricultural resources and productivity are:

- Occupation of the land by the total physical footprint of the proposed development including all roads and electrical infrastructure; and
- Disturbance and changes to the land surface characteristics and soil profile from constructional activities such as levelling and excavations as well as the establishment of hard surfaces. These may lead to erosion and land degradation.

The significance of all potential agricultural impacts is kept low by the low agricultural potential of the land and the consequent low agricultural sensitivity to the loss of this land for agriculture.

Impacts of the Grid Connection Infrastructure

Grid connection infrastructure has negligible impact on agriculture because all viable agricultural activities in this environment can continue undisturbed below transmission lines and the remaining footprint of the infrastructure (substations etc.) occupies an insignificantly small proportion of the available land. Only one (1) agricultural impact has been identified. It is a direct, negative impact that applies to two (2) of the phases of the development (namely construction and decommissioning):

- *Soil degradation:*
  Soil degradation can result from erosion and topsoil loss. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during construction related soil profile disturbance. Soil degradation will reduce the ability of the soil to support vegetation growth.

The significance of the agricultural and soils related impacts associated with the proposed development are detailed in **Table 21** on **page 206**.

7.2.5 Geotechnical Impacts

The geotechnical related impacts associated with the proposed development are discussed in detail below.

7.2.5.1 Preliminary Geological & Geotechnical Impact Assessment

From a geological / geotechnical perspective, no fatal flaws have been identified that would prevent the construction of the proposed development at this site.

Further intrusive investigation is recommended for detailed design purposes.

Impact of the Proposed Development on the Geological Environment

The impact of the project alternatives on the geological environment will predominantly relate to the impact that the development will have on the soils / rock units beneath the site. Various outcrops / boulders have been noted across the sites generally associated with ridges. Removal of the boulders (during site clearing) and construction on hilltops and ridge tops may have a negative (aesthetic / visual) impact on the environment (besides increasing the cost of site preparation in these areas). It is assumed that a visual impact will be undertaken by others.

Both vertebrate and invertebrate fossils have also been found in the Beaufort Group of the Karoo Supergroup. Reptiles, mammal-like reptile (therapsid), amphibian, fish, insect and plant fossils have been discovered (Johnson, 2006). Excavation into the rock and removal of the material will potentially result in damage / destruction of the fossils. The locations of the fossils will have to be determined during an archaeological / palaeontological investigation.

The main potential impact of the proposed development on the geological environment will be the increased potential for soil erosion, caused by the removal of vegetation and the construction activities. Removal of vegetation for terrace preparation and compaction during earthworks will reduce the infiltration of rainwater and therefore increase surface runoff. An increase in runoff will lead to an increase in erosion. Potential impacts of the proposed development on the soils is provided in the section below, as well as in **Table 21** on **page 206**. The proposed duration of the construction phase was not provided at the time that this report was compiled. For the purpose of the assessment, a construction duration of one (1) year was assumed. Please note that the impact rating will change should the construction duration increase. A description of the weighting system and description of terms used is attached in Annexure A of the Geotechnical Impact Assessment Report (**Appendix 6C**), as well as in **Appendix 9D** of this DBAR.

Mooi Plaats Grid Infrastructure

The impact of the grid Infrastructure on the general environment was found to be ‘Low’. Areas with steep slopes associated with slope instability and surface bedrock / boulders associated with ridges, where construction will be difficult, have been identified.

It is the specialist’s professional opinion that the proposed development may go ahead, if all mitigation measures given in the Geotechnical Impact Assessment Report are implemented.

The significance of the geotechnical related impacts associated with the proposed development are detailed in **Table 21** on **page 206**.

7.2.6 Visual Impacts

The visual impacts associated with the proposed development are discussed in detail below.

7.2.6.1 Generic Visual Impacts associated with the Grid Connection Infrastructure

In this section, the typical visual issues related to the establishment of grid connection infrastructure as proposed are discussed. It is important to note that the renewable energy industry is still relatively new in South Africa and as such this report draws on international literature and web material (of which there is significant material available) to describe the generic impacts associated with the proposed development.

Grid Connection

Grid connection infrastructure will include:

- Collector and on-site substations to supply electricity to the Eskom grid; and
- Overhead 132kV power lines to connect the substations to the Eskom grid.

Power line towers and substations are by their nature very large objects and thus highly visible. It is understood that the maximum tower height envisaged for the proposed power line is 25m (equivalent in height to an eight storey building). Although a pylon / tower structure would be less visible than a building, the height of the structure means that the pylon would still typically be visible from a considerable distance. Visibility would be increased by the fact that the power line comprises a series of towers typically spaced approximately 200m to 400m apart in a linear alignment.

As described above, power lines and substations are not features of the natural environment, but are representative of human (anthropogenic) alteration of the natural environment. Thus, elements of grid connection infrastructure could be perceived to be highly incongruous in the context of a largely natural landscape. The height and linear nature of the power line will exacerbate this incongruity, as the towers may impinge on views within the landscape. In addition, the practice of clearing taller vegetation from areas within the power line servitude can increase the visibility and incongruity of the power line. In a largely natural, bushy setting, vegetation clearance will cause fragmentation of the natural vegetation cover, thus making the power line more visible and drawing the viewer’s attention to the servitude.

In this instance, the proposed grid connection infrastructure is intended to serve the three proposed solar PV projects and as such, will only be built if these projects go ahead. The power lines and substations are therefore likely to be perceived as part of the greater PV facility and the visual impact will be relatively minor when compared to the visual impact associated with the development as a whole.

7.2.6.2 Night-Time Impacts

The visual impact of lighting on the nightscape is largely dependent on the existing lighting present in the surrounding area at night. The night scene in areas where there are numerous light sources will be visually degraded by the existing light pollution and therefore additional light sources are unlikely to have a significant impact on the nightscape. In contrast, introducing new light sources into a relatively dark night sky will impact on the visual quality of the area at night. It is thus important to identify a night-time visual baseline before exploring the potential visual impact of the proposed development at night.

Much of the study area is characterised by natural areas with pastoral elements and low densities of human settlement. As a result, relatively few light sources are present in the broader area surrounding the proposed development site. The closest built-up areas are the towns of Noupoort and Middelburg which are both situated more than 30kms from the sites proposed for the substations and are thus too far away to have significant impacts on the night scene. At night, the general study area is characterised by a picturesque dark starry sky and the visual character of the night environment across the broader area is largely ‘unpolluted’ and pristine. Sources of light in the area are largely limited to isolated lighting from surrounding farmsteads and transient light from the passing cars travelling along the N10 national route.

Given the scale of the proposed development, the operational and security lighting required for the proposed development is likely to intrude on the nightscape and create glare, which will contrast with the dark backdrop of the surrounding area.

Power lines and associated towers or pylons are not generally lit up at night and, thus light spill associated with the proposed grid connection infrastructure is only likely to emanate from the proposed on-site substations. Lighting from these facilities is therefore expected to intrude on the nightscape to some degree. It should however be noted that the grid connection infrastructure will only be constructed if the proposed solar PV facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) is developed and thus the lighting impacts from the proposed substations would be subsumed by the glare and contrast of the lights associated with the PV facility. As such, the grid connection infrastructure is not expected to result in significant lighting impacts.

7.2.6.3 Overall Visual Impact Rating

The EIA Regulations, 2014 (as amended) require that an overall rating for visual impact be provided to allow the visual impact to be assessed alongside other environmental parameters. **Table 21** on **page 206** presents the impact matrix for visual impacts associated with the proposed construction and operation of the grid connection infrastructure. Preliminary mitigation measures have determined based on best practice and literature reviews.

7.2.7 Heritage Impacts

7.2.7.1 Impact Ratings

After consideration of the proposed layout in relation to the heritage resource, the significance of the heritage impacts associated with the proposed development (inclusive of corridors) are detailed in **Table 21** on **page 206**.

7.2.8 Palaeontological Impacts

Impact on Palaeontological Heritage will only occur during the construction phase of the proposed development with no impacts on the pre-construction, operational and decommissioning phases. Impacts will only occur when the vegetation is cleared and levelled, and excavations into the bedrock will occur

The Nature of the impact is to damage, destroy or permanently seal-in fossils at or below the ground surface that are unavailable for scientific study. This will occur during vegetation clearance or during the construction phase. The extent will have an effect nationally (3). Since fossil heritage is known from these formations, the probability of impacts on palaeontological heritage during the construction phase is probable (3). Impacts on fossil heritage are generally irreversible (4). By taking a precautionary approach, an insignificant loss of fossil resources is expected (No Loss) (1). The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures (should fossil material be present within the affected area) the damage or destruction of any palaeontological materials will be permanent (4).

The cumulative effect of the proposed development within the proposed location is considered to be High. This is as a result of the broader Middelburg and Noupoort areas being considered as fossiliferous (3). Probable significant impacts on palaeontological heritage during the construction phase are high, but the intensity of the impact on fossil heritage is rated as medium as fossil heritage is common in the greater Middelburg and Noupoort area (2).

Should the proposed development progress without due care to the possibility of fossils being present at the proposed site, the resultant damage, destruction or inadvertent relocation of any affected fossils will be permanent and irreversible. Thus, any fossils occurring within the area are potentially scientifically and culturally significant and any negative impact on them would be of high significance (without the implementation of mitigation measures).

7.2.8.1 Impact Ratings

The significance of the palaeontological impacts associated with the proposed development are detailed in **Table 21** on **page 206**.

7.2.9 Social Impacts

The social impacts associated with the proposed development are discussed in detail below.

7.2.9.1 Identification of Potential Impacts

The social impact variables considered across the proposed development are in accordance with Vanclay's list of social impact variables clustered under the following main categories as adapted by Wong (Vanclay, 2002; Wong, 2013) and include:

1. Health and social well-being;
2. Quality of the living environment (Liveability);
3. Economic; and
4. Cultural.

These categories are not exclusive and at times tend to overlap as certain processes may have an impact within more than one (1) category.

Under the following section the grid connection infrastructure is considered and assessed in respect of these impacts.

1) <u>Health and Social Wellbeing</u>

The health and social wellbeing impacts related to the proposed development include:

- Annoyance, dust noise and shadow flicker;

- Increase in crime;
- Increased risk of HIV infections;
- Influx of construction workers and job seekers; and
- Hazard exposure.

Annoyance, Dust and Noise

Annoyance, dust and noise will be more evident during the construction phase of the proposed development, as construction activities will result in disruptions and the generation of dust and noise from construction vehicles and equipment. Site-specific activities such as site clearance and the deliveries of materials, equipment, plant and the transportation of the workforce along unsealed access roads will generate the most dust and noise. Dust that accumulates on foliage and grasses that is used for grazing may result in the foliage and those grasses becoming unpalatable for livestock and/or game. This may in turn have an effect on farming activities within the vicinity of the project site and along the access road over the construction period. This impact will negatively impact sensitive receptors situated within or in close proximity to the project site and could also potentially impact surrounding land users. The impact of noise and dust on surrounding land users and local farmsteads can be reduced to acceptable levels through the application of appropriate mitigation measures.

Over the operational phase of the proposed development far less disruptions, dust and noise is expected in the vicinity of the project site, however, along the unsealed access road dusts and noise can be generated by traffic travelling to and from the project site. Even at low speeds heavy vehicles could generate noise in what is a remote area, particularly if they need to at times engage low gear ratios.

Increase in Crime

The proposed development fall within the Noupoort Precinct which, according to Crime Stats SA, has a relatively high level of crime with a total of 530 reported crimes in 2018[14]. The surrounding precincts of Hanover and Middelburg also have relatively high levels of reported crime at 428 and 1 474 respectively. It is likely that these crimes are associated with the more densely populated urban areas and that the level of crime in the sparsely populated urban areas would be lower, however, there are no available statistics to confirm this. It is often opportunistic crime, stock theft, the abuse of alcohol and relationship related crimes that are associated with construction activities.

Considering the relative remoteness of the proposed development it is unlikely that the proposed development will lead to any significant increase in crime levels in the area, however, it would be prudent for the developers to ensure that processes are put in place through which any suspected criminal activates associated with the proposed development can be easily communicated and swiftly addressed. The construction phase carries with it a higher risk of associated criminal activates than would be associated with the operational phase.

Increased Risk of HIV Infections

At 17.5%, the Northern Cape Province has the lowest HIV prevalence rate when compared to all other South African provinces. At a district level the Pixley ka Seme District Municipality has the seventh

[14] According to Crime Stats SA as at 28 April 2018 (www.crimestatssa.com/precinct.php?id=798)

lowest HIV prevalence rate when compared against all district municipalities across the country. These higher prevalence rates are likely to occur within the higher density urban areas and along transport corridors. As the proposed development falls within a sparsely populated rural area, the HIV prevalence rate within the immediate vicinity of the proposed development is likely to be low. Considering this together with the fact that sexually transmitted diseases tend to be spread by construction and transport workers (Singh & Malaviya, 1994; Ramjee & Gouws, 2002; Meintjes, Bowen, & Root, 2007; World Bank Group, 2016; Bowen, Dorrington, Distiller, Lake, & Besesar, 2008; Bowen P., Govender, Edwards, & Cattell, 2016; Kikwasi & Lukwale, 2017; Bowen P., Govender, Edwards, & Lake, 2018), opens the area to a high risk of HIV infections. This risk is likely to peak during the construction phase of the proposed development as the conduction workforce increases and material and equipment is delivered to site but is likely to subside during the operational phase.

Due to the low HIV prevalence in the area it is important that this issue be given serious attention and that the appropriate mitigation measures are implemented, and the situation is closely monitored throughout the construction and operational phases of the proposed development. The risk of the spread of HIV is most prevalent on a cumulative basis and is addressed as such under **section 7.3.8**.

Influx of Construction Workers and Job Seekers

It is estimated that over the construction period of the proposed development, the construction workforce will average approximately 126 workers peaking at approximately 297 workers. It is likely that 75% of this workforce will be recruited from within local communities. The influx of workers could lead to the disruption of social networks with the formation of temporary relationships and an increase in pregnancy which may place pressures on local family units. Apart from this the arrival of construction workers may result in the formation of a subculture that could manifest in antisocial behaviour which conflicts with the expectations of local communities. This may result in these local communities, who are accustomed to a quiet, rural environment, becoming dissatisfied with the neighbourhood. These disruptions are, however, more likely to occur in the nearby urban areas such as Noupoort, Hanover and to a lesser degree due to the size of the population, in Middleburg, when workers seek recreational activities.

During the operational phase of the proposed development the workforce will be comprised of approximately 16 workers who will be accommodated off-site. Consequently, the risks associated with disruptions to social networks will be minimal over the operation phase of the proposed development.

Hazard Exposure

The use of heavy equipment and vehicles and an increase in vehicle traffic within the vicinity of the construction site will result in an increased risk to the personal safety of people and animals. Of particular concern are increased hazards faced by pedestrians, cyclists and motorists with emphasis on vulnerable groups such as children and the elderly. Excavation work and trenches also pose a hazard to the safety of people, particularly children and animals, who may fall into these works and may have difficulty in getting out. However, due to the low population numbers within the vicinity of the proposed development, this risk is likely to be low and the appropriate mitigation measure, such as fencing, can reduce the impact further. There will also be an increased risk of fires brought about through construction workers lighting fires for cooking and for warmth during cold periods. Nevertheless, with the recommended mitigation measures being successfully put in place this can be controlled.

2) Quality of the Living Environment

The following quality of the living environment impacts are related to the proposed development:

- Disruption of daily living patterns;
- Disruptions to social and community infrastructure; and
- Transformation of the sense of place.

Disruption of Daily Living Patterns

If there are any disruptions to daily living patterns these are likely to be minimal and restricted to the construction phase of the proposed development. This impact will be mainly associated with the site and the main access roads. These disruptions are only likely to be associated with the delivery of materials and machinery to site and the transportation of workers to and from site.

Disruptions of daily living patterns are likely to be negligible during the operation phase of the proposed development as these will be associated with maintenance and repair activities which will be far less frequent and intense than construction activities are likely to be.

Disruption to Social and Community Infrastructure

An increase in the population of the area as a result of the workforce associated with the proposed development has the potential to place pressure on existing community services supplies and infrastructure such as schools, health care facilities, access to water, electricity and sanitary services. With the workforce associated with the construction phase of the proposed development peaking at approximately 297 people, of which 75% are likely to be recruited locally, it is unlikely that in isolation the proposed development will have any significant effect on social and community infrastructure in the area. However, on a cumulative basis, considering the activities taking place and planned for the area, there is likely to be a significant impact in this regard. This impact is dealt with in greater depth under **section 7.3.8**.

Over the operational phase of the proposed development, with a smaller workforce being recruited locally, it is unlikely that there will be significant disruptions to community and social infrastructure.

Transformation of the Sense of Place

Within a social context a sense of place includes a wide range of criteria, all or some of which add meaning to a particular area for individuals and groups. These criteria may include the vista, geography, urban layout, flora and fauna, community, history and fragrance of a place amongst many others and are uniquely interpreted on an individual basis. Some individuals may embrace changes to the sense of place that others may reject and for some it may merely be a change in the demographics of an area that leaves them feeling threatened, vulnerable and insecure. Groups and group membership can help to reinforce the sense of place of an area and can also serve to reinforce fears and suspicions associated with pending changes to the sense of place. A sense of place has much to do with unique individual perceptions attached to the location and is subjective by nature.

One (1) of these criteria is the visual aspect, which was the subject of the Visual Impact Assessment specialist report (**Appendix 6I**) in which it is indicated that:

'The area is not typically valued for its tourism significance and there is limited human habitation resulting in relatively few potentially sensitive receptors in the area. A total of twenty-six (26) potentially sensitive receptors were identified in the combined study area, three (3) of which are considered to be sensitive receptors as they are linked to leisure / nature-based tourism activities in the area. None of the receptors are however expected to experience high levels of visual impact from any of the proposed grid connection infrastructure. Although the N10 receptor road traverses the study area, motorists travelling along this route are only expected to experience moderate impacts from the proposed grid connection infrastructure' [SiVEST SA (Pty) Ltd, 2019b, p. 116].

Notwithstanding this, however, the issue regarding the sense of place is likely to remain controversial as sense of place is personal and subjective, with some accepting changes to the landscape in support of renewable energy while others may reject them (Farhar, Hunter, Kirkland & Tierney, 2010; Carlisle, Kane, Solan & Joe, 2014).

3) Economic

The economic impacts related to the proposed development include:

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

Job Creation and Skills Development

The proposed development will lead to the creation of both direct and indirect job which will have a positive economic benefit within the region. In this regard there are approximately 297 jobs associated with the construction phase of the proposed development and 16 with the operational phase of the proposed development. During construction approximately 3 569 person-months are likely to be created of which approximately 2 679 or approximately 75% will be allocated to local communities creating employment opportunities for residents of Middelburg, Noupoort and Hanover. Many of the beneficiaries are likely to be historically disadvantaged members of the community and the proposed development will provide opportunities to develop skills amongst these people. The operational phase will employ approximately 16 people full time for a period of up to 20 years.

Socio-Economic Stimulation

Apart from these jobs, the proposed development is also likely to stimulate the local economy and again this is likely to be most significant at a cumulative level. Nevertheless, there will be a significant economic contribution attached to the proposed development. This contribution will be in the form of disposable salaries and the purchases of services and supplies from the local communities in and around the towns of Noupoort, Hannover and Middleburg estimated at 40% of the total project value yet to be finalised.

Apart from job creation and procurement spend, the proposed development will also have broader positive socio-economic impacts as far as socio-economic development contributions are concerned. Although, at the point of writing, the project developer had not as yet put a corporate social responsibility plan in place, the intention is to either fall in line with the REIPPPP BID guidelines or put an equivalent plan in place. This will create an opportunity to support the local community over the life span of the operational phase of the proposed development, which will stretch over a 20-year period. At a national level the proposed development also has the potential to contribute towards the national grid requirements as part of the Government's vision to source 10.5% of the country's energy through solar power by 2030 (Department of Energy Republic of South Africa, 2018, p. 41).

4) Cultural Impacts

At a social level it is likely that any cultural impacts would be associated with sensitive archaeological and/or heritage sites that may be found. In this regard, a Heritage Impact Assessment (**Appendix 6D**) was undertaken, and it was found that:

'*The projected impact assessment indicates that unmitigated impacts during construction can be MEDIUM to HIGH but reduced to LOW with the implementation of management measures. Impacts during the operational and decommissioning phase is projected to be LOW with the implementation of management measures.*

These findings provide the basis for the recommendation:

- *further field truthing through an archaeological walk-down. The aim of this will be to compile a comprehensive database of heritage sites within the PV development area, with the aim of developing a heritage management plan for inclusion in the Environmental Management Plan'* [PGS Heritage (Pty) Ltd, 2019, p. 37].

At this point no heritage resources have been identified that could have cultural significance. If these are identified at a later point, they can be addressed in the heritage report and as such will not be pursued any further at the social level.

7.2.9.2 Impact Assessment

These impacts are assessed in respect of the following phases of the proposed development:

- Planning and design;
- Construction;
- Operational;
- Decommissioning; and
- The 'no-go' option.

Planning and Design Phase

It is evident that the proposed development fits with legislation and key planning and policy documentation. In this regard renewable energy facilities are supported on a national, provincial and municipal level.

However, provincial and municipal documentation also regards tourism as an important resource for the area. In addition to this, there have been concerns raised regarding the cumulative effect of the proliferation of renewable energy in the region and the impact that this may have on the sense of place of the area (see *section 8.3: Transformation of sense of place* of Social Impact Assessment Report – **Appendix 6F**).

Construction Phase

Most of the impacts discussed above apply over the short-term to the construction phase of the proposed development and include:

- Annoyance, dust and noise;
- Increase in crime;
- Increased risk of HIV infections;
- Influx of construction workers and job seekers;
- Hazard exposure;
- Disruption of daily living patterns;
- Disruptions to social and community infrastructure;
- Job creation and skills development; and
- Socio-economic stimulation.

Operational Phase

The social impacts that apply to the operational phase of the proposed development are:

- Transformation of the sense of place; and
- Economic.
    - Job creation and skills development.
    - Socio-economic stimulation.

Decommissioning Phase

If the proposed development were to be completely decommissioned the major social impacts likely to be associated with this would be the loss of jobs and revenue stream that stimulated the local economy and flowed into the municipal coffers. It is estimated that the proposed development has a lifespan of approximately 20 years and there is the possibility that after this period the associated solar facility (part of separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) could be replaced with more up-to-date technology that would extend the life of the facility. Although the loss of a job is significant and can be devastating on an individual and family level, the total number of jobs under threat could be insignificant as the operational staff complement is estimated at a total of 48 and many of these employees will be skilled and could find alternative employment.

Decommissioning will result in a limited number of jobs being created over a short period of time as components are dismantled and the site is cleared. Although positive, this will be a rather insignificant benefit considering the size of the proposed development and the time period attached to decommissioning.

Considering the time period to decommissioning, the uncertainty of what would exactly occur, and the significance of the impact in isolation, it would be rather meaningless to attach assessment criteria to decommissioning at this point. However, prior to decommissioning the following mitigation measures are suggested:

Decommissioning mitigation measures:

- Ensure that a retrenchment package is in place;
- Ensure that staff have been trained in a manner that would provide them with saleable skills within the job market; and
- Ensure that the site is cleared responsibly and left in a safe condition.

The significance of the social impacts mentioned above which are associated with the proposed development are detailed in **Table 21** below.

Table 21: Assessment of identified environmental impacts (all phases) associated with the Mooi Plaats on-site and collector substations and power line

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Terrestrial Ecology																				
Indigenous natural vegetation	Loss and/or fragmentation of vegetation due to clearing for construction of infrastructure.	1	3	2	2	3	2	22	-	Low	-Use existing road infrastructure for access roads. -Avoid construction of infrastructure within sensitive habitats. -Minimise vegetation clearing and disturbance to footprint areas only. -Compile a rehabilitation programme and rehabilitate disturbed areas.	1	3	2	2	2	2	20	-	Low
Plant species of concern and protected plants	Loss of individuals due to clearing for construction of infrastructure.	1	3	2	2	3	2	22	-	Low	-Undertake a walk-through survey of footprint areas. -Obtain all necessary permits.	1	3	1	2	1	1	8	-	Low

Fauna	Loss of habitat due to clearing for construction of infrastructure	1	3	2	2	3	2	22	-	Low	-Use existing road infrastructure for access roads. -Avoid construction of infrastructure within sensitive habitats. -Minimise vegetation clearing and disturbance to footprint areas only. -Compile a rehabilitation programme and rehabilitate disturbed areas.	1	2	2	2	3	1	10	-	Low
Fauna	Direct mortality due to machinery, construction and increased traffic	1	2	2	2	1	2	16	-	Low	-Avoid construction of infrastructure within sensitive habitats. -Implement traffic control measures, including speed limits and 'no-go' zones.	1	2	2	2	1	1	8	-	Low
Fauna	Displacement and disturbance due to increased activity and noise levels	1	2	2	2	1	2	16	-	Low	-Avoid construction of infrastructure within sensitive habitats. -Implement traffic control measures, including speed limits and 'no-go' zones.	1	2	2	2	1	1	8	-	Low
Flora and fauna	Increased poaching and/or illegal collecting due to improved access to the area.	1	2	2	2	1	2	16	-	Low	-Strict access control to the site. -Environmental awareness education for staff and visitors. -Report any infringements to law enforcement.	1	2	2	2	1	1	8	-	Low
Avifauna																				
Avifauna	Displacement of priority species due to disturbance associated with the construction of the power line and substations	1	3	1	3	1	3	27	-	Medium	-Activity to be restricted to the immediate footprint of the infrastructure. -Access to the remainder of the site to be strictly controlled to prevent unnecessary disturbance of avifauna. -Measures to control noise to be applied according to current best practice in the industry. -Maximum use to be made of existing access roads and the construction of new roads to be kept to a minimum.	1	1	1	1	1	1	5	-	Low

											-The recommendations of the ecological and botanical specialist studies must be strictly implemented. -A walk-through must be conducted by the avifaunal specialist to assess whether there are any Red Data species, and/or large raptors breeding in the vicinity of the power line, which could be displaced by the construction activities. Should this be the case, appropriate measures must be put in place to prevent the displacement of the breeding birds, through the timing of activities.									
Avifauna	Displacement of priority species due to habitat destruction associated with the construction of the substations	1	2	4	2	3	1	12	-	Low	-Activity to be restricted to the immediate footprint of the infrastructure. -Access to the remainder of the site to be strictly controlled to prevent unnecessary disturbance of avifauna. -Measures to control noise to be applied according to current best practice in the industry. -Maximum use to be made of existing access roads and the construction of new roads must be kept to a minimum. -The recommendations of the ecological and botanical specialist studies must be strictly implemented.	1	2	2	2	3	1	10	-	Low
Surface Water																				
Watercourses – Impacts to the Watercourses	Impacts associated with disturbance and edge effects to watercourses	1	3	2	2	2	2	20	-	Low	**<u>Avoiding Direct Impacts to the Watercourses</u>** – No vegetation trimming and/or pruning must take place along the existing access roads running through the extent of the watercourse. However, where nearby vegetation trimming and/or pruning is required outside the extent of the watercourse, this must take place in	1	3	1	1	2	1	8	-	Low

										accordance with recommendations of the vegetation specialist. **<u>Preventing Temporary Increased Run-off Impacting on Watercourses</u>** – Vegetation clearing must take place in a phased manner, only clearing areas where construction will take place and not in areas where construction will only take place in the future. **<u>Preventing Littering of Watercourses</u>** – Provide sufficient facilities for litter disposal. Regular clean-ups are required to keep the construction area and adjacent watercourses clean. **<u>Alien Eradication Programme</u>** - An Alien Eradication and Removal Programme is to be compiled prior to construction and implemented for the duration of the proposed development									
Watercourse – Impacts to the Hydrology of the Watercourse	Impacts associated with accelerated run-off and associated increased flood peaks to the watercourse	2	3	2	2	1	2	20	-	Low	**<u>Preventing Increased Run-off and associated Erosion Impacting on Watercourses</u>** – Adequate structures, where necessary, must be put into place (temporary or permanent where necessary in extreme cases) to deal with increased / accelerated run-off and potential erosion. The use of silt fencing and potentially sandbags or hessian 'sausage' nets or other appropriate measures along the boundaries of the power line foundations and substations can be used where required to slow run-off entering the watercourses and the associated buffer zones, thereby preventing increase in flood	1	2	2	2	2	1	9	-	Low

										peaks, run-off volumes and also the likelihood of erosion. An appropriate construction stormwater management plan formulated by a suitably qualified professional must accompany the proposed development to deal with increased run-off and associated sedimentation and erosion. An Environmental Control Officer (ECO) must be appointed during the construction phase to oversee construction activities undertaken by contractors. The ECO must also monitor increased run-off and associated erosion impacts. Where additional mitigation measures are stipulated by the ECO in order to control increased run-off and erosion, this is to be undertaken accordingly.										
Watercourse – Impacts to Water Quality	Potential impacts associated with the leakage / spillage of oils, fuels and other potentially hazardous substances from construction vehicles / machinery entering run-off and flowing into the watercourse. Pollution from workers using the watercourse for sanitation and cleaning purposes, as well as sedimentation via run-off polluting the watercourse.	2	3	2	3	3	3	39	-	Medium	**<u>Storage of Oils, Fuels and Hazardous Substances / Liquids</u>** – All oils, fuels and hazardous substances or liquids must not be stored within 100m from the full extent of the watercourse and the associated buffer zone, unless such storage is unavoidable and is approved by the ECO. Where these items are stored, the storage area must be adequately bunded to contain any spillage from containers. Emergency spill kits must be available to clean up and remove spills. **<u>Preventing Soil and Surface Water Contamination</u>** – All vehicles and machinery operating on the study site are to be checked for oil, fuel or any other fluid leaks before entering the construction areas. All vehicles	1	1	2	2	3	1	9	-	Low

											and machinery must be regularly serviced and maintained before being allowed to enter the construction areas. No fuelling, re-fuelling, vehicle and machinery servicing or maintenance is to take place within 100m of the watercourse and the associated buffer zone. The study site is to contain sufficient safety measures throughout the construction process. Safety measures include (but are not limited) oil spill kits and the availability of fire extinguishers. Additionally, fuel, oil or hazardous substances storage areas must be bunded to 110% capacity to prevent oil or fuel contamination of the ground and/or nearby watercourses and the associated buffer zones. No cement mixing is to take place in the watercourse or the associated buffer zone. In general, any cement mixing must take place over a bin lined (impermeable) surface or alternatively in the load bin of a vehicle to prevent the mixing of cement with the ground. Cement / concrete can also be trucked in ready-mix vehicles. Importantly, no mixing of cement or concrete directly within the watercourse and associated buffer zone. No ‘long drop’ toilets are allowed on the study site. Suitable temporary chemical sanitation facilities are to be provided. Temporary chemical sanitation facilities must be placed at least 100 meters from the watercourse and the associated buffer zone where required.									

										Temporary chemical sanitation facilities must be checked regularly for maintenance purposes and cleaned often to prevent spills. **<u>Preventing Sedimentation Impacting on Surface Water Resources</u>** – Adequate structures, where required, must be put into place (temporary or permanent where necessary in extreme cases) to deal with sedimentation. The use of silt fencing and potentially sandbags or hessian 'sausage' nets or other appropriate measures along the boundaries of the power line foundations and substations can be used where required to prevent and/or reduce sediments entering the watercourse and the associated buffer zone. An appropriate construction stormwater management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation. An ECO must be appointed during the construction phase to oversee construction activities undertaken by contractors. The ECO must also monitor sedimentation impacts. Where additional mitigation measures are stipulated by the ECO in order to control sedimentation, this is to be undertaken accordingly.									
Agriculture and Soils																				
Soil	Soil degradation and erosion	1	1	2	2	2	1	8	-	Low	-Control run-off. -Maintain vegetation cover. -Strip, stockpile and re-spread topsoil	1	1	2	2	2	1	8	-	Low

Geotechnical																				
Soils	Soil disturbance during construction may destabilise the soil and lead to soil erosion. - Increased soil erosion / runoff due to clearing of vegetation - Construction and use of access roads by heavy duty vehicles and construction equipment may destabilise the soil and lead to soil erosion. - There may be spillages (petroleum / lubricants) from the vehicles - There may be siltation of watercourses due to increased runoff and dust	1	4	2	1	1	1	9	-	Low	-Use of berms and drainage channels to direct water away from the construction areas where necessary -Minimise earthworks and levelling -Use existing access roads wherever possible -Rehabilitate disturbed areas as soon as possible after construction -Correct engineering design of stream and watercourse crossings -Correct engineering design of any new access roads -Maintain vehicles and only undertake repairs and maintenance work in designated areas -Implement groundcover measures to prevent erosion such as keeping as much natural vegetation as possible, straw mulch, erosion control mats etc. -Contain and control stormwater flow	1	2	1	1	1	1	6	-	Low
Visual																				
▪ Potential alteration of the visual character and sense of place; and	▪ Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to	2	3	1	2	1	2	18	-	Low	-Carefully plan to minimise the construction period and avoid construction delays; -Inform receptors of the construction programme and schedules; -Minimise vegetation clearing and rehabilitate cleared areas as soon as possible;	2	2	1	1	1	2	14	-	Low

▪ Potential visual impact on receptors in the study area	impacts associated with construction; ▪ Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings; ▪ Dust emissions and dust plumes from increased traffic on gravel roads serving the construction site may evoke negative sentiments from surrounding viewers; ▪ Surface disturbance during construction would expose bare soil which could visually contrast with the surrounding environment; ▪ Vegetation clearance required for the construction of the proposed substation is expected to increase dust emissions and alter the natural character of the surrounding area,										-Maintain a neat construction site by removing rubble and waste materials regularly; -Make use of existing gravel access roads where possible; -Limit the number of vehicles and trucks travelling to and from the construction site, where possible; and -Unless there are water shortages, ensure that dust suppression techniques are implemented: ○ on all access roads; ○ in all areas where vegetation clearing has taken place; and ○ on all soil stockpiles.									

	thus creating a visual impact; and ▪ Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.																				
Heritage																					
Impact on known Stone Age resources	Impact on stone age resources during earth moving - including trenching, road making, foundation digging	1	2	3	4	4	2	28	-	Medium	-Review layout to avoid the identified heritage sites; and -Implement 30-meter buffer.	1	1	3	2	1	2	16	-	Low
Impact on chance finds	Impact on stone age resources during earth moving - including trenching, road making, foundation digging	1	1	3	4	4	4	52	-	High	-Develop a chance finds procedures to be included in the EMPr; and -Implement mitigation measures such as buffering, documentation and excavations and request destruction permits from the South African Heritage Resources Agency (SAHRA).	1	1	3	4	3	2	24	-	Medium
Impact on palaeontological resources	Impact on palaeontological resources during earth moving - including trenching, road making, foundation digging	1	2	3	4	4	2	28	-	Medium	-Implement chance finds procedures; and -Implement mitigation measures such as buffering, documentation and excavations and request destruction permits from the South African Heritage Resources Agency (SAHRA).	1	1	2	4	4	2	24	-	Medium
Palaeontology																					

Fossil Heritage	Excavations and site clearance of the development will involve substantial excavations into the superficial sediment cover as well as locally into the underlying bedrock.	1	2	4	4	4	4	60	-	High	A palaeontologist must conduct a field visit after vegetation clearance. Fossil Excavation will need a SAHRA permit. If an excavation is impossible, the fossil and locality must be protected and the development moved	1	1	4	4	4	2	28	-	Medium
Social																				
Annoyance, dust and noise	Annoyance, dust and noise generated through construction activities.	1	3	1	2	1	2	16	-	Low	-Apply appropriate dust suppressant to gravel roads on a regular basis; -Ensure that vehicles used to transport sand and building materials are fitted with tarpaulins or covers; -Ensure all vehicles are roadworthy and drivers are qualified and made aware of the potential noise and dust issues; and -Appoint a Community Liaison Officer (CLO) to deal with complaints and grievances from the public.	1	3	1	2	1	1	8	-	Low
Increase in crime	An increase in crime associated with the construction phase of the proposed development.	2	3	2	2	2	3	33	-	Medium	-All workers must carry identification cards and wear identifiable clothing; -Fence off the construction site and control access to the site; -Appoint an independent security company to monitor the site; -Appoint a Community Liaison Officer (CLO); -Encourage local people to report any suspicious activity associated with the construction site to the community liaison officer; -A grievance mechanism must be prepared and communicated to surrounding landowners and local communities, to ensure	2	3	2	2	2	2	22	-	Low

										that the project proponent, Engineering, Procurement and Construction (EPC) contractor and sub-contractors remain responsible and accountable. This will also facilitate the identification and implementation of additional mitigation measures if required; and -Prevent loitering within the vicinity of the construction camp as well as construction sites by recruiting off-site via an off-site recruiting office / agent, whatever is most appropriate.									
Increased risk of HIV and AIDS	Increased risk of HIV and AIDS due to the influx of workers, job seekers and deliveries and availability of disposable income.	3	3	3	3	4	3	48	-	High	-Ensure that an on-site HIV and AIDS policy is in place and that construction workers are exposed to a health and HIV / AIDS awareness educational programme within the first month of construction; -Provide voluntary and free counselling, free testing and condom distribution services to the workforce; and -Where feasible, extend the HIV / AIDS programme into the community with specific focus on schools and youth clubs.	3	3	3	3	4	2	32	-	Medium
Influx of construction workers and job seekers	Influx of construction workers and job seekers resulting in a temporary change in demographics	2	3	2	2	2	2	22	-	Low	-Communicate, through Community Leaders and Ward Councilors, the limitation of opportunities created by the proposed development to prevent an influx of job seekers; -Develop and implement a local procurement policy which prioritises 'locals first' to reduce the movement of people into the area in search of work; -Draw up a recruitment policy in conjunction with Community Leaders and Ward Councilors and ensure compliance with this policy;	2	2	2	2	2	2	20	-	Low

Hazard exposure	Exposure to hazards associated with construction activities and the delivery of heavy machinery and equipment to site.	2	3	2	2	1	2	20	-	Low	-Ensure all construction equipment and vehicles are properly maintained at all times; -Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population such as children and the elderly; -Ensure that fires lit by construction staff are only ignited in designated areas and that the appropriate safety precautions, such as not lighting fires in strong winds and completely extinguishing fires before leaving them unattended, are strictly adhered to; -Make staff aware of the dangers of fire during regular toolbox talks; -A grievance mechanism must be prepared and communicated to surrounding landowners and local communities, to ensure that the project proponent, Engineering, Procurement and Construction (EPC) contractor, and sub-contractors remain responsible and accountable and to facilitate the identification and implementation of additional mitigation measures, if required; -Where necessary, training must be provided on the implementation of the grievance mechanism to ensure that those who are most likely to be affected by the proposed development are suitably equipped in the mechanism of raising concerns and having these addressed; and -Compile and implement a Fire Management and Emergency Preparedness Response Plan.	2	2	2	2	1	2	18	-	Low

Disruption of daily living patterns	Disruption of daily living patterns due to construction activities and deliveries of machinery and heavy equipment to site.	2	3	2	2	1	2	20	-	Low	-Ensure that, at all times, people have access to their properties as well as to social facilities; -All vehicles must be roadworthy and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues; -Heavy vehicles must be inspected regularly to ensure their road safety worthiness; and -The developer and Engineering, Procurement and Construction (EPC) Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if damaged due to construction activities.	2	2	2	2	1	2	18	-	Low
Disruption of services supplies and infrastructure	Disruptions of community facilities and infrastructure due to construction activities and an influx of workers.	2	3	2	2	1	2	20	-	Low	Regularly monitor the effect that the construction activities is having on public infrastructure and immediately report any damage to infrastructure to the appropriate authority.	2	2	2	2	1	2	18	-	Low
Job creation and skills development	The creation of job opportunities and the development of skills amongst the workforce.	3	3	2	2	1	2	22	+	Low	-Wherever feasible, local residents must be recruited to fill semi- and unskilled jobs; -Women to be given equal employment opportunities and encouraged to apply for positions; -A skills transfer plan must be put in place at an early stage and workers must be given the opportunity to develop skills which they can use to secure jobs elsewhere post-construction; and -A procurement policy promoting the use of local business must, where possible, be put in place to be applied throughout the construction phase.	3	3	2	2	2	2	24	+	Medium

Socio-economic development	Potential for positive socio-economic opportunities for the region associated with downstream business opportunities and corporate social responsibility initiatives.	3	3	2	2	2	2	24	+	Medium	A procurement policy promoting the use of local business must, where possible, be put in place to be applied throughout the construction phase.	3	3	2	2	3	2	26	+	Medium
Operational Phase																				
Terrestrial Ecology																				
Fauna	Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure	1	2	2	2	1	2	16	-	Low	-Implement traffic control measures, including speed limits; and -Environmental awareness education for staff and visitors.	1	2	2	2	1	1	8	-	Low
Vegetation	Establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors	1	3	2	3	3	2	24	-	Medium	-Compile and implement Alien Invasive Management Plan; and -Rehabilitate disturbed areas.	1	2	2	2	3	1	10	-	Low
Vegetation	Runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape	1	2	2	3	3	2	22	-	Medium	-Compile and implement a stormwater management plan, which highlights control priorities and areas and provides a programme for long-term control; and -Undertake regular monitoring to detect erosion features early so that they can be controlled; and -Implement control measures;	1	2	2	2	3	1	10	-	Low

											-Avoid building on or near steep or unstable slopes; and -Construct proper culverts, bridges and/or crossings at drainage-line crossings, and other attenuation devices to limit overland flow									
Avifauna																				
Avifauna	Collisions of priority species with the earth wire of the proposed 132kV grid connection.	2	4	2	4	3	3	45	-	High	-The 132kV grid connection must be marked with Bird Flappers, on the earth wire for the entire length of the line; and -A 500m power line-free zone must be implemented around dams and agricultural areas.	2	2	2	4	3	2	26	-	Medium
Avifauna	Electrocutions on the proposed 132kV power line and in the substations	2	2	1	4	3	3	36	-	Medium	-The final pole design must be signed off by the bird specialist to ensure that a bird-friendly design is used; and -With regards to the infrastructure within the substation yard, the hardware is too complex to warrant any mitigation for electrocution at this stage. It is rather recommended that if any impacts are recorded once operational, site specific mitigation be applied reactively.	2	1	1	4	3	1	11	-	Low
Surface Water																				
Watercourse - Impacts to the Hydrology of the Watercourse	Increased run-off as well as associated erosion and sedimentation impacts	2	3	2	2	3	3	36	-	Medium	**<u>Minimising Stormwater Impacts to Watercourses</u>** – The access roads, and substations must have energy dissipating structures where required to prevent increased run-off and sediments contained in the run-off entering adjacent areas or surface water resources. This will assist in erosion prevention as well. Structures can be in the form of hard concrete structures or soft engineering structures (such as grass blocks for example). A buffer strip of vegetation and rock reinforcement must be maintained	1	2	2	1	3	2	18	-	Low

											downslope of the substations, as this will allow a reduction in erosion and sedimentation from increased overland flows from the hardened surfaces. Alternatively, a suitable operational stormwater management design or plan can be compiled and implemented that accounts for the use of appropriate alternative structures or devices that will prevent increased run-off and sediment entering the watercourses thereby, also preventing erosion. ECO monitoring is to take place during the post-construction rehabilitation phase. Monitoring is to take place for erosion as well as re-establishment of vegetation where trenching has taken place.									
Agriculture and Soils																				
N/A	N/A									N/A	N/A									N/A
Geotechnical																				
Soils	Increased soil erosion / runoff due to clearing of vegetation and alteration of natural drainage (paved areas) - There may be spillages (petroleum / lubricants) from the vehicles	1	2	1	1	1	1	6	-	Low	-Use existing access roads wherever possible; -Correct engineering design of stream and watercourse crossings; -Correct engineering design of access roads; -Maintain vehicles and only undertake repairs and maintenance work in designated areas; -Implement groundcover measures to prevent erosion, such as keeping as much natural vegetation as possible, straw mulch, erosion control mats etc.; and	1	2	1	1	1	1	6	-	Low

											-Contain and control stormwater flow									
Visual																				
▪ Potential alteration of the visual character and sense of place; and ▪ Potential visual impact on receptors in the study area.	▪ The proposed power line and substations could alter the visual character of the surrounding area and expose sensitive visual receptor locations to visual impacts; ▪ The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings; ▪ Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers; and ▪ The night time visual environment could be altered as a result of operational and security lighting at	2	4	2	2	3	1	13	-	Low	-Where possible, limit the number of maintenance vehicles using access roads; -Non-reflective surfaces must be utilised where possible; -Where possible, limit the amount of security and operational lighting present at the on-site substations; and -Light fittings for security at night must reflect the light toward the ground and prevent light spill.	2	4	2	2	3	1	13	-	Low

	the proposed substations.																			
Heritage																				
Impact on heritage resources	Impact on heritage resources during general maintenance	1	1	4	4	4	4	56	-	High	-Develop chance finds procedures to be included in the EMPr; and -Implement mitigation measures such as buffering, documentation and excavations and request destruction permits from the South African Heritage Resources Agency (SAHRA).	1	1	4	4	4	1	14	-	Low
Social																				
Transformation of the sense of place	Transformation of the sense of place due to the nature of the proposed development.	2	4	4	3	4	3	51	-	High	-Apply the mitigation measures suggested in the Visual Impact Assessment (VIA) Report; Ensure that all affected landowners and tourist associations are regularly consulted; A Grievance Mechanism must be put in place and all grievances must be dealt with in a transparent manner; and The mitigation measures recommended in the Heritage Impact Assessment (HIA) must be followed.	2	4	4	3	4	2	34	-	Medium
Job creation and skills development	The creation of job opportunities and the development of skills amongst the workforce.	2	3	2	2	3	2	24	+	Medium	-Implement a training and skills development programme for locals; and -Work closely with the appropriate municipal structures in regard to establishing a social responsibility programme.	2	3	2	2	3	2	24	+	Medium
Socio-economic stimulation	Potential for positive socio-economic opportunities for the region associated with downstream business opportunities and corporate social responsibility initiatives.	3	3	2	3	3	2	28	+	Medium	-Ensure that the procurement policy supports local enterprises; -Establish a social responsibility programme either in line with the REIPPP BID guidelines or equivalent; -Work closely with the appropriate municipal structures in regard to establishing a social responsibility programme; and	3	3	2	3	3	3	42	+	Medium

										-Ensure that any trusts or funds are strictly managed in respect of outcomes and funds.									
Decommissioning Phase																				
Terrestrial Ecology																				
Vegetation	Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites	1	3	2	2	2	2	20	-	Low	-No additional clearing of vegetation must take place without a proper assessment of the environmental impacts and authorisation from relevant authorities; -If any additional infrastructure needs to be constructed, for example overhead power lines, communication cables, etc., then these must be located next to existing infrastructure, and clustered to avoid dispersed impacts; -No driving of vehicles off-road; -Implement Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas; -Access to sensitive areas outside of development footprint must not be permitted during operation; and -Surface runoff and erosion must be properly controlled and any issues addressed as quickly as possible.	1	3	2	2	2	1	10	-	Low
Fauna	Direct mortality of fauna due to machinery, construction and increased traffic	1	2	2	2	3	2	20	-	Low	-Personnel and vehicles to avoid sensitive habitats; -No speeding on access roads – install speed control measures, such as speed humps, if necessary; -No illegal collecting of any individuals, particularly the Armadillo Girdled Lizard; -No hunting of protected species or hunting of any other species without a valid permit; -Personnel to be educated about protection status of species, including distinguishing	1	2	2	1	3	1	9	-	Low

											features to be able to identify protected species; -Report any sitings to conservation authorities; and -Prevent unauthorised access to the site – project roads provide access to remote areas that were not previously easily accessible for illegal collecting or hunting.										
Fauna	Displacement and/or disturbance of fauna due to increased activity and noise levels	1	2	2	1	1	1	7	-	Low	-Restrict impact to development footprint only and limit disturbance spreading into surrounding areas; -Access to sensitive areas outside of infrastructure footprint must not be permitted during construction; No speeding on access roads – install speed control measures, such as speed humps, if necessary; -No hunting of protected species; -Personnel to be educated about protection status of species, including distinguishing features to be able to identify protected species; and -Report any sitings to conservation authorities.	1	2	2	1	1	1	7	-	Low
Vegetation	Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors	1	3	2	3	3	2	24	-	Medium	-Implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control; -Undertake regular monitoring to detect alien invasions early so that they can be controlled; -Post-decommissioning monitoring must continue for an appropriate length of time to ensure that future problems are avoided; and -Do NOT use any alien plants during any rehabilitation that may be required.	1	2	2	2	3	1	10	-	Low

Vegetation	Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape	1	3	2	3	3	2	24	-	Medium	-Implement a stormwater management plan, which highlights control priorities and areas and provides a programme for long-term control; -Following decommissioning, undertake regular monitoring for an appropriate length of time to detect erosion features early so that they can be controlled; -Implement any control measures that may become necessary; and -Avoid undertaking any activities on or near steep or unstable slopes.	1	2	2	2	3	1	10	-	Low
Avifauna																				
Avifauna	Displacement of priority species due to disturbance associated with the dismantling of the power line and substations	1	3	1	3	1	3	27	-	Medium	-Activity to be restricted to the immediate footprint of the infrastructure; -Access to the remainder of the site must be strictly controlled to prevent unnecessary disturbance of avifauna; -Measures to control noise must be applied according to current best practice in the industry; -Maximum use to be made of existing access roads and the construction of new roads to be kept to a minimum; -The recommendations of the ecological and botanical specialist studies must be strictly implemented; and -A walk-through must be conducted by the avifaunal specialist to assess whether there are any Red Data species, and/or large raptors breeding in the vicinity of the power line, which could be displaced by the dismantling activities. Should this be the case, appropriate measures must be put in place to	1	1	1	1	1	1	5	-	Low

											prevent the displacement of the breeding birds, through the timing of activities.									
Surface Water																				
Watercourses – Impacts to the Watercourses	Impacts associated with disturbance and edge effects to watercourses	1	3	2	2	2	2	20	-	Low	**Avoiding Direct Impacts to the Watercourses** – No vegetation trimming and/or pruning must take place along the existing access roads running through the extent of the watercourse. However, where nearby vegetation trimming and/or pruning is required outside the extent of the watercourse, this must take place accordance with recommendations of the vegetation specialist. **Preventing Temporary Increased Run-off Impacting on Watercourses** – Vegetation clearing must take place in a phased manner, only clearing areas where construction will take place and not in areas where construction will only take place in the future. **Preventing Littering of Watercourses** – Provide sufficient facilities for litter disposal. Regular clean-ups are required to keep the construction area and adjacent watercourses clean. **Alien Eradication Programme** - An Alien Eradication and Removal Programme is to be compiled prior to construction and implemented for the duration of the proposed development	1	3	1	1	2	1	8	-	Low

Watercourse – Impacts to the Hydrology of the Watercourse	Impacts associated with accelerated run-off and associated increased flood peaks to the watercourse	2	3	2	2	1	2	20	-	Low	**<u>Preventing Increased Run-off and associated Erosion Impacting on Watercourses</u>** – Adequate structures, where necessary, must be put into place (temporary or permanent where necessary in extreme cases) to deal with increased / accelerated run-off and potential erosion. The use of silt fencing and potentially sandbags or hessian 'sausage' nets or other appropriate measures along the boundaries of the power line foundations and substations can be used where required to slow run-off entering the watercourses and the associated buffer zones, thereby preventing increase in flood peaks, run-off volumes and also the likelihood of erosion. An appropriate construction stormwater management plan formulated by a suitably qualified professional must accompany the proposed development to deal with increased run-off and associated sedimentation and erosion. An ECO must be appointed during the construction phase to oversee construction activities undertaken by contractors. The ECO must also monitor increased run-off and associated erosion impacts. Where additional mitigation measures are stipulated by the ECO in order to control increased run-off and erosion, this is to be undertaken accordingly.	1	2	2	2	2	1	9	-	Low
Watercourse – Impacts to Water Quality	Potential impacts associated with the leakage / spillage of oils, fuels and other	2	3	2	3	3	3	39	-	Medium	**<u>Storage of Oils, Fuels and Hazardous Substances / Liquids</u>** – All oils, fuels and hazardous substances or liquids must not be stored within 100m from the full extent of the	1	1	2	2	3	1	9	-	Low

	potentially hazardous substances from construction vehicles / machinery entering run-off and flowing into the watercourse. Pollution from workers using the watercourse for sanitation and cleaning purposes; as well as sedimentation via run-off polluting the watercourse.										watercourse and the associated buffer zone, unless such storage is unavoidable and is approved by the ECO. Where these items are stored, the storage area must be adequately bunded to contain any spillage from containers. Emergency spill kits must be available to clean up and remove spills. **<u>Preventing Soil and Surface Water Contamination</u>** – All vehicles and machinery operating on the study site are to be checked for oil, fuel or any other fluid leaks before entering the construction areas. All vehicles and machinery must be regularly serviced and maintained before being allowed to enter the construction areas. No fuelling, refuelling, vehicle and machinery servicing or maintenance is to take place within 100m of the watercourse and the associated buffer zone. The study site is to contain sufficient safety measures throughout the construction process. Safety measures include (but are not limited) oil spill kits and the availability of fire extinguishers. Additionally, fuel, oil or hazardous substances storage areas must be bunded to 110% capacity to prevent oil or fuel contamination of the ground and/or nearby watercourses and the associated buffer zones. No cement mixing is to take place in the watercourse or the associated buffer zone. In general, any cement mixing must take place over a bin lined (impermeable) surface or									

											alternatively in the load bin of a vehicle to prevent the mixing of cement with the ground. Cement / concrete can also be trucked in ready-mix vehicles. Importantly, no mixing of cement or concrete directly within the watercourse and associated buffer zone. No 'long drop' toilets are allowed on the study site. Suitable temporary chemical sanitation facilities are to be provided. Temporary chemical sanitation facilities must be placed at least 100m from the watercourse and the associated buffer zone, where required. Temporary chemical sanitation facilities must be checked regularly for maintenance purposes and cleaned often to prevent spills. **<u>Preventing Sedimentation Impacting on Surface Water Resources</u>** – Adequate structures, where required, must be put into place (temporary or permanent where necessary in extreme cases) to deal with sedimentation. The use of silt fencing and potentially sandbags or hessian 'sausage' nets or other appropriate measures along the boundaries of the power line foundations and substations can be used where required to prevent and/or reduce sediments entering the watercourse and the associated buffer zone. An appropriate construction stormwater management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation.									

										An ECO must be appointed during the construction phase to oversee construction activities undertaken by contractors. The ECO must also monitor sedimentation impacts. Where additional mitigation measures are stipulated by the ECO in order to control sedimentation, this is to be undertaken accordingly.									
Agricultural and Soils																				
Soil	Soil degradation and erosion	1	1	2	2	2	1	8	-	Low	-Control run-off; -Maintain vegetation cover; and -Strip, stockpile and re-spread topsoil.	1	1	2	2	2	1	8	-	Low
Geotechnical																				
Soils	Soil disturbance during decommissioning / deconstruction may destabilise the soil and lead to soil erosion. -Contamination of soil due to chemical spillages from equipment; -Construction and use of access roads by heavy duty vehicles and construction equipment may destabilise the soil and lead to soil erosion; -There may be spillages (petroleum /	1	4	2	1	1	1	9	-	Low	-Use of berms and drainage channels to direct water away from the decommissioning / deconstruction areas, where necessary; -Minimise earthworks and levelling; -Use existing access roads wherever possible; -Rehabilitate disturbed areas as soon as possible; -Add as much natural vegetation back as possible; -Try reinstate natural drainage patterns; -Have chemical spill kits on-site and remove all spill material when decommissioning any substations; -Maintain vehicles and only undertake repairs and maintenance work in designated areas; and -Contain and control stormwater flow.	1	2	1	1	1	1	6	-	Low

	lubricants) from the vehicles; and -There may be siltation of watercourses due to increased runoff and dust.																		
Visual																			
▪ Potential visual intrusion resulting from vehicles and equipment involved in the decommissioning process; ▪ Potential visual impacts of increased dust emissions from decommissioning activities and related traffic; and ▪ Potential visual intrusion of any remaining infrastructure on the site.	▪ Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts; ▪ Decommissioning activities may be perceived as an unwelcome visual intrusion; ▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers;	2	3	1	2	1	2	18	-	Low	-All infrastructure that is not required for post-decommissioning use must be removed; -Carefully plan to minimise the decommissioning period and avoid delays; -Maintain a neat decommissioning site by removing rubble and waste materials regularly; -Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase; -All cleared areas must be rehabilitated as soon as possible; and -Rehabilitated areas must be monitored post-decommissioning and remedial actions implemented as required.	2	2	1	2	1	2	16	-	Low

	▪ Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment; and ▪ Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.																			
Heritage																				
Impact on heritage resources	Impact on heritage resources during rehabilitation work associated with decommissioning - grading trench filling etc.	1	1	4	4	4	4	56	-	High	-Development of chance finds procedures to be included in the EMPr; and -Implement mitigation measures such as buffering, documentation and excavations and request destruction permits from the South African Heritage Resources Agency (SAHRA).	1	1	4	4	4	1	14	-	Low
Cumulative																				
Terrestrial Ecology																				
Vegetation	Loss and/or fragmentation of indigenous natural	2	4	4	2	4	2	32	-	Medium	-Limit development within conservation zones, especially CBA1 areas.	2	4	4	2	4	1	16	-	Low

	vegetation due to clearing																			
Plant species of concern and protected plants	Loss of individuals	2	4	2	3	3	2	28	-	Medium	-It is a legal requirement to obtain permits for specimens that will be lost; -Undertake a detailed pre-construction walk-through survey during a favourable season to locate any additional individuals of protected plants. This survey must cover the footprint of all approved infrastructure, including internal access roads; -Plants lost to the development can be rescued and planted in appropriate places in rehabilitation areas. This will reduce the irreplaceable loss of resources as well as the cumulative effect; -A Plant Rescue Plan must be compiled to be approved by the appropriate authorities; -Where large populations of affected species of high value are encountered, consideration must be given to shifting infrastructure to avoid such areas; -No authorisation must be given that results in the loss of populations of threatened plants; -Infrastructure must be relocated and a suitable buffer zone maintained around such populations; and -An ecological management plan must be compiled for such areas.	2	4	2	2	2	1	12	-	Low
Ecosystems	Changes to ecological processes at a landscape level	2	2	2	3	2	2	22	-	Low	-Limit development within conservation zones, especially CBA1 areas.	2	2	2	2	2	2	20	-	Low

Fauna	Mortality, displacement and/or disturbance	2	2	2	2	1	2	18	-	Low	-Apply site-specific mitigation measures.	2	2	2	1	1	1	8	-	Low
Vegetation, ecosystems and habitats	General increase in the spread and invasion of new habitats by alien invasive plant species	2	3	2	3	3	2	26	-	Medium	-Implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control; -Undertake regular monitoring to detect alien invasions early so that they can be controlled; -Post-decommissioning monitoring must continue for an appropriate length of time to ensure that future problems are avoided; and -Do NOT use any alien plants during any rehabilitation that may be required.	2	2	2	2	3	1	11	-	Low
Ecosystems and vegetation	Reduction in the opportunity to undertake or plan conservation, including effects on CBAs and ESAs, as well as on the opportunity to conserve any part of the landscape	3	3	2	3	4	2	30	-	Medium	-Avoid development within conservation zones, especially CBA1 areas.	3	3	2	2	4	2	28	-	Medium
Surface Water																				
Watercourse - Cumulative Impacts to Hydrology of Region	Increased run-off as well as associated erosion and sedimentation impacts	2	3	2	2	3	3	36	-	Medium	**Minimising Stormwater Impacts to Watercourses** – The substation and access roads must have energy dissipating structures where required to prevent increased run-off and sediments contained in the run-off entering adjacent areas or surface water resources. This will assist in erosion prevention as well. Structures can be in the form of hard concrete structures or soft engineering structures (such as grass blocks for example).	2	2	2	1	3	2	20	-	Low

											Alternatively, a suitable operational stormwater management design or plan can be compiled and implemented that accounts for the use of appropriate alternative structures or devices that will prevent increased run-off and sediment entering the watercourses thereby, also preventing erosion. ECO monitoring is to take place during the post-construction rehabilitation phase. Monitoring is to take place for erosion as well as re-establishment of vegetation where trenching for cabling has taken place.									
Agriculture and Soils																				
Soil	Soil degradation and erosion	2	1	2	2	2	1	9	-	Low	-Control run-off; -Maintain vegetation cover; and -Strip, stockpile and re-spread topsoil.	2	1	2	2	2	1	9	-	Low
Visual																				
▪ Potential alteration of the visual character and sense of place in the broader area; ▪ Potential visual impact on receptors in the study area; and ▪ Potential impact on the night time visual environment.	▪ Additional renewable energy and associated infrastructure developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts;	3	3	2	3	3	2	28	-	Medium	▪ Where possible, limit the number of maintenance vehicles using access roads; ▪ Non-reflective surfaces must be utilised where possible; ▪ Where possible, limit the amount of security and operational lighting present at the on-site substations; and ▪ Light fittings for security at night must reflect the light toward the ground and prevent light spill.	3	3	2	2	2	2	24	-	Medium

	▪ Visual intrusion of multiple renewable energy and infrastructure developments may be exacerbated, particularly in more natural undisturbed settings; ▪ Additional renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes; and ▪ The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area.																			
Heritage																				
Impact on heritage resources	Additional impact of the development on heritage resources adding to the current cumulative impact of	2	2	4	4	4	2	32	-	Medium	-Develop chance finds procedures to be included in the EMPr; and -Implement mitigation measures such as buffering, documentation and excavations and request destruction permits from the	1	1	4	4	4	1	14	-	Low

	existing or proposed developments in the region										South African Heritage Resources Agency (SAHRA).									
Impact on palaeontological resources	Additional impact of the development on palaeontological resources adding to the current cumulative impact of existing or proposed developments in the region	2	2	4	4	4	2	32	-	Medium	-Develop chance finds procedures to be included in the EMPr; and -Implement mitigation measures such as buffering, documentation and excavations and request destruction permits from the South African Heritage Resources Agency (SAHRA).	1	1	4	4	4	1	14	-	Low
Palaeontology																				
Fossil Heritage	Excavations and site clearance of the development will involve substantial excavations into the superficial sediment cover as well as locally into the underlying bedrock.	2	2	4	4	4	2	32	-	Medium	-A palaeontologist must conduct a field visit after vegetation clearance; -Fossil Excavation will need a South African Heritage Resources Agency (SAHRA) permit; and -If an excavation is impossible, the fossil and locality must be protected and the development moved.	1	1	4	4	4	1	14	-	Low
Social																				
Risk of HIV infection	Risk associated with the influx of workers in the area.	3	3	4	3	4	3	51	-	High	**Mitigation can only be implemented on a regional basis and are not project specific.** -Ensure that all companies coming into the area have and are implementing an effective HIV / AIDS policy; -Introduce HIV / ADS awareness programs to schools and youth institutions; -Carefully monitor and report on the HIV status of citizens in the region; and	3	2	4	3	4	2	32	-	Medium

											-Be proactive in dealing with any increase in the HIV prevalence rate in the area.									
Sense of place	The transformation of the sense of place of the region.	2	4	4	3	4	3	51	-	High	**<u>Mitigation measures can only be implemented on a regional basis and are not project specific.</u>** -Consider undertaking a cumulative impact assessment to evaluate the changes taking place across the area on a broader scale; -Form a regional work group tasked with addressing the effect of changes to the sense of place of the region; -Establish grievance mechanisms to deal with complaints associated with changes to the area; -Enlighten the public about the need and benefits of renewable energy; and -Engage with the tourism businesses and authorities in the region to identify any areas of cooperation that could exist.	2	4	4	3	4	2	34	-	Medium
Services, supplies and infrastructure	The influx of construction workers is likely to place pressure on accommodation and the need for both services and supplies.	2	3	2	2	2	2	22	-	Low	**<u>Mitigation measures can only be implemented on a regional basis and are not project specific.</u>** -Engage with the municipal authorities to ensure that they are aware of the expansion planned for the area and the possible consequences of this expansion; and -Ensure that local labour is recruited in respect of these developments in the area.	2	2	2	2	2	2	20	-	Low

Economic	A proliferation of renewable energy facilities across the region is likely to result in significant and positive impacts in the area in terms of job creation, skills development, training opportunities and the creation of business opportunities for local businesses.	3	3	2	2	2	3	36	+	Medium	**<u>Optimisation measures can only be implemented on a regional basis and are not project specific.</u>** -Implement a training and skills development programme for locals; -Ensure that the procurement policy supports local enterprises; -Work closely with the appropriate municipal structures in regard to establishing a social responsibility programme; and -Ensure that any trusts or funds are strictly managed in respect of outcomes and funds allocated.	3	3	2	2	2	4	48	+	High

7.3 Assessment of Cumulative Impacts

The area has seen a notable interest from developers of various renewable energy developments, which could be associated with the energy resource potential found in the region, proximity to the grid access and its evacuation capacity, as well as other factors. Such developments, whether already approved or only proposed, need to be considered as they have the potential to create cumulative impacts, whether positive or negative, if implemented. The potential cumulative impact of the proposed development in combination with other renewable energy facilities in the area have been identified and assessed per environmental aspect and mitigation measures will be identified to address the cumulative impact, where possible. Cumulative impacts were also rated as part of the impact rating system and used to determine the significance of the impacts (refer to **Table 21** in **section 7.2** above). The specialists have identified specific cumulative impacts, and these are outlined below.

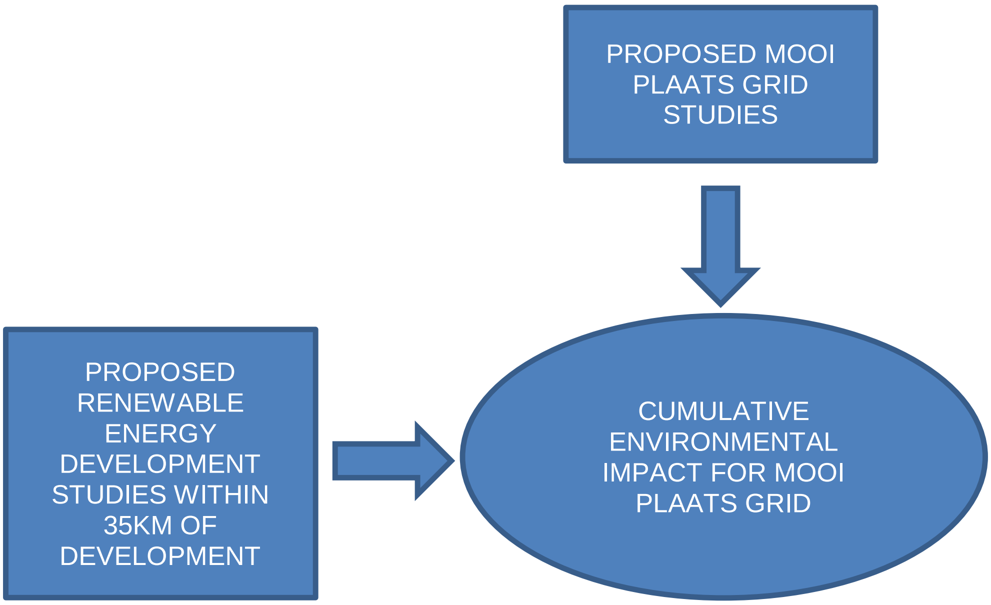

Figure 49: Cumulative Impact Organogram

As part of the Cumulative Impact Assessment, literature reviews of other specialist assessments / studies which were undertaken for the other renewable energy developments (both wind and solar) proposed within a 35km radius of the proposed development (**Figure 50**) were undertaken by the respective specialists in order to ascertain any additional cumulative impacts that should be taken into consideration. A fair amount of information was available and was provided to the respective specialists to assess and incorporate into their respective assessment reports, where applicable. **Table 22** below highlights the renewable energy developments that are operational, being proposed and/or which are approved within a 35km radius of the proposed development, as well as the various stages of the development. Their location relative to the proposed development under review is illustrated in **Figure 50**.

Table 22: Renewable energy developments identified within a 35km radius of the proposed development

Project	DEFF Reference No	Technology	Capacity	Status of Application / Development
Allemans Fontein SEF	14/12/16/3/3/1/730	Solar	20MW	Approved
Carolus Poort SEF	14/12/16/3/3/1/729	Solar	20MW	Approved
Damfontein SEF	14/12/16/3/3/1/728	Solar	20MW	Approved
Gillmer SEF	14/12/16/3/3/1/735	Solar	20MW	Approved
Inkululeko SEF	14/12/16/3/3/1/553	Solar	20MW	Approved
Kleinfontein SEF	12/12/20/2654	Solar	20MW	Approved
Klip Gat SEF	14/12/16/3/3/2/354	Solar	75M	Approved
Linde SEF	12/12/20/2258	Solar	40MW	In Operation
Linde SEF (Expansion)	14/12/16/3/3/1/1122	Solar	75MW	Approved
Middelburg Solar Park 1	12/12/20/2465/2	Solar	75MW	Approved
Middelburg Solar Park 2	12/12/20/2465/1	Solar	75MW	Approved
Naauw Poort SEF	14/12/16/3/3/2/355	Solar	75MW	Approved
Toitdale SEF	12/12/20/2653	Solar	20MW	Approved
Noupoort Wind Farm	12/12/20/2319	Wind	188MW	In Operation
Phezukomoya WEF	14/12/16/3/3/1/1028	Wind	315MW	EIA in Process
San Kraal WEF	14/12/16/3/3/1/1069	Wind	390MW	EIA in Process
Umsobomvu WEF	14/12/16/3/3/2/730	Wind	140MW	Approved
Mooi Plaats Solar PV	14/12/16/3/3/2/1134	Solar	400MW	EIA in process
Wonderheuvel Solar PV	14/12/16/3/3/2/1135	Solar	480MW	EIA in process
Paarde Valley Solar PV	14/12/16/3/3/2/1136	Solar	700MW	EIA in process

The renewable energy development listed above are in different stages of planning, ranging from developments that have been constructed and are in operation, to developments where the EIAs / BAs are still being conducted.

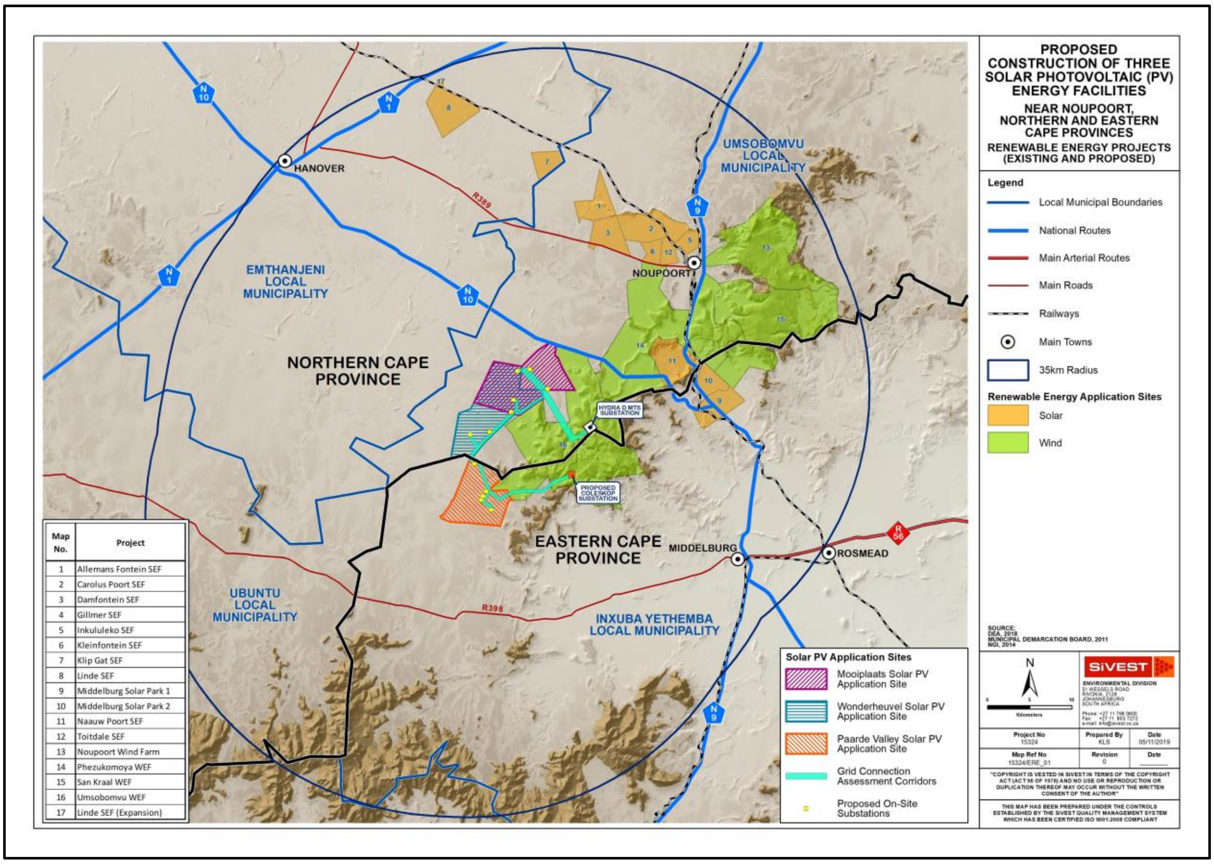

Figure 50: Map showing other proposed renewable energy developments within 35km radius of the proposed development

It should be noted that SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments. However, many of the documents are not currently publicly available to download. The information that could be obtained for the surrounding planned renewable energy developments was taken into account as part of the cumulative impact assessment.

The information (including specialist studies, EIA / Scoping and EMPr Reports) that could be obtained for the surrounding proposed renewable energy sites that were taken into account by the various specialists is elaborated on below.

7.3.1 Terrestrial Ecology

Environmental Impact Reports for a number of the renewable energy developments listed in **Table 22** above were made available to assess cumulative impacts for the current proposed development. A summary of the main impacts and associated mitigation measures are provided in **Table 23** below.

Table 23: Ecological impacts and proposed mitigation measures for renewable energy developments within a 35km radius of the proposed development

Impact	Mitigation measures	Project
▪ Loss of vegetation ▪ Increase in runoff and erosion ▪ Loss of and alteration of microhabitats ▪ Establishment and spread of alien invasive species ▪ Ecological degradation and loss of ecological integrity ▪ Fragmentation and reduction in core habitat	▪ Make use of existing tracks. ▪ Plant search and rescue. ▪ Minimise habitat loss. ▪ Remove and collect all succulent and bulbous plants from cleared areas and transplant into newly redistributed topsoils. ▪ Prevent pollution of the environment. ▪ Re-establish vegetation where possible. ▪ Implement an invasive / exotic species eradication programme. ▪ Keep new developments close to existing developed areas and/or keep components of the new development as close together as possible. ▪ New power lines should follow existing servitudes.	▪ Allemans Fontein Solar Energy Facility ▪ Carolus Poort Solar Energy Facility ▪ Damfontein PV Solar Energy Facility ▪ Gillmer Solar Energy Facility
▪ Loss of vegetation ▪ Increase in runoff and erosion ▪ Loss of and alteration of microhabitats ▪ Altered vegetation cover ▪ Altered distribution of rainfall ▪ Spread and establishment of alien invasive species ▪ Oil and chemical contamination of habitats	▪ Use existing roads. ▪ Keep affected footprint to a minimum. ▪ Create structures under roads to permit free-flow of water. ▪ Reinforce existing roads and create berms to limit erosion. ▪ Prevent leakage of oil and other chemicals. ▪ Remove topsoil and redistribute to mimic microtopography of the original vegetation. ▪ Monitor the establishment of alien vegetation and remove as soon as detected. ▪ After decommissioning, rehabilitate disturbed areas. ▪ Maintain natural vegetation cover under panels. ▪ Place power line pylons as far as possible outside drainage lines.	▪ Inkululeko Solar Energy Facility
▪ Loss of protected plants ▪ Loss of faunal habitat	▪ Cause minimum damage to the environment with construction equipment. ▪ Restrict construction activities to development footprint. ▪ Use existing roads as far as possible. ▪ Check final footprint for burrows of small mammals.	▪ Kleinfontein Solar Energy Facility ▪ Toitdale Solar Energy Facility
▪ Direct loss of vegetation ▪ Spread of declared weeds and alien invader plants ▪ Loss of faunal habitat	▪ Keep development impact within footprint area. ▪ Disturbed areas should be rehabilitated as soon as possible. ▪ Establish a monitoring programme to detect alien invasive plant species. ▪ An active re-vegetation plan should be implemented to assist the return of natural indigenous species.	▪ Klip Gat Solar Energy Facility ▪ Tollie PV
▪ Alteration of vegetation cover ▪ Erosion ▪ Disruption of ethology of species	No specific measures proposed, habitat considered to be of low value.	Nine Scatec sites

Impact	Mitigation measures	Project
▪ Loss of individuals of species of concern ▪ Loss of habitat / indigenous natural vegetation ▪ Impacts on ecosystem function	▪ Contain impacts to within footprint of infrastructure. ▪ Implement measures to minimise erosion. ▪ Implement a storm-water management plan. ▪ Limit disturbance to vegetation surrounding infrastructure. ▪ Rehabilitate disturbed areas as quickly as possible. ▪ Avoid translocating soil stockpiles from areas containing alien plants. ▪ Control alien plants. ▪ Establish a monitoring programme to detect and control alien plants.	Middelburg Solar Park
▪ Direct loss of vegetation ▪ Disturbance to vegetation and associated habitats ▪ Spread of declared weeds and alien invasive species	▪ Search and Rescue all translocatable indigenous plants. ▪ Prevent contamination by oil, diesel and other contaminants.. ▪ Mitigate disturbance or loss of natural vegetation ▪ Control declared weeds and alien invasive plants. ▪ Mitigate loss of fauna. ▪ Prevent damage to drainage systems. ▪ Minimise soil degradation and erosion.	Naauwpoort Solar Energy Facility
▪ Loss of natural vegetation ▪ Loss of habitat for red data and general species ▪ Loss of species richness ▪ Edge effects ▪ Erosion ▪ Introduction of exotic species ▪ Loss of habitat for fauna	▪ Maintain footprint strictly during construction ▪ Conduct walk-through survey prior to construction to conduct a search and rescue ▪ Retain indigenous vegetation, where possible ▪ Demarcate sensitive areas prior to construction ▪ Vegetation to be removed only when necessary ▪ No vegetation to be used for firewood ▪ Implement a programme of weed control ▪ Grass soil stockpiles to prevent weed invasion ▪ Avoid emergence of alien invasive species ▪ Use existing access roads ▪ Compile a rehabilitation plan ▪ Revegetate any disturbed areas as a priority to avoid erosion ▪ Put in place suitable stormwater / wind controls until rehabilitation is completed	Noupoort Wind Farm
▪ Faunal habitat loss ▪ Loss of vegetation and listed / protected plant species ▪ Impacts on fauna	▪ Avoid placement of infrastructure within High sensitivity areas and drainage lines. ▪ Preconstruction walk-through of approved development footprint. ▪ Rehabilitate disturbed areas, for example laydown areas, after use. ▪ Minimise development footprint. ▪ Rehabilitate disturbed areas that are no longer required by the operational phase of the development. ▪ Exact routing of roads should be adjusted to avoid sensitive habitats. ▪ Pre-construction environmental induction for all construction staff.	▪ Phezukomoya Wind Energy Facility ▪ San Kraal Wind Farm

Impact	Mitigation measures	Project
	▪ Demarcate sensitive areas in close proximity to the development footprint as 'no-go' areas. ▪ During construction, any fauna directly threatened by construction activities should be removed to a safe location. ▪ Illegal collection, hunting or harvesting should be strictly forbidden. ▪ No fires in open veld. ▪ No fuelwood collection on-site. ▪ No dogs or cats should be allowed on-site. ▪ Control type, nature and timing of night-time lighting. ▪ Store all hazardous materials in an appropriate manner. ▪ No unauthorised persons to be allowed on-site and implement site access control. ▪ Enforce speed limits. ▪ If electric fencing is required anywhere, this should be designed to minimise impacts on fauna. ▪ Manage erosion according to an Erosion Management Plan and Rehabilitation Plan. ▪ All roads and hardened surfaces should have runoff control features. ▪ Regular monitoring of erosion. ▪ All cleared areas should be revegetated with indigenous species from the local area. ▪ Wherever excavation is necessary, topsoil should be set aside and replaced after construction. ▪ Implement a long-term alien plant management plan. ▪ Regular monitoring for alien plants within the development footprint as well as surrounding areas. ▪ Undertake regular clearing of alien plants using best-practice methods for the species concerned. ▪ No excavated holes or trenches should be left open for extended periods. ▪ Regular monitoring for at least two years after decommissioning to ensure that no erosion problems develop. ▪ All erosion problems observed should be rectified as soon as possible using appropriate erosion control methods.	

Note that none of the projects recorded threatened plant species or protected trees.

7.3.1.1 Description of Cumulative Impacts

There are various cumulative impacts that may occur as a result of the combined impact of a number of similar projects in the area, as follows:

1. Loss and/or fragmentation of indigenous natural vegetation due to clearing;
2. Loss of individuals of plant species of conservation concern and/or protected plants;
3. Changes to ecological processes at a landscape level;
4. Mortality, displacement and/or disturbance of fauna;
5. General increase in the spread and invasion of new habitats by alien invasive plant species;
6. Reduction in the opportunity to undertake or plan conservation, including effects on CBAs and ESAs, as well as on the opportunity to conserve any part of the landscape; and
7. Positive cumulative impact on climate change.

Cumulative impacts on indigenous natural vegetation

The regional terrestrial vegetation types in the broad study area are listed as Least Threatened and generally have large areas. Loss of habitat will definitely occur, which will be a small area in comparison to the total area of the vegetation type. The total loss of habitat due to a number of projects together will be greater than for any single project, so a cumulative effect will occur. However, the area lost in total will be small compared to the total area of the vegetation types concerned. Of more concern is the total degree of fragmentation due to the combination of all projects, which will be much more significant than gross loss of habitat, measured in hectares. Direct loss of habitat will not result in a change in the conservation status of the vegetation types, but overall degradation due to fragmentation effects may be cause for concern. The cumulative effect will therefore be low for vegetation loss, but possibly significant for fragmentation. In addition, the current project is located in a rural area with the no existing infrastructure nearby, as is the case with all the other proposed projects. This will fundamentally change the character of this area in terms of its remoteness and natural state.

Cumulative impacts on plant species of concern and protected plant species

There are no plant species of conservation concern for the site, but there are various protected plant species that may occur in the study area, all of which are relatively widespread. Constructing the current project increases the likelihood of individuals being affected, but unless large numbers of individuals are directly affected, there will only be small cumulative effects.

Cumulative impacts on ecological processes

There are various ecological processes that may be affected at a landscape level by the presence of multiple projects. This includes obvious processes, such as migration, pollination and dispersal, but also more difficult to interpret factors, such as spatial heterogeneity, community composition and environmental gradients, that can become disrupted when landscapes are disturbed at a high level. Disturbance can alter the pattern of variation in the structure or function of ecosystems. Fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. An important consequence of repeated, random clearing is that contiguous cover can break down into isolated patches. This happens when the area cleared exceed a critical level and landscapes start to become disconnected. Spatially heterogeneous patterns can be interpreted as individualistic responses to environmental gradients and lead to natural patterns in the landscape. Disrupting gradients and creating disturbance edges across wide areas is very disruptive of natural processes and will lead to fundamental changes in ecosystem function. It is possible that this could be a cumulative consequence of the combined projects, but it is difficult to determine without a detailed assessment of fragmentation of the combination of all the projects.

Cumulative impacts on fauna

Construction activities, loss of habitat, noise, dust and general activity associated with the construction phase of the project are likely to cause all mobile species to move away from the area. This effect will be increased if there are a number of projects being constructed at the same time or in quick succession, so the effect is likely to be cumulative. However, the geographical ranges of the species of concern is wide and it is considered that the significance of the effect will be low in the long-term, although probably significant during the combined construction phase of the projects. It is possible that some species will be more significantly negatively affected than others, especially shy species, territorial species that get displaced, or those with large territories that get shrunk. It is also possible that some species will benefit from the increased presence of humans and will migrate into the area. This will possibly cause additional shifts in other species that are affected by the increase in numbers or new species.

Cumulative impacts due to spread of declared weeds and alien invader plants

There is a moderate to high possibility that alien plants could be introduced to areas within the footprint of the proposed infrastructure from surrounding areas in the absence of control measures. The greater the number of projects, the more likely this effect will happen; therefore, the effect is cumulative. For the current site, the impact is predicted to be a moderate to high risk due to the current presence of various invasive species on-site and in surrounding areas. The significance will probably be low if control measures are implemented. However, the increased overall disturbance of the landscape will create invasion opportunities and, if new invasions are not controlled, can create nodes that spread to new locations due to the heightened disturbance levels.

Cumulative impacts due to loss of protected animals

There are various animal species protected according to National legislation that occur in the geographical area covered by the combined projects. Some of these animals may be vulnerable to secondary impacts, such as hunting, roadkill and illegal collecting. The greater the number of projects, the more likely this effect will happen; therefore, the effect is cumulative. However, in all cases, the geographical distribution of each species is much wider than the combined project areas. The significance will therefore be low, especially if control measures are implemented.

Cumulative impacts on CBAs and conservation planning

Significant proportions of the site and surrounding sites are included in CBAs for the Northern Cape. Disruption of these areas means that conservation planners have to find alternative sites to include in future CBAs according to an algorithm that seeks a least-cost outcome for preserving biodiversity, i.e. the least amount of land space for preserving the greatest amount of area of biodiversity importance, as well as meeting specific conservation targets. At some point, the loss of suitable sites leads to a situation where it is no longer possible to plan effective conservation networks or the cost of doing so increases due to a lack of choice. The higher the density of similar projects in a uniform area, the less chance there is of finding sites suitable for conservation that contain all the attributes that are desired to be conserved, including both ecological processes and ecological patterns.

Cumulative impact on climate change

One (1) of the primary reasons for promoting renewable energy projects is the desire to make South Africa compliant with international treaties regarding climate-change effects. The combined generation capacity of all the renewable energy projects considered here is just less than 1 600MW, which is more than half of the average size of one (1) of the fourteen (14) coal power stations in South Africa (Eskom's Generation Division has fourteen (14) coal-fired power stations with an installed capacity of 38 548MW, www.eskom.co.za). A reduction in reliance on coal power would improve the air quality of the Mpumalanga Highveld (where many of these power stations are located), reduce the amount of coal-mining that would take place (which has a devastating effect on biodiversity resources and water quality) and would reduce the per capita carbon footprint of our country. Greater uptake of renewable energy would furthermore reduce the global risk of climate change, one (1) of the factors taken into account in designing the conservation network in South Africa. The construction of renewable energy projects can be viewed as an offset for other carbon-generating technology.

7.3.1.2 Assessment of Cumulative Impacts

Based on the assessment undertaken (refer to **Table 21** on **page 206**), all cumulative impacts can be reduced to a LOW significance with mitigation measures, with the exception of '*Reduction in the opportunity to undertake or plan conservation, including effects on CBAs and ESAs, as well as on the opportunity to conserve any part of the landscape'*, which has a residual significance of MEDIUM. Based on this assessment, it is considered that the cumulative impacts are acceptable.

7.3.2 Avifauna

Cumulative effects are commonly understood to be impacts from different projects that combine to result in significant change, which could be larger than the sum of all the individual impacts. The assessment of cumulative effects therefore needs to consider all renewable energy developments (wind and solar) within at least a 35km radius of the proposed development. The seventeen (17) renewable energy developments which are planned or authorised are listed in **Table 22** and displayed in **Figure 50**. Appendix 4 of the Avifaunal Specialist Study Report (**Appendix 6B**) lists the renewable energy developments together with the relevant recommended mitigation measures pertaining to birds.

7.3.2.1 Grid Connection

In the case of the grid connections, the existing high voltage grid (66 - 400kV) in the 35km radius around the proposed development comes to about 300km. The existing and proposed renewable energy developments add approximately 60km of sub-transmission lines to this. The proposed development will add another approximately 34 – 40km of sub-transmission line, depending which alternative is used. This translates into an 11% increase in the length of existing and proposed high voltage line within the 35km radius around the proposed development. The most significant potential impact of high voltage lines within the aforesaid 35km radius is bird collisions with the earth wires of the lines. An 11% increase in line length should represent a **medium** increase in cumulative risk, which could be mitigated to a **low** level with the application of appropriate mitigation measures. This is on the assumption that the proposed mitigation measures as detailed in the EIA reports, namely the marking of lines, will be implemented at all the relevant sites.

7.3.3 Surface Water

Cumulative impacts are hard to predict even with knowledge of other sites in the general area that are also going to be developed. A single solar energy facility has little impact beyond the borders of the site, however, when several solar energy facilities are developed in an area, there is potentially a large cumulative impact. Negative impacts linked to roads are frequently cited as one (1) of the major effects of renewable energy developments on watercourses and water resources. These impacts include increased hardened surfaces, erosion, and direct loss of watercourse habitat. However, given the semi-arid to arid system that the proposed development will impact upon it is unlikely that large-scale impacts will be impacted by the construction of the proposed development on the project site, and the cumulative impact of the other developments in the area on water resources is likely to still pose a low risk to these systems if correct mitigation measures are implemented. Most of the drainage of the site does not join that were found on the sites to the south of the study area, and thus the effects of the neighbouring land parcels being developed will have little impact on the study area drainage. There are however a few developments to the east and north of the site that also drain towards the Klein-Seekoei River but correct use of mitigation measures within the project site will ensure that the cumulative impact will have minimal impact on the other sites in the area. Thus, no immediate cumulative impact to the drainage patterns of the site are predicted.

On a larger scale, all the drainage of the sites enters the Klein-Seekoei River which flows into the Orange River away from site. Thus, if the sites to the north cause a hydrological impact, and the Mooi Plaats site causes a hydrological impact, these impacts (increased run-off as well as associated erosion and sedimentation impacts) will eventually meet in the Seekoei River and exacerbate each other. However, the risk of either site causing a significant impact is small if all appropriate mitigation (as contained in **Table 21**) that has been proposed is implemented.

SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments. However, many of the documents are not currently publicly available to download. The information that could be obtained for the surrounding planned renewable energy developments were considered as part of the cumulative impact assessment.

7.3.4 Agriculture and Soils

The discussion of cumulative impacts applies to the grid connection infrastructure as well. However, because the agricultural impacts of grid connection infrastructure are negligible, the cumulative impacts are even lower than those for the solar PV facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134). This environment could accommodate many more overhead power lines than currently exist or than are proposed, before acceptable levels of land loss and degradation as a result of transmission lines have any likelihood of being exceeded. Acceptable levels of change in terms of other areas of impact, such as visual impact, would be exceeded long before agricultural levels of change came anywhere near to being exceeded.

7.3.5 Visual

Although it is important to assess the visual impacts of the proposed grid connection infrastructure specifically, it is equally important to assess the cumulative visual impact that could materialise if other renewable energy facilities (both wind and solar facilities) and associated infrastructure projects are developed in the broader area. Cumulative impacts occur where existing or planned developments, in conjunction with the proposed development, result in significant incremental changes in the broader study area. In this instance, such developments would include renewable energy facilities and associated infrastructure development.

Renewable energy facilities have the potential to cause large scale visual impacts and the location of several such developments in close proximity to each other could significantly alter the sense of place and visual character in the broader region. Although power lines and substations are relatively small developments when compared to renewable energy facilities, they may still introduce a more industrial character into the landscape, thus altering the sense of place.

Seventeen (17) renewable energy developments were identified within a 35km radius of the proposed grid connection infrastructure (**Figure 50**). These projects, as listed in **Table 22**, were identified using the DEFF's Renewable Energy EIA Application Database for SA in conjunction with information provided by IPPs operating in the broader region. It is assumed that all of these renewable energy developments include grid connection infrastructure, although few details of this infrastructure were available at the time of writing this report.

The relatively large number of renewable energy facilities within the surrounding area and their potential for large scale visual impacts could significantly alter the sense of place and visual character in the broader region, as well as exacerbate the visual impacts on surrounding visual receptors, once constructed.

As can be seen from **Table 22**, thirteen (13) of these developments are solar PV energy facilities, most of which are located more than 10km from the proposed development, clustered on the western edge of Noupoort and also to the north of Main Road 389 and along an existing rail route . Given the distance from the study area and the concentration of these facilities in close proximity to existing built infrastructure, it is not anticipated that these developments will result in any significant cumulative impacts affecting the landscape or the visual receptors within the assessment zone for the proposed development. It should be noted that although all of these solar PV energy facility applications were approved at least five (5) years ago, to date only one (1) has been constructed.

The remaining four (4) projects are wind energy facilities (WEFs), all of which are located on the hillier terrain to the east of the proposed development. Although WEFs are expected to have different impacts when compared to solar PV projects, these renewable energy developments are however relevant as they influence the cumulative visual impact of the proposed development.

The proposed San Kraal WEF is located well outside the visual assessment zone, just east of the N9 national route, while only a small portion of the Phezukomoya WEF, which is located immediately west of the N9, is located within 5km of the proposed development. As such, these WEFs are not expected to give rise to any significant cumulative impacts on the landscape or visual receptors within the study area.

The remaining WEF, namely Umsobomvu WEF, is however almost entirely within 5km of the proposed development, and is in fact adjacent to sections of the proposed development. It is understood that most of the proposed turbines on the WEF development site will be located on high-lying plateaus and ridges and as such they will be visible to many of the visual receptors in the assessment area.

This proposed WEF, in conjunction with the proposed solar PV facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) and associated grid connection infrastructure, will inevitably introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts.

It should be noted however that PV panels, at an approximate height of 4m, are considerably less visible than wind turbines and as such the proposed solar PV facilities would be outside the viewshed of many of the potentially sensitive receptor locations identified in the study area. Cumulative impacts affecting these receptors would therefore be reduced and the severity of these impacts would depend on the perceptions of the receptors.

A cursory examination of the literature available for the environmental assessments undertaken for many of these renewable energy applications showed that the visual impacts identified and the recommendations and mitigation measures provided are largely consistent with those identified in this report. Where additional mitigation measures were provided in respect of the other renewable energy applications, these have been incorporated into this report where relevant.

From a visual perspective, the further concentration of renewable energy facilities as proposed will inevitably change the visual character of the area and alter the inherent sense of place, introducing an increasingly industrial character into the broader area, and resulting in significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures put forward by the visual specialists in their respective reports.

7.3.6 Heritage

The cumulative impact on heritage resources evaluated a 35km radius (**Figure 50**). It must further be noted that the evaluation is based on available heritage studies (**Table 24**) and cannot take the findings of outstanding studies on current on-going EIA's in consideration.

The following must be considered in the analysis of the cumulative effect of development on heritage resources:

- **Fixed datum or dataset:** There is no comprehensive heritage dataset for the region and thus we cannot quantify how much of a specific cultural heritage element is present in the region. The region has never been covered by a heritage resources study that can account for all heritage resources. Further to this, none of the heritage studies conducted can with certainty state that all heritage resources within the study area has been identified and evaluated;
- **Defined thresholds:** The value judgement on the significance of a heritage site will vary from individual to individual and between interest groups. Thus, implicating that heritage resources' significance can and does change over time. And so, will the tipping threshold for impacts on a certain type of heritage resource; and
- **Threshold crossing:** In the absence of a comprehensive dataset or heritage inventory of the entire region we will never be able to quantify or set a threshold to determine at what stage the impact from developments on heritage resources has reached or is reaching the danger level or excludes the new development on this basis. (Godwin, 2011).

Keeping the above short comings in mind, the methodology in evaluating cumulative impacts on heritage resources has been as follows:

The analysis of the completed studies as listed in **Table 24** below, took in to account the findings and recommendation of each of the seventeen (17) evaluated HIA's. The cumulative impact on the cultural landscape was discounted as the HIA's, in most cases, did not address this and the VIA covers such analysis in detail.

The overall findings of the seventeen (17) studies all concur that the area is characterised by numerous Stone Age findspots and archaeological resources. Many these concentrated around outcrops in a landscape where water, food and shelter came at a premium. The sites around the outcrops where in most cases given a medium to high heritage significance on a local scale and in the majority of the cases were recommended as being 'no-go' areas or extensive mitigation is required.

This cumulative assessment has also not addressed the possible cumulative impacts on the heritage landscape. The evaluated studies have in most cases not addressed or quantified the possible impact on the cultural landscape.

Table 24 below provides an analysis of the projected cumulative impact this proposed development will add to impact on heritage resources.

The significance of the cumulative impacts is assessed in **Table 21** on **page 206**. The projected impact significance for the proposed development on heritage resources is MEDIUM before mitigation and management and will reduce to LOW.

Table 24: Heritage Impact Assessments conducted within 35km from the proposed development

Project	DEFF Reference No	Findings	Recommendations
Allemans Fontein SEF	14/12/16/3/3/1/730	Surface scatters of middle stone age artefacts occurred over the extent of the area. Most were however disturbed and of low heritage value. No. Although the area was underlain by fossiliferous mudstone and sandstone no palaeontological significant finds were made.	General management measures such as informing SAHRA and chance finds procedure to be put in place.
Carolus Poort SEF	14/12/16/3/3/1/729	Surface scatters of middle stone age and later stone age artefacts occurred over the extent of the area. Most were however disturbed and of low heritage value. Although the area was underlain by fossiliferous mudstone and sandstone, no palaeontological significant finds were made.	General management measures such as informing SAHRA and chance finds procedure to be put in place.
Damfontein SEF	14/12/16/3/3/1/728	Surface scatters of middle stone age and later stone age artefacts occurred over the extent of the area. Most were however disturbed and of low heritage value.	General management measures such as informing SAHRA and chance finds procedure to be put in place.
Gillmer SEF	14/12/16/3/3/1/735	Surface scatters of middle stone age and later stone age artefacts occurred over the extent of the area. One (1) single collapsed stone structure was discovered. Most were however disturbed and of low heritage value. Although the area was underlain by fossiliferous mudstone and sandstone, no palaeontological significant finds were made.	General management measures such as informing SAHRA and chance finds procedure to be put in place.
Inkululeko SEF	14/12/16/3/3/1/553	Surface scatters of middle stone age and later stone age artefacts occurred over the extent of the area.	General management measures such as informing SAHRA and chance finds procedure to be put in place.
Kleinfontein SEF	12/12/20/2654	Surface scatters of middle stone age artefacts occurred over the extent of the area.	General management measures such as informing SAHRA and chance finds procedure to be put in place.
Klip Gat SEF	14/12/16/3/3/2/354	Surface scatters of middle stone age and later stone age artefacts occurred over the extent of the area. One (1) single collapsed stone structure was discovered. One (1) area of high significance was demarcated. Although the area was underlain by fossiliferous mudstone and sandstone, no palaeontological significant finds were made.	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was recommended.
Linde SEF	12/12/20/2258	One (1) site was identified with a cultural heritage resource, a stone redoubt emanating from the Second Boer War together with a portion of low gauge railway line. The resource has been excluded from the development footprint on-site H, Taaibos.	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was

Project	DEFF Reference No	Findings	Recommendations
			recommended. Buffering of the site was recommended.
Linde SEF (Expansion)	14/12/16/3/3/1/1122	One (1) site was identified with a cultural heritage resource, a stone redoubt emanating from the Second Boer War together with a portion of low gauge railway line. The resource has been excluded from the development footprint on-site H, Taaibos.	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was recommended. Buffering of the site was recommended.
Middelburg Solar Park 1	12/12/20/2465/2	Surface scatters of middle stone age and later stone age artefacts occurred over the extent of the area. A few stone outcrops showed higher concentrations of lithics and required buffering.	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was recommended. Buffering some sites were recommended.
Middelburg Solar Park 2	12/12/20/2465/1	Surface scatters of middle stone age and later stone age artefacts occurred over the extent of the area. A few stone outcrops showed higher concentrations of lithics and required buffering.	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was recommended. Buffering some sites were recommended.
Naauw Poort SEF	14/12/16/3/3/2/355	Surface scatters of middle stone age and later stone age artefacts occurred over the extent of the area. A few dry pack stone walls were identified as having a medium heritage significance. One (1) area of high significance was demarcated. Various fossil finds were made in the Katberg formation during fieldwork.	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was recommended. Further ground truthing of footprint areas were recommended.
Toitdale SEF	12/12/20/2653	Surface scatters of middle stone age artefacts occurred over the extent of the area.	General management measures such as informing SAHRA and chance finds procedure to be put in place.
Noupoort Wind Farm	12/12/20/2319	A rock shelter with rock art was identified. Numerous dry stone walled enclosures were identified. A farmstead and cemetery was also identified during the fieldwork. Various fossil finds were made in the Katberg formation during fieldwork.	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was

Project	DEFF Reference No	Findings	Recommendations
			recommended. Further ground truthing of footprint areas were recommended
Phezukomoya WEF	14/12/16/3/3/1/1028	Stone Age archaeological sites are sparse in the high suurveld areas and that not very many sites will be physically impacted. Two (2) archaeological sites will require mitigation through avoidance or alternatively systematic collection. Only a few fossil remains were recorded during a four (4)-day field assessment	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was recommended. Buffering some sites were recommended.
San Kraal WEF	14/12/16/3/3/1/1069	The comprehensive survey of the project area, associated infrastructure and power lines has revealed that Stone Age archaeological sites are sparse in the high suurveld areas and that not very many sites will be physically impacted. Fossil finds on-site are confined to mostly fragmented river-washed bone fragments. The presence of a number of fossilised vertebrate burrows in a river bed was also noted	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was recommended. Buffering some sites were recommended.
Umsobomvu WEF	14/12/16/3/3/2/730	A total of 41 heritage sites were noted in the study area from in the desktop and field survey. These sites varied from open stone tool scatters, rock art sites in small overhangs, and built structures such as farm buildings and kraals. The historical buildings were the most frequently occurring heritage sites. Three (3) of these early farmsteads have associated cemeteries. There are no fatal flaws in the Umsobomvu WEF development proposal as far as fossil heritage is concerned.	General management measures such as informing SAHRA and chance finds procedure to be put in place. A detailed survey of the demarcated area was recommended. Buffering some sites were recommended.

7.3.7 Palaeontology

A total of seventeen (17) renewable energy facilities (13 Solar Energy Facilities and 3 Wind Energy Facilities) are present in a 35km radius of the proposed development. Thirteen (13) of these facilities have been approved, while two (2) facilities are operational and two (2) are in and EIA process (**Table 22**).

It was difficult to obtain all the relevant Palaeontological Impact Assessments from the internet, except the following

- ALMOND, J. E., 2017. Palaeontological Impact Assessment of the proposed Phezukomoya wind farm near Noupoort, Northern and Eastern Cape.
- 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.
- GESS, R. 2012. Proposed construction of a Photovoltaic Power station and associated infrastructure at Collett substation near Middelburg in the Eastern Cape. Palaeontological Impact Assessment Report.
- ORTON, J., ALMOND, J., CLARKE, N., FISHER, R., HALL, S., KRAMER, P., MALAN, A., MAGUIRE, J. AND JANSEN, L. 2016. IMPACTS ON HERITAGE. IN SCHOLES, R., LOCHNER, P., SCHREINER, G., SNYMAN- VAN DER WALT, L. AND DE JAGER, M. (EDS.). 2016. Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks. CSIR/IU/021MH/EXP/2016/003/A, ISBN 978-0-7988-5631-7, Pretoria: CSIR. Available at http://seasgd.csir.co.za/scientific-assessmentchapters/

Table 25 below provides the findings and recommendations from the other specialist studies / assessments which were reviewed.

Table 25: Findings and Recommendations from other Specialist Studies / Assessments

Project	Findings	Recommendations
Allemans Fontein SEF	Mudstones and sandstones and dolerite	No fossils observed. No special recommendations. Proceed with Project
Carolus Poort SEF	Katberg and Balfour Formations present, dolerite	No fossils observed. No special recommendation. Proceed with Project
Damfontein SEF	Mudstones and sandstones and dolerite	Pre-construction site visit
Gillmer SEF	Mudstones and sandstones and dolerite	No fossils observed. No special recommendations. Proceed with Project
Inkululeko SEF	-	-
Kleinfontein SEF	-	-
Klip Gat SEF	Adelaide Subgroup and dolerite	Pre-construction site visit
Linde SEF	-	-
Linde SEF (Expansion)	-	-
Middelburg Solar Park 1	Katberg and Balfour Formations, dolerite and Quaternary	Pre-construction site visit
Middelburg Solar Park 2	Katberg and Balfour Formations, dolerite and Quaternary	Pre-construction site visit
Naauw Poort SEF	Katberg Formation	Pre-construction site visit
Toitdale SEF	-	-
Noupoort Wind Farm	Katberg Formation, dolerite and Quaternary	No site visits, pending discovery of fossils
Phezukomoya WEF	Katberg and Balfour Formations present; fragmentary bones vertebrate burrows,	Buffer, mitigation
San Kraal WEF	Katberg and Balfour Formations present;	Buffer, mitigation
Umsobomvu WEF	-	-

7.3.8 Social

Renewable energy facilities require specific climatic conditions that provide high levels of solar radiation and wind energy. This has resulted in a tendency for these facilities to be clustered in specific areas, such as the Karoo, that provide these ideal conditions. Consequently, this grouping of facilities in specific areas has in turn led to cumulative impacts. In this regard the following developments, illustrated in the map in **Figure 50**, have been identified within a 35km radius of the proposed development:

- Allemans Fontein SEF;
- Carolus Poort SEF;
- Damfontein SEF;
- Gillmer SEF;
- Inkululeko SEF
- Kleinfontein SEF;
- Klip Gat SEF;
- Linde SEF;
- Middelburg Solar Park 1;
- Middelburg Solar Park 2;
- Naauw Poort SEF;
- Toitdale SEF;
- Noupoort Wind Farm;
- Phezukomoya WEF;
- San Kraal WEF;
- Umsobomvu WEF; and
- Linde SEF (Expansion).

7.3.8.1 Review of Specialist Reports for Renewable Energy Facilities in the Area

The following more specific social issues have been raised in the specialist reports pertaining to the various renewable energy initiatives identified above.

- **<u>Positive impacts:</u>**
  - Job creation; Impacts associated with the construction phase are generally short-term;
  - Establishment of local community trust; and
  - Establishment of renewable energy infrastructure.

- **<u>Negative impacts:</u>**
  - Sense of place;
  - Influx of construction workers;
  - Impact on family and community relations – STDs and HIV;
  - Risk of stock theft, poaching and damage to farm infrastructure;
  - Risk of veld fires;
  - Impact of heavy vehicles, damage to roads, safety, noise and dust;
  - Loss of agricultural land; and

- Impact on tourism.

- **Indirect Impacts:**
  - After construction locals may not find future employment; and
  - Skills and development – increased employability.

- **Cumulative Impacts:**
  - Development of additional renewable energy facilities – increased potential for job creation;
  - Impact on family and community relations – STDs and HIV;
  - Sense of place; and
  - Pressure on municipal and social services.

- **'No-Go' option:**
  - Loss of renewable energy infrastructure;
  - High carbon emissions;
  - Unsustainable way to produce electricity;
  - Overall social impact;
  - Predominantly low significance (positive impact); and
  - In respect of climate change – a positive social benefit for society as a whole.

The details of the reports from which these impacts have been sourced are provided in **Table 26** below.

Table 26: List of EIA reports for developments within a 35km radius

Date	Title of report	DEFF Ref number	Consultant responsible for report	Page numbers
July 2011	Establishment of Photovoltaic (Solar Power) Farms in the Northern Cape	12/12/20/2258	Sustainable Development Projects cc	4-5, 37-39, 51
February 2012	Environmental Basic Impact Assessment Process Draft Basic Assessment Report, Proposed Toitdale Solar Energy Facility Northern Cape Province	12/12/20/2653	Savannah Environmental (Pty) Ltd	47, 58, 61-62
March 2012	Social Impact Assessment Aced Middleburg Photovoltaic Solar Energy Facility Eastern Cape Province	Specialist report	Tony Barbour Environmental Consulting and Research	Entire report
March 2012	Environmental Basic Impact Assessment Process Draft Basic Assessment Report, Proposed Middelburg Solar Park 1 Eastern Cape Province	12/12/20/2465/2	Savannah Environmental (Pty) Ltd	54-63, 71-73
13 April 2012	Mainstream Renewable Power South Africa Noupoort (Pty) Ltd. Proposed Construction of a Wind Farm near Noupoort, Northern Cape Province, South Africa. Final Environmental Impact Report	12/12/20/2319	SiVEST Environmental Division	156-177, 221-228, 232-234
May 2012	Environmental Basic Impact Assessment Process Draft Basic Assessment Report, Proposed Tollie Solar Energy Installation on a site near Noupoort, Northern Cape Province	14/12/16/3/3/1/528	Savannah Environmental (Pty) Ltd	54-59, 65-68
September 2012	Environmental Impact Assessment Process Final Basic Assessment Report, Proposed Klip Gat Solar Energy Facility (75MW) near Noupoort, Northern Cape Province	14/12/16/3/3/2/354	Savannah Environmental (Pty) Ltd	61-62, 71-72, 79
September 2012	Environmental Impact Assessment Process Final Basic Assessment Report, Proposed Naauw Poort Solar Energy Facility (75MW) near Noupoort, Northern Cape Province	14/12/16/3/3/2/355	Savannah Environmental (Pty) Ltd	84-86, 95-96, 101, 101-111
November 2012	Social Impact Assessment Klipgat Solar Energy Facility Northern Cape Province (Draft Report)	Specialist report	Tony Barbour Environmental Consulting and Research	Entire report
December 2012	Environmental Impact Assessment Process Final Basic Assessment Report, Proposed Damfontein Solar Energy Facility near Noupoort, Northern Cape Province	14/12/16/3/3/1/728	Savannah Environmental (Pty) Ltd	70-72 & 79-81

Date	Title of report	DEFF Ref number	Consultant responsible for report	Page numbers
January 2013	Environmental Impact Assessment Process Final Basic assessment Report, Allemans Fontein Solar Energy Facility near Noupoort, Northern Cape Province	14/12/16/3/3/1/730	Savannah Environmental (Pty) Ltd	66-67 & 80-81
January 2013	Environmental Impact Assessment Process Final Basic Assessment Report, Proposed Carolus Poort Solar Energy Facility near Noupoort, Northern Cape Province	14/12/16/3/3/1/729	Savannah Environmental (Pty) Ltd	73-74
January 2013	Environmental Impact Assessment Process Final Basic Assessment Report, Proposed Gillmer Solar Energy Facility near Noupoort, Northern Cape Province	14/12/16/3/3/1/735	Savannah Environmental (Pty) Ltd	74-75 & 78-79, 82-83
January 2013	Environmental Impact Assessment Process Final Basic Assessment Report, Proposed Inkululeko Solar Energy Facility near Noupoort, Northern Cape Province	14/12/16/3/3/1/553	Savannah Environmental (Pty) Ltd	63, 66 & 68
January 2013	Environmental Impact Assessment Process Final Basic Assessment Report, Proposed Kleinfontein Solar Energy Facility near Noupoort, Northern Cape Province	12/12/20/3//2654	Savannah Environmental (Pty) Ltd	45-46, 59, 61
April 2016	Proposed Umsobomvu Wind Energy Facility, Northern Cape & Eastern Cape Provinces	14/12/16/3/3/2/730	Savannah Environmental (Pty) Ltd	117-121, 127, 147
December 2017	Social Impact Assessment Phezukomoya Wind Energy Facility Northern Cape and Eastern Cape Province	Specialist report	Tony Barbour Environmental Consultant and Researcher	Entire report
December 2017	Social Impact Assessment San Kraal Wind Energy Facility Northern and Eastern Cape Province	Specialist report	Tony Barbour Environmental Consultant and Researcher	Entire report
March 2018	Environmental Impact Assessment Report for the Proposed 315 MW Phezukomoya Wind Energy Facility and Grid Connection, Northern and Eastern Cape Provinces	14/12/16/3/3/2/1028	Arcus Consultancy Services South Africa (Pty) Limited	ix, 329-338, 350
March 2018	Environmental Impact Assessment Report for the Proposed 390 MW San Kraal Wind Energy Facility and Grid Connection, Northern and Eastern Cape Provinces	14/12/16/3/3/2/1029	Arcus Consultancy Services South Africa (Pty) Limited	vii-viii, 328-337, 350

Recommendation

Recommendations of the reports reviewed indicate that, on an overall basis, the social benefits of renewable energy developments in the area outweigh the negative benefits and that the negative social impacts can be mitigated.

In this regard the following cumulative impacts are addressed below:

- Risk of HIV;
- Sense of place;
- Service supplies and infrastructure; and
- The economic benefit.

7.3.8.2 Risk of HIV Infections[15]

With an HIV prevalence rate of 17.5%, the Northern Cape Province has the lowest HIV prevalence rate of all provinces across South African with the Eastern Cape having the third highest rate at 31.4%. At a district level the Pixley ka Seme District Municipality has the 5th lowest HIV prevalence rate across all district municipalities in South Africa at 15.1%. In comparison, the Chris Hani district has the 14th highest HIV prevalence rate across all district municipalities with a rate of 34.5%. It is most likely that this higher prevalence rates in the Chris Hani district will be associated with more densely populated urban areas and along transport routes, considering that the Chris Hani district serves as a linking node to all regions in the Eastern Cape.

With most projects falling within what is a sparsely populated region of the Northern Cape and along the sparsely populated Northern and Eastern Cape border, it is likely that HIV prevalence rates will be low within the immediate vicinity of these projects. Consequently, it is important to consider the risk of the spread of HIV associated with these projects, particularly where the workforce is recruited from areas that are likely to have relatively high levels of HIV such as Middelburg and other urban areas further afield. This is important as it is well documented on both an international and local basis that the construction industry carries with it a high risk of HIV (Meintjes, Bowen, & Root, 2007; Bowen, Dorrington, Distiller, Lake, & Besesar, 2008; Wasie, *et al.,* 2015; Bowen P., Govender, Edwards, & Cattell, 2016; Kikwasi & Lukwale, 2017; Bowen P., Govender, Edwards, & Lake, 2018) which can be spread amongst the local communities, particularly through an increase in prostitution that follows the availability of disposable income. It is also well documented, on both an international and local level, that HIV is also spread by truck drivers (Singh & Malaviya, 1994; Ramjee & Gouws, 2002; Strauss, *et al.,* 2018) and there is likely to be an increase in truck drivers in the area as equipment and material is delivered to the various construction sites.

These issues, associated with the area being extremely poor and the associated disposable income that will follow the construction workers and truck drivers to the area, will heighten the risk of the spread of HIV infections across what is a rather remote region. In this regard the World Bank (2009, pp. 367-368) had indicated a strong link between infrastructure projects and health as:

[15] HIV prevalence rates are at 2013 figures based on The 2013 National Antenatal Sentinel HIV Prevalence Survey, South Africa

'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.'

7.3.8.3 Transformation of Sense of Place

There is also a concern amongst various interest groups that the proliferation of renewable energy facilities in the Karoo will have a significant and negative cumulative social impact on the area's isolated, tranquil and pristine environment[16]. In this regard issues such as the aesthetic appearance associated with highly visible solar parks and wind farms; the noise from turbine blades; the loss of bird and bat life and its effect on tourism; as well as the disruption of social networks have all been cited amongst these concerns.

This is, however, a complex issue as there are varying opinions in respect of the aesthetic appearance of renewable energy facilities with some regarding them in a far more positive light than others (Firestone, Bidwell, Gardner, & Knapp, 2018; Schneider, Mudra, & Kozumplíková, 2018). In a study of public attitudes towards onshore wind farms in south-west Scotland, it was found that many regarded the visual impact of these developments in a positive light. It must, however, be noted that this was linked with community ownership having a positive impact on public attitudes towards wind farm developments in Scotland (Warren & McFadyen, 2010). A further and important consideration in this regard is of an ethical nature associated with community acceptance and energy justice and raises the question of the incorporation of public acceptance, particularly that of the underrepresented, into energy policy (Roddisa, Carvera, Dallimerb, Normana & Ziva, 2018, pp. 362-363).

7.3.8.4 Services, Supplies and Infrastructure

With the increase in renewable energy facilities in the area it is quite likely that the local authorities, currently hard-pressed to deliver services, will find it difficult to keep up with these developments. The influx of construction workers is likely to place pressure on accommodation and the need for both services and supplies. Noupoort, Hanover and Middelburg, being within a 35km radius of these developments, are likely to bear the brunt of the demand for accommodation, services and supplies. On this basis, market demands could inflate costs which may have a negative effect on local communities, particularly the poor, who may be forced to pay higher prices for essential supplies resulting in an escalation in the cost of living in the area.

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[16] Amongst others see for instance:
1. Heritage South Africa's Karoo News Group http://heritagesa.org/wp/2222-2/
2. Alternative sources of energy for South Africa in various shades of green (Smit, 2011)
3. Social media sites such as the Facebook Karoo Energy Debate https://www.facebook.com/TheKarooEnergyDebate/
4. Why the Karoo (Research Chair in the Sociology of Land, Environment and Sustainable Development. Department of Sociology and Social Anthropology, Stellenbosch University, 2016).

Social services such as medical and educational facilities could also be placed under pressure due to increased demand. Although this may reach its peak during the construction phase it should be mitigated somewhat by the fact that the construction of the various developments will be spread across different timelines, with some developments commencing while others reach completion. Employing local people across the various developments and development phases will help in reducing the stress placed on services, supplies and infrastructure in the area.

During the operational phases it is likely that these demands will continue as operational staff take up more long-term residency in the area and are supported by service and maintenance personnel who may spend some time on-site on a contractual basis. An influx of temporary maintenance and service workers is likely to last over the operational phase of the developments but is likely to settle within the medium term as the economy adjusts and the municipal authorities are able to respond to this growth.

7.3.8.5 Economic Benefit

The cumulative economic impact of the proposed development will be both positive and negative. The negative economic impacts, associated with a possible rise in living costs driven by market demand, are considered under the section above. Under this section, the positive economic impacts will be addressed.

From a positive perspective, the proliferation of renewable energy facilities within the region is likely to result in significant and positive cumulative impacts in the area associated with both direct and indirect job creation, skills development, training opportunities, and the creation of business opportunities for local businesses. The district and local municipalities within the area have identified renewable energy as a strategic economic opportunity in a region that previously had few such opportunities. This is indicated in the various IDPs and LEDs pertaining to the affected municipalities.

7.3.8.6 Assessment of Cumulative Impacts

The cumulative impacts discussed above are assessed in **Table 21** on **page 206**. It must, however, be noted that this assessment is at a superficial level as any in-depth investigation of the cumulative effects of the various developments being planned for the region are beyond the scope of this study as they would require a broad-based investigation on a far larger scale.

The assessment of the cumulative impacts takes into consideration the impacts associated with all renewable energy facilities within a 35km circumference of the proposed development. On this basis, no fatal flaws associated with the cumulative impacts are evident at a social level. The findings support the recommendations of the reports listed in **Table 26** that, on an overall basis, the social benefits of renewable energy developments in the area outweigh the negative benefits and that the negative social impacts can be mitigated.

8 LAYOUT ALTERNATIVES

One (1) of the aims of the BA process was to identify alternatives for detailed assessment (as was discussed in **section 3.3**). The selection of alternatives helped to focus investigations, both in terms of the environmental investigations required and the scope of the public participation process. Design or layout alternatives were therefore considered and assessed as part of the BA process. These include grid connection infrastructure alternatives, which include on-site and collector substation sites and 132kV power line corridors. These alternatives essentially provide for two (2) different route alignments with associated substations (on-site and collector) contained within an assessment corridor between approximately 400m and 900m wide. This is to allow for flexibility to route the power line on either side of the existing high voltage Eskom power lines.

Four (4) power line route alternatives and three (3) substation site alternatives were identified for assessment during the BA process. It should be noted that the substation sites are intrinsically linked to the grid connection infrastructure alternatives. The locations for the on-site and collector substation sites being proposed as part of this application have therefore been informed by the grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists (see **Table 27** on **page 269**).

The above-mentioned grid connection infrastructure alternatives work as follows:

- **Option 1:**
  - **Corridor Option 1a** - links Substation 2 and Substation 1a (which acts as the Northern Collector Substation) to the Hydra D MTS[8]; and
  - **Corridor Option 1b** - links Substation 2 and Substation 1b (which acts as the Northern Collector Substation) to the Hydra D MTS[8].

- **Option 2:**
  - **Corridor Option 2a** - links Substation 2 and Substation 1a (which acts as the Northern Collector Substation) to the Hydra D MTS[8] via the proposed Central Collector substation (namely Substation 4a) located on the Wonderheuvel Solar PV project application site (part of separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1135); and
  - **Corridor Option 2b** - links Substation 2 and Substation 1b (which acts as the Northern Collector Substation) to the Hydra D MTS[8] via the proposed Central Collector substation (namely Substation 4a) located on the Wonderheuvel Solar PV project application site.

Various environmental specialists assessed the project area during their respective field investigations. Their assessments focussed on the project area and also included the identification of sensitive areas. Based on the specialist assessments which were conducted, a few potentially sensitive areas have been identified within the study area. These sensitive areas were subsequently used to inform the area for the potential erection of the substations (on-site and collector) and 132kV overhead power line. In addition, the layout was further refined to avoid environmental sensitivities and was subsequently investigated by the respective specialists[17]. These include the Terrestrial Ecologist, Palaeontologist, Surface Water, Heritage, Avifauna and Agricultural Specialists. The sensitive areas were also used to perform a comparison of grid connection infrastructure alternatives, which were extensively investigated.

The proposed grid connection infrastructure alternatives which were investigated and comparatively assessed in relation to the identified environmental sensitive areas are presented in **Figure 51** below.

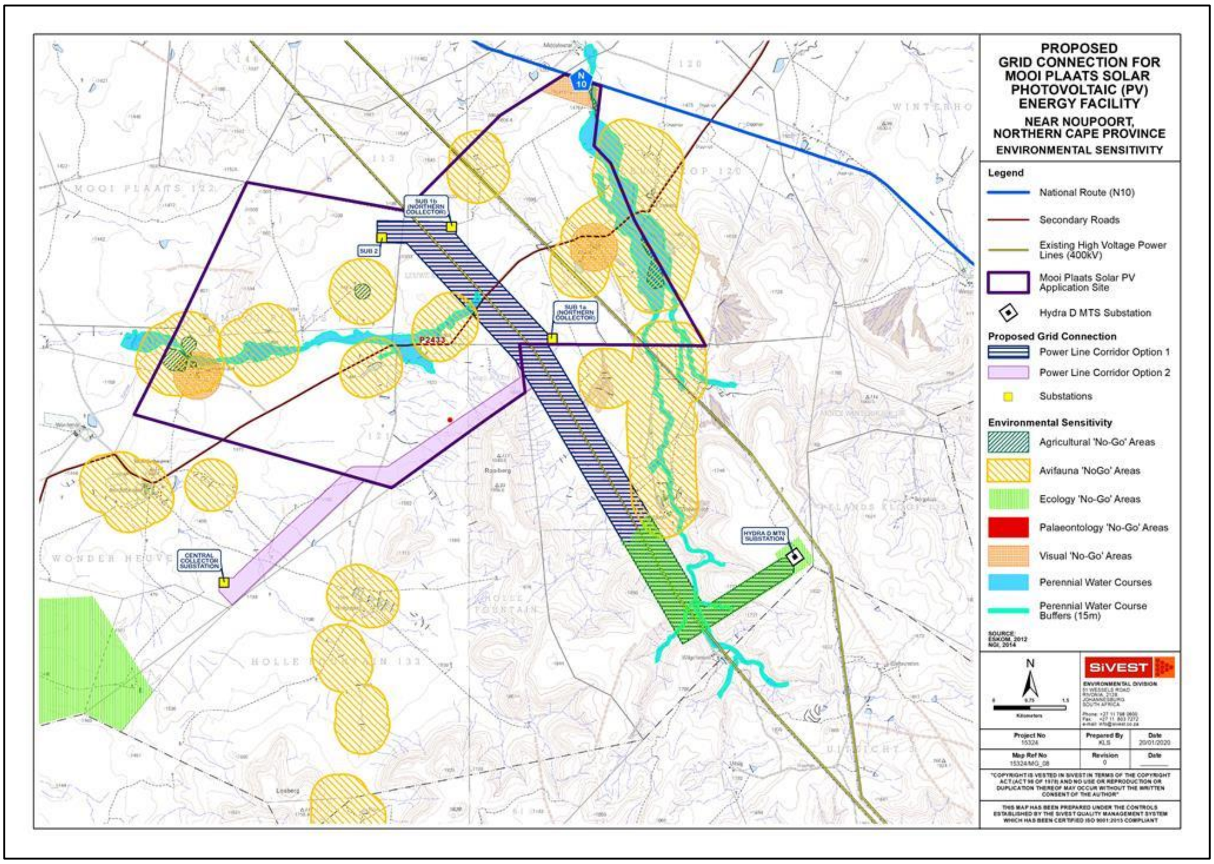

Figure 51: Proposed grid connection infrastructure alternatives in relation to environmental sensitive areas

Each of these alternatives have been comparatively assessed in terms of the findings from the specialist studies conducted during the BA process. The selected preferred alternatives were based on environmental constraints and design factors.

Table 27 below summarised the preferences associated with each alternative, thereby identifying the preferred alternative.

[17] Prior to submission of DBAR, preliminary power line corridor routes and substation sites were considered by the applicant. However, in order to ensure that the proposed development avoids the sensitive and 'no-go' areas identified by specialists, the preliminary power line corridor routes and substation sites were subsequently amended

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Table 27: Summary of comparative assessment of grid connection infrastructure alternatives

ALTERNATIVE	ENVIRONMENTAL ASPECT									FATAL FLAW (YES / NO)	PREFERRED (YES /NO)
	Terrestrial Ecology	Surface Water	Visual	Geotechnical	Avifauna	Social	Palaeontology	Agricultural and Soils	Heritage		
GRID CONNECTION INFRASTRUCTURE (132kV POWER LINE AND ON-SITE AND COLLECTOR SUBSTATIONS) ALTERNATIVES											
Grid Connection Option 1a (Substation 1a and 2)	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	No Preference	No Preference	No Preference	NO	**YES**
Grid Connection Option 1b (Substation 1b and 2)	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	No Preference	No Preference	No Preference	NO	**YES**
Grid Connection Option 2a (Substation 1a and 2)	Favourable	Favourable	Favourable	Favourable	Not Preferred	Favourable	No Preference	No Preference	No Preference	NO	NO
Grid Connection Option 2b (Substation 1b and 2)	Favourable	Favourable	Favourable	Favourable	Not Preferred	Favourable	No Preference	No Preference	No Preference	NO	NO

In terms of the grid connection infrastructure alternatives, **Grid Connection Option 1a** and **Option 1b** were found to be the most preferred alternatives from an environmental perspective. This is due to the fact that majority of the specialists (namely Terrestrial Ecology, Surface Water, Visual, Geotechnical, Avifauna and Social) found Option 1a and Option 1b to be 'Preferred', while the remainder of the specialists found there to be 'No Preference' between these two (2) alternatives. In addition, Grid Connection Option 2a and 2b were found to be 'Not Preferred' from an Avifauna perspective and are thus not deemed to be acceptable grid connection infrastructure alternatives from an environmental perspective. As mentioned, the substation site alternatives are intrinsically linked to the grid connection infrastructure alternatives. As such, the grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists have informed the location of the on-site and collector substation sites. In light of the above, **Substation 1a (Northern Collector)** and **Substation 2 (on-site)** are being proposed, as these are intrinsically linked to **Grid Connection Option 1a** which is preferred from an environmental perspective.

Based on the results of the comparative assessment of alternatives, the following alternatives are preferred:

- **Grid Connection Option 1a (132kV overhead power line corridor route);**
- **Substation 1a (Northern Collector Substation); and**
- **Substation 2 (On-site Substation).**

As mentioned, the grid connection infrastructure alternatives for the BA process were based on both environmental constraints and design factors. The findings of the specialist studies and sensitivity mapping were used to inform the location of the substation sites and power line corridor routing during the BA process. As part of the BA process, the layout for the proposed grid connection infrastructure (on-site and collector substations and 132kV overhead power line) has aimed to avoid the sensitive features / areas identified by the specialists.

It is requested that the above-mentioned alternatives be authorised by the DEFF. The substation site alternatives being proposed as part of this BA application also align with the preferences for the substation sites associated with the proposed Mooi Plaats Solar PV Energy Facility EIA (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134). It must be noted that the specialist sensitivities and 'no-go' areas informed the location of all alternatives and have been incorporated into the layout design of the preferred site layout (**Figure 52**). In addition, no fatal flaws were identified and therefore all of the alternatives mentioned above are considered to be acceptable, although not necessarily preferable from an environmental perspective.

The preferred site layout in relation to the sensitive areas identified by the specialists is indicated in **Figure 52** below.

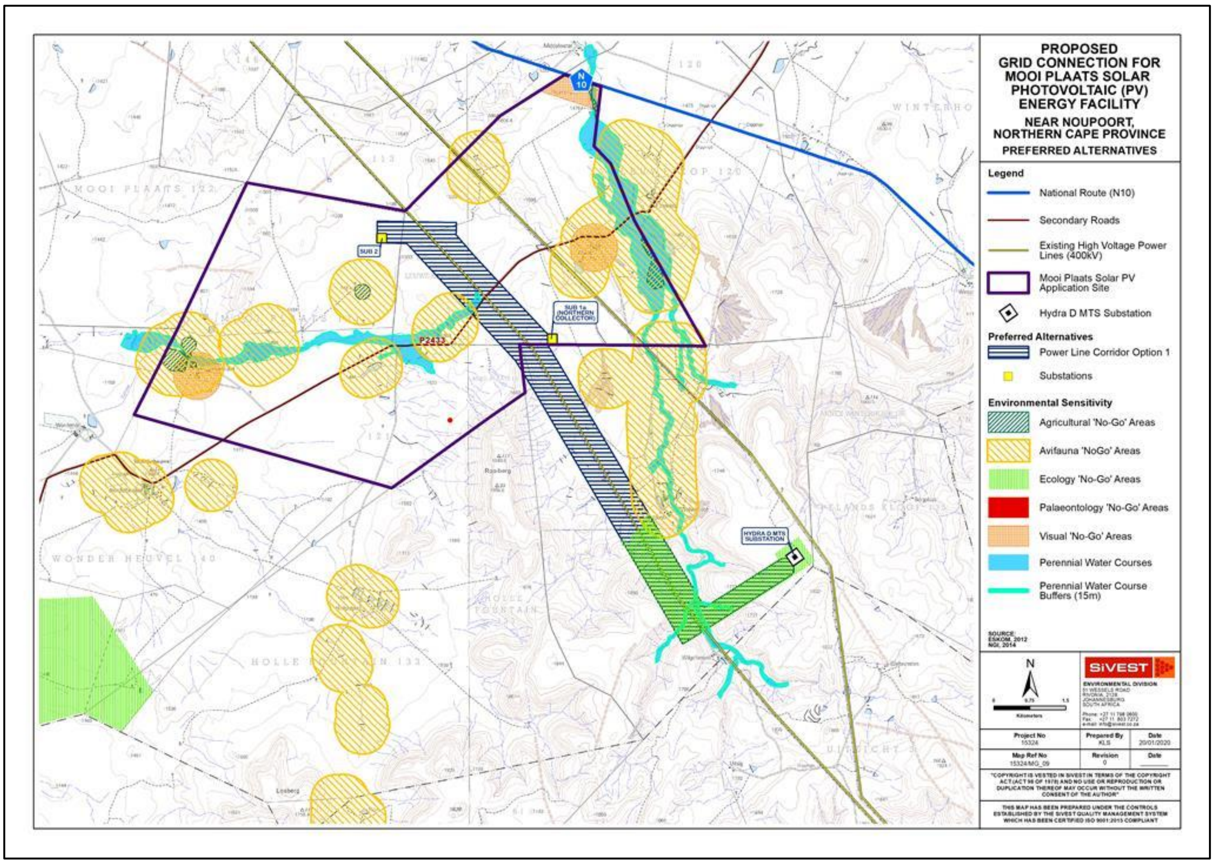

Figure 52: Preferred site layout in relation to identified environmental sensitive areas

Refer to **Appendix 9A** for the list of coordinates for the preferred layout.

It is important to note that the preferred layout provided above is not the final layout for the proposed development. A final layout will be submitted to the DEFF for review and approval, along with a Final EMPr, prior to construction commencing. The alignment of the power line within the authorised power line corridor will be determined and confirmed during the detailed design phase, taking the identified sensitive areas into account. This is to enable the avoidance of any unidentified features on-site, including those identified as a result of the detailed palaeontological assessment, or any design constraints when the development reaches construction. In addition, routing the power line or locating the substations within the authorised corridor would not be regarded as a change to the scope of work or the findings of the impact assessments undertaken during the BA process. This is based on the understanding that the specialists have assessed the larger area / corridor in detail and all identified sensitive areas have been excluded from this area, if possible. Therefore, moving the components within the assessed corridor would not change the impact significance. Any changes to the power line route or substation sites within the boundaries of the authorised corridor following the issuing of the EA (should it be granted) will therefore be considered to be non-substantive.

9 PUBLIC PARTICIPATION PROCESS

Public participation is the cornerstone of any BA process. The principles of NEMA as well as the EIA Regulations, 2014 (as amended), govern the BA process, including public participation. These include provision of sufficient and transparent information on an on-going basis to Interested and/or Affected Parties (I&APs) and key stakeholders, such as Organs of State (OoS) / authorities, to allow them to comment, and ensuring the participation of previously disadvantaged people, women and the youth.

The public participation process is primarily based on two (2) factors.

1. Firstly, on-going interaction with the environmental specialists and the technical teams in order to achieve integration of technical assessment and public participation throughout; and
2. Secondly, to obtain the bulk of the issues to be addressed early on in the process, with the latter half of the process designed to provide environmental and technical evaluation of these issues. These findings are presented to stakeholders for verification that their issues have been captured and for further comment.

Input into the public participation process by members of the public, I&APs and key stakeholders can be given at various stages of the BA process. Registration on the project database can take place at any time during the BA process up until the final BA report is submitted to the DEFF for decision-making. There are however established periods in which comments are required from I&APs and key stakeholders in order to ensure that these are captured in time for the submission of the various reports. The comment periods during the BA process will be implemented according to the EIA Regulations, 2014 (as amended). The comment periods which will be implemented during the BA process (as set out by the EIA Regulations, 2014) are as follows:

- Comment and review period for the Draft Basic Assessment Report (DBAR): 30 days.

As stipulated in the EIA Regulations, 2014 (as amended), the DBAR will undergo a 30-day comment and review period that will from **Monday 10 February 2020** until **Wednesday 11 March 2020** (excluding public holidays). A hard copy of the DBAR will be made available at a public venue (namely the Noupoort Public Library) and an electronic copy will also be made available on SiVEST's website (see **section 9.7**). All I&APs and key stakeholders, such as OoS / authorities, which are registered on the project database will be notified of the submission of the DBAR as well as the 30-day comment and review period accordingly. In addition, all OoS / authorities will be sent electronic copies (on CD) of the DBAR. Comments received on the DBAR will be taken into consideration, incorporated into the report (where possible) and will be used when compiling the FBAR, which will be submitted to the competent authority for decision-making.

Any I&APs and key stakeholders that wish to register on the project's database or comment on this DBAR are encouraged to contact SiVEST environmental division. The contact details are as follows:

Contact: Hlengiwe Ntuli or Stephan Jacobs
🖃 PO Box 2921, RIVONIA, 2128
☎ Phone:(011) 798 0600

E-mail:hlengiwen@sivest.co.za / stephanj@sivest.co.za / sivest_ppp@sivest.co.za
Fax:(011) 803 7272
Websites:www.sivest.co.za

The EIA Regulations, 2014 (as amended), emphasise the importance of public participation. In terms of these regulations, registered I&APs and key stakeholders –

- may participate in the application process;
- must comment within the timeframes as stipulated by the EIA Regulations, 2014 (as amended);
- must send a copy of any comments to the applicant or EAP, if the comments were submitted directly to the competent authority; and
- must disclose any direct business, financial, personal or other interests that the person has in the application being granted or refused.

Further, in terms of the EIA Regulations, 2014 (as amended), the EAP:

- manages the application process;
- must be independent;
- must undertake the work objectively, even if this results in views and findings that are not favourable to the applicant;
- must disclose material information that may influence the decision; and
- must conduct a public participation process.

It should be noted that the Public Participation Process is being undertaken in line with Chapter 6 of the EIA Regulations, 2014 (as amended). Comments / queries / issues / concerns related to the proposed development which been received to date have been included in **Appendix 7D** of this report. The following actions are undertaken upon receiving comments / queries / issues:

- Once a comment / query / issue / concern has been obtained from an I&AP and/or key stakeholder who was not yet been included in the project database, the contact details provided will be included in the project database for use in future notifications;
- Comments will be addressed in an email (if required) or in the Comments & Response Report (C&RR);
- The C&RR has been included in the DBAR (**Appendix 7E**);
- The C&RR will be updated throughout the BA process to address any comments / queries / issues / concerns received; and
- The C&RR has been made available to all I&APs and key stakeholders within the DBAR. The C&RR will also be made available to all I&APs and key stakeholders within the FBAR.

The sub-sections below detail the Public Participation Process which has been undertaken to date.

9.1 Objectives of Public Participation

An understanding of what the public participation is, and is what it is not, needs to be explored and must be clarified.

- Public Participation is:

- A communication mechanism to inform I&APs and key stakeholders regarding a proposed development; and
- A communication mechanism to record comments and/or concerns regarding a proposed development raised during the relevant phases of the BA process by I&APs and key stakeholders.

- Public Participation is not:
  - A marketing exercise;
  - A process to address grievances but rather to record comments and/or concerns raised; and
  - One-on-one consultation with each I&AP and/or key stakeholder during the BA process.

The primary aims of the Public Participation Process were:

- To inform I&APs and key stakeholders of the proposed development;
- To initiate meaningful and timeous participation of I&APs and key stakeholders;
- To identify issues and/or concerns of key stakeholders and I&APs with regards to the proposed development;
- To promote transparency and an understanding of the proposed development and its potential environmental impacts;
- To provide information used for decision-making;
- To provide a structure for liaison and communication with I&APs and key stakeholders;
- To assist in identifying potential environmental impacts associated with the proposed development;
- To ensure inclusivity (the views, needs, interests and values of I&APs and key stakeholders must be considered in the decision-making process);
- To focus on issues relevant to the proposed development and issues considered important by I&APs and key stakeholders;
- To provide responses to I&AP and key stakeholder queries / comments / concerns;
- To encourage co-regulation, shared responsibility and a sense of ownership; and
- Meet the requirements for Public Participation as stated in Chapter 6 of the EIA Regulations, 2014 (as amended).

In addition to the guidance of the Public Participation Process in the EIA Regulations, 2014 (as amended), every effort was also made to conform to the requirements of the Promotion of Administrative Justice Act, 2000 (Act No. 3 of 2000).

9.2 Overview of the Public Participation Process to date

As mentioned, the Public Participation Process has been undertaken in line with Chapter 6 of the EIA Regulations, 2014 (as amended).

The public participation process was initiated in July 2019 with initial landowner consultation and has included the following activities to date[18]:

- An I&AP database which includes all affected landowners, adjacent landowners, occupiers of affected and adjacent land, other I&APs, key stakeholders (such as OoS / authorities) and other surrounding project developers was compiled. The I&AP database is included in **Appendix 7F**;
- Contacting all affected and adjacent landowners to request contact details of the occupiers residing on their land. Proof of this is included in **Appendix 7H**. It should be noted that SiVEST were unable to obtain contact details for one (1) of the adjacent landowners / occupiers (see **Table 28**) as contact details for this landowner / occupier are unknown. Attempts were made to obtain these contact details, to no avail. SiVEST will however continue to attempt to obtain contact details for this landowner / occupier and will send notifications and project information once contact details have been obtained. **Table 28** provides details regarding the landowners / occupiers (affected and adjacent) who have been contacted and/or notified with regards to the BA process, as well as the method in which they were contacted. Landowners / occupiers who have not yet been notified will be notified at a later stage, once the relevant contact details have been obtained. Proof of this will be provided in the FBAR;
- Public notification of the BA process was advertised (in English and Afrikaans) in a local / regional newspaper (namely the Graaff-Reinet Advertiser), as required under the EIA Regulations, 2014 (as amended), on the 3rd of July 2019. Proof of the advertisements is provided in **Appendix 7C**;
- The affected and adjacent landowners and/or occupiers were notified about the proposed development via a notification letter. Proof of these notifications is included in **Appendix 7H**. As mentioned, one (1) of the adjacent landowners / occupiers could not be notified about the proposed development as contact details for this landowner / occupier are unknown (see **Table 28** below). Attempts were made to obtain these contact details, to no avail. SiVEST will however continue to attempt to obtain contact details for this landowner / occupier and will send notifications and project information once contact details have been obtained. Landowners / occupiers who weren't notified about the proposed development will thus be notified at a later stage, once the relevant contact details have been obtained. Proof of this will be provided in the FBAR. **Table 28** provides details regarding the landowners / occupiers (affected and adjacent) who have been contacted and/or notified with regards to the BA process, as well as the method in which they were contacted;
- A Background Information Document (BID) (English and Afrikaans) was compiled and distributed to I&APs and key stakeholders registered on the project database on **28 January 2020**, along with written notification to all I&APs and key stakeholders. In addition, copies of the BID were emailed to the relevant Ward Councilors in order for this information to be distributed / shared with members of the affected communities (**Appendix 7D**). Copies of the BID as well as the written notifications to all I&APs and key stakeholders are provided in **Appendix 7B**. Proof of distribution is also included in **Appendix 7B** and **Appendix 7D** of this report;

[18] A single public participation process is being undertaken to consider all of the proposed developments which form part of the greater Umsobomvu PV project [i.e. three (3) solar PV energy facility EIAs and three (3) grid connection BAs]

- English and Afrikaans site notices (as per regulations) were placed within the study area during a site visit undertaken on the 12th of July 2019. Proof of the site notices is shown in **Appendix 7A**. Refer to **section 9.6** for more information regarding the site notices;
- Posters (English and Afrikaans) were erected at a public venue in the town of Noupoort. In addition, hard copies of the BIDs (English and Afrikaans) were also distributed at this venue. Proof of the posters which were erected and the BIDs which were distributed is included in **Appendix 7B**; and
- The stages that typically form part of the public participation process during a BA process are reflected in **Figure 53** below.

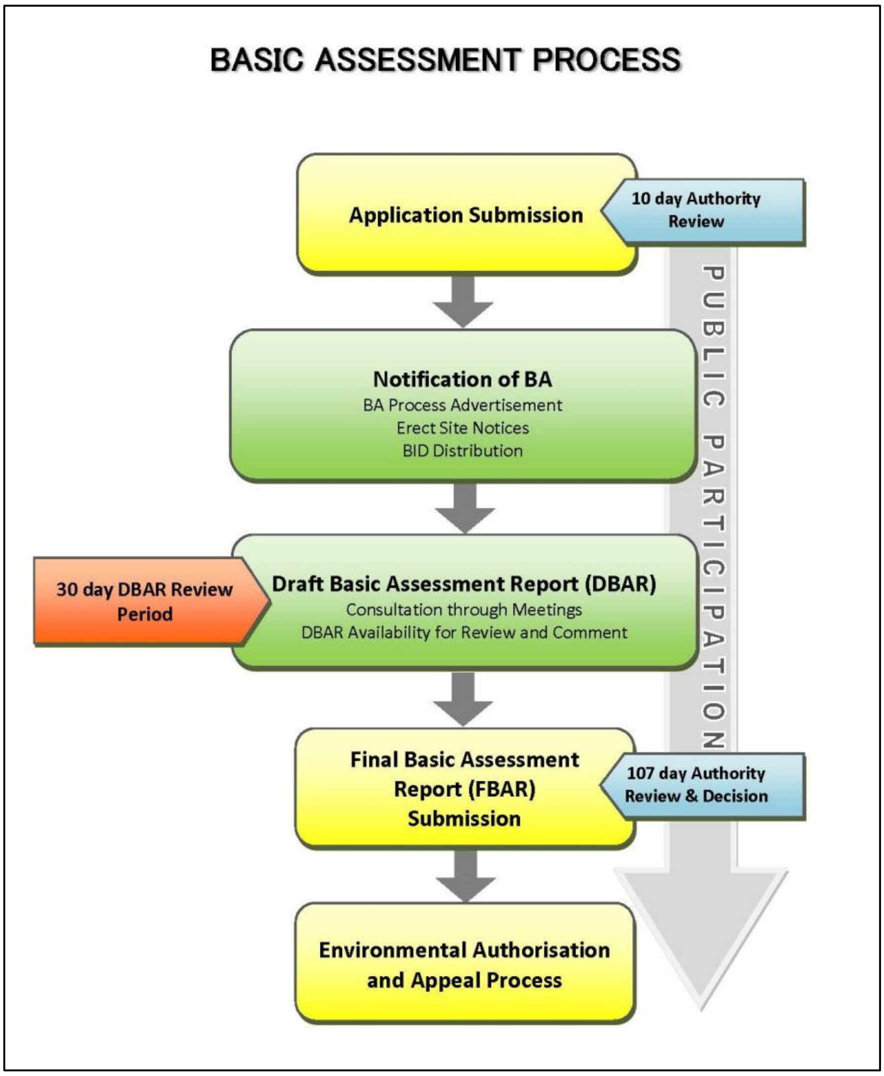

Figure 53: BA and Public Participation Process

On-going consultation with key stakeholders (e.g. provincial, district and local authorities, relevant government departments, local business etc.) and identified I&APs will ensure that I&APs and key stakeholders are kept informed regarding the BA process. Networking with I&APs and key stakeholders will effectively continue throughout the BA process until the final BA report is submitted to the DEFF for decision-making. Where required, key stakeholders and I&APs will be engaged on an individual basis.

During the BA process, individuals, businesses, institutions and organisations, and the following sectors of society have been identified and will be afforded the opportunity to comment and/or raise concerns (the full stakeholder / Organ of State database is included in **Appendix 7I**):

- National Authorities;
- Provincial Authorities;
- Umsobomvu Local Municipality;
- Pixley ka Seme District Municipality;
- Government Structures such as SAHRA, SANRAL, SENTECH, Eskom Telkom, etc.;
- Agriculture Associations;
- Department of Agriculture Forestry and Fisheries (DAFF);
- Environmental bodies / Non-Government Organisations (NGOs);
- DEFF: Biodiversity Conservation Department;
- BirdLife SA (BLSA);
- Department of Water and Sanitation (DWS);
- Community representatives, CBOs, development bodies;
- Landowners;
- I&APs;
- Civil Aviation Authority (CAA);
- Square Kilometre Array (SKA);
- All telecommunication service providers; and
- Air Traffic and Navigation Services (ATNS).

9.3 Landowner Consent and Notification

Regulation 39 (1) of the EIA Regulations, 2014 (as amended), states that '*if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land*'.

Regulation 39 (2) of the 2014 NEMA EIA Regulations, 2014 (as amended), further states that '*sub-regulation (1) does not apply in respect of: (a) linear activities; (b) activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and (c) strategic integrated projects as contemplated in the Infrastructure Development Act, 2014*'.

Since the proposed development constitutes a linear activity according to (b) of Regulation 39 (2) of the 2014 NEMA EIA Regulations, 2014 (as amended), namely the construction of an overhead power line, landowner consent is not required.

The landowners and/or occupants of the affected farm portions, on which the proposed grid connection infrastructure (substations and power lines) is proposed, have however been notified. The notification has been included as **Appendix 7H** and has been submitted to the DEFF for consideration together with the DBAR for comment.

In terms of the Chapter 6, Section 39 of the EIA Regulations, 2014 (as amended), notification of directly adjacent landowners and occupiers is required. As a result, the affected and adjacent landowners were notified of the proposed development accordingly. Please refer to **Appendix 7H** for proof of this correspondence. With regards to occupiers, all landowners and adjacent landowners were approached in order to confirm whether anyone was occupying their respective properties, as well as to determine the best method to notify the occupiers of each property.

It should be noted that not all of the adjacent landowners / occupiers could be notified about the proposed development before the submission of the DBAR as SiVEST were unable to get in contact with these individuals. Numerous attempts were made to obtain these contact details, to no avail. Landowners / occupiers who weren't notified about the proposed development at this stage will however be notified at a later stage, once the relevant contact details have been obtained. Proof of this will be provided in the FBAR.

The table below provides details regarding the landowners / occupiers (affected and adjacent) who have been contacted and/or notified with regards to the BA process, as well as the method in which the landowners / occupiers were contacted. As mentioned, landowners / occupiers who the EAP was unable to contact at this stage will be notified at a later stage, once the relevant contact details have been obtained. Proof of this will be provided in the FBAR.

Table 28: Landowner Notification

Landowners (Affected and Adjacent)				Occupier Details Requested	Method of Contact				Date	Follow-up to be done during 30-day DBAR review and comment period
Landowner (Affected or Adjacent)	ERF	Farm Name	Contact Name		Phone	Email	SMS	Registered Post		
Adjacent Landowner	2/3	Uitzicht	Wilgefontein Trust (Lindo van der Merwe)	✓		✓			24-Jan-20	
Adjacent Landowner	RE/3	Uitzicht	Lindo van der Merwe	✓		✓			24-Jan-20	
Adjacent Landowner	1/113	Elands Heuvel	In the name of Jacobus Andries van der Merwe (Estate). Ilze Nel is however acting as Curator for property. Requested that all correspondence go through Curator. Landowner and Curator both included as contact people for property and both notified	✓		✓			24-Jan-20	
Adjacent Landowner	RE/135	Elands Kloof	Vivian van der Merwe. All notices and comunication however to be sent to Curator, namely Ilze Nel. Landowner and Curator both included as contact people for property and both notified	✓		✓			24-Jan-20	
Adjacent Landowner	3/133	Holle Fountain	Bovlei Boerdery Trust (Lindo van der Merwe)	✓		✓			24-Jan-20	
Adjacent Landowner	4/133	Holle Fountain	Gillmer Fauntleroy Bartholomew (Faunty Gillmer)	✓		✓			24-Jan-20	
Adjacent Landowner	5/133	Holle Fountain	Andries Johannes Keun	✓		✓			24-Jan-20	
Adjacent Landowner	RE/133	Holle Fountain	Gillmer Fauntleroy Bartholomew (Faunty Gillmer)	✓		✓			24-Jan-20	

Affected Landowner	***1/120***	Leuwe Kop	Bovlei Boerdery Trust (Lindo van der Merwe)	✓		✓			24-Jan-20	
Adjacent Landowner	RE/120	Leuwe Kop	Vivian van der Merwe. All notices and comunication however to be sent to Curator, namely Ilze Nel. Landowner and Curator both included as contact people for property and both notified	✓		✓			24-Jan-20	
Affected Landowner	***RE/121***	Mooi Plaats	Andries Johannes Keun	✓		✓			24-Jan-20	
Adjacent Landowner	RE/122	Mooi Plaats	JJ van Lingen Family Trust (Philip van Ligen)	✓		✓			24-Jan-20	
Adjacent Landowner	4/3	Uitzicht	Lindo van der Merwe	✓		✓			24-Jan-20	
Affected Landowner	***6/3***	Uitzicht	Lindo van der Merwe	✓		✓			24-Jan-20	
Affected Landowner	***7/3***	Uitzicht	Wilgefontein Trust (Lindo van der Merwe)	✓		✓			24-Jan-20	
Affected Landowner	***8/3***	Uitzicht	Wilgefontein Trust (Lindo van der Merwe)	✓		✓			24-Jan-20	
Adjacent Landowner	1/140	Wonder Heuvel	JJ van Lingen Family Trust (Philip van Ligen)	✓		✓			24-Jan-20	
Affected Landowner	***3/140***	Wonder Heuvel	Andries Johannes Keun	✓		✓			24-Jan-20	
Adjacent Landowner	4/140	Wonder Heuvel	Gillmer Fauntleroy Bartholomew (Faunty Gillmer)	✓		✓			24-Jan-20	
Adjacent Landowner	2/140	Wonder Heuvel	Gillmer Fauntleroy Bartholomew (Faunty Gillmer)	✓		✓			24-Jan-20	
Adjacent Landowner	RE/140	Wonder Heuvel	JJ van Lingen Family Trust (Philip van Ligen)	✓		✓			24-Jan-20	

Adjacent Landowner	RE/146	Elands Heuvel	UNKNOWN. SiVEST unable to obtain contact details of landowner / occupier. Numerous attempts made to obtain contact details, to no avail. SiVEST will continue to attempt to obtain contact details for landowner and will send notifications and project info once contact details have been obtained							✓ - SiVEST will continue to attempt to obtain contact details for landowner and will send notifications and project info once contact details have been obtained
Adjacent Landowner	RE/62	Paarde Valley	Abbott Erasmus / Neil Erasmus	✓		✓			24-Jan-20	

9.4 Notification of Stakeholders and I&APs

In line with Regulation 41 (2) (b) of GN R. 982 (as amended) and prior to the commencement of the BA Process (and advertising the BA Process in the local print media), an initial database of I&APs (including key stakeholders such as OoS / authorities) was developed for the BA Process. This was supplemented with input from the applicant as well as the EAP's experience. **Appendix 7F** contains a detailed copy of the I&AP database. All relevant key stakeholders and I&APs have been added to the project database.

In line with Regulation 41 (2)(b) of the EIA Regulations, 2014 (as amended), the database includes the details of the following:

- Landowners of the affected farm portions;
- Landowners of the neighbouring adjacent farm portions;
- Contact details of known occupiers of the affected farm portions and neighbouring adjacent farm portions (Refer to **Appendix 7H**);
- The municipal councilors of the wards in which the proposed development will be undertaken;
- The municipalities which have jurisdiction in the areas (i.e. the Umsobomvu Local Municipality and the Pixley ka Seme District Municipality);
- Relevant OoS that have jurisdiction in respect of any aspect of the activity; and
- Any other party as required by the DEFF.

Communication with I&APs and key stakeholders was conducted by means of telephone and email in order to obtain the necessary background information to compile this report.

An advertisement was placed in the Graaff-Reinet Advertiser local / regional newspaper on 04 July 2019. Proof of the above-mentioned advertisement that was placed is provided in **Appendix 7C**.

In addition, site notices (as per regulations) were erected on one (1) of the boundaries of the sites proposed for substations (Portion 1 of the Farm Leuwe Kop No. 120) during a site visit undertaken on the 12th of July 2019. Proof of the site notices which were erected (including GPS coordinates) is provided in **Appendix 7A**.

As I&APs and key stakeholders respond to the above-mentioned advertisements, they will be registered on the project database and sent letters of invitation to participate, as well as the BID. The EAP will continue to register I&APs and key stakeholders on the project database and send them letters of invitation to participate as well as the BID, as they respond to the above-mentioned advertisements.

It should be noted that all key stakeholders and I&APs which are registered on the project database have accordingly received written notification of the commencement of the BA process, as well as a copy of the BID. In addition, they also received written notification about the availability of the DBAR for review and comment. All OoS were also sent electronic copies (on CD) of the DBAR for comment and review. Refer to **Appendix 7B** and **Appendix 7I**.

The identification and registration of I&APs and key stakeholders will be on-going for the duration of the study. Stakeholders from a variety of sectors, geographical locations and/or interest groups are expected to show an interest in the proposed development, for example:

- Provincial and Local Government Departments;
- Local interest groups (for example, Councilors and Rate Payers associations);
- Surrounding landowners;
- Farmer Organisations;
- Environmental Groups and Non-Government Organisations (NGOs); and
- Grassroots communities and structures.

9.5 Proof of Notification

Appendix 7 includes the proof of all notifications to I&APs and key stakeholders to date. More specifically, the types of proofs are as follows:

- Site notice text (**Appendix 7A**);
- Photographs of site notices (**Appendix 7A**);
- Background Information Document (BID) (**Appendix 7B**);
- Proof of BID Distribution (**Appendix 7B**);
- Notification of commencement of BA process (**Appendix 7B**);
- Proof of advertisements in a local / regional newspaper (**Appendix 7C**);
- Notification to landowners of affected and neighbouring adjacent farm portions (**Appendix 7H**); and
- Notification to Organs of State (OoS) / key stakeholders (**Appendix 7I**).

9.6 Site Notices

As mentioned, site notices were erected on one (1) of the boundaries of the sites proposed for substations (Portion 1 of the Farm Leuwe Kop No. 120) (coordinates: 31°15'51.43"S; 24°46'27.06"E). Site notices (in the form of posters) and BID's were also placed at the following location:

- Noupoort Public Library.

9.7 Comment and Review of Draft Basic Assessment Report (DBAR)

The DBAR will be circulated to all I&APs and key stakeholders for comment and review for a period of 30-days after submission to the DEFF, from **Monday the 10th of February 2020** to **Wednesday the 11th of March 2020**, excluding public holidays.

The report will be made available to the public for review and comment for a period of 30 calendar days, excluding public holidays. Hard copies of the DBAR an be reviewed at the following public place:

VENUE	STREET ADDRESS	HOURS	CONTACT NO
Noupoort Public Library	Shaw Street Noupoort 5950	**Monday - Friday** 10:00 - 13:00 13:45 - 16:30	049 843 1056

The report can also be downloaded from SiVEST's website during the 30-day comment and review period: http://www.sivest.co.za/, click on '*Downloads*' then browse to the folder '*15324 Mooi Plaats Grid*'.

Written notice will be given to all registered I&APs and key stakeholders on the project database that the DBAR is available for comment and review (**Appendix 7B**). Electronic copies (CD) of the DBAR will also be distributed on written request.

Issues, comments and concerns raised to date have been captured in the Comments and Response Report (C&RR), which is included in **Appendix 7E**. This will include all comments received following the 30-day comment and review period of the DBAR. All comments received following the 30-day comment and review period of the DBAR will be incorporated into the C&RR, which will be attached in the FBAR. The C&RR provides a summary of the issues and concerns raised, as well as responses provided to I&APs and key stakeholders. A detailed C&RR is included in **Appendix 7E** of the DBAR.

9.8 Review of the Draft Basic Assessment Report (DBAR) by Organs of State (OoS) / Key Stakeholders

In terms of section 40 (2) of the EIA Regulations, 2014 (as amended), public participation must include consultation with all OoS which have jurisdiction in respect of the activity to which the application relates.

Table 29 below includes all the OoS who were e-mailed the DBAR and sent electronic copies (on CD) of the full report, including all appendices. Telephonic follow-up will be done throughout the 30-day DBAR comment and review period in order to provide them with ample opportunity to comment.

Table 29: Organs of State (OoS) database

DISTRIBUTION OF THE DRAFT BASIC ASSESSMENT REPORT (DBAR) TO ORGANS OF STATE (OoS) FOR COMMENT					
TITLE	**SURNAME**	**NAME**	**POSITION**	**POSTAL ADDRESS**	**EMAIL ADDRESS**
UMSOBOMVU LOCAL MUNICIPALITY					
Ms	Qumba	Fundiswa		Church Street 21A COLESBERG 9795	qumba@umsobomvumun.co.za qumbafundiswa@gmail.com
Mr	Mpela	Amos	Municipal Manager	Church Street 21A COLESBERG 9795	mpela@umsobomvumun.co.za
PIXLEY KA SEME DISTRICT MUNICIPALITY					
Mr	Nkondeshe	Sonwabile		Culvert Road Industrial Area DE AAR 7000	-
AGRI SA-NORTHERN CAPE					
Mr	Myburg	Henning	General Manager	PO Box 1094 KIMBERLEY 8300	henning@agrink.co.za
AIR TRAFFIC NAVIGATION SERVICES (ATNS)					
Ms	Morobane	Johanna	Manager: Corporate Sustainability and Environment	Private Bag X15 KEMPTON PARK 1620	JohannaM@atns.co.za
Ms	Masilela	Simphiwe	Obstacle Evaluator	Private Bag X15 KEMPTON PARK 1620	SimphiweM@atns.co.za
BIRDLIFE SOUTH AFRICA (BLSA)					

DISTRIBUTION OF THE DRAFT BASIC ASSESSMENT REPORT (DBAR) TO ORGANS OF STATE (OoS) FOR COMMENT					
TITLE	**SURNAME**	**NAME**	**POSITION**	**POSTAL ADDRESS**	**EMAIL ADDRESS**
Mr	Booth	Jonathan	Policy Manager	PO Box 515 RANDBURG 2125	advocacy@birdlife.org.za
Ms	Ralston	Samantha		PO Box 515 RANDBURG 2125	-
ENDANGERED WILDLIFE TRUST (EWT)					
Mr	Little	Ian	Senior Manager	Kirstenbosch National Botanical Garden Rhodes Drive Newlands Cape Town	ianl@ewt.org.za
Mr	Leeuwner	Lourens	Renewable Energy Project Manager	Private Bag X11, MODDERFONTEIN 1609	lourensl@ewt.org.za
ESKOM					
Mr	Geeringh	John	Chief Planner	PO Box 1091 JOHANNESBURG 2000	GeerinJH@eskom.co.za
DEPARTMENT OF ENVIRONMENT, FORESTRY AND FISHERIES (DEFF): BIODIVERSITY CONSERVATION DEPARTMENT					
Mr	Lekota	Seoka		Private Bag X447 PRETORIA 0001	slekota@environment.gov.za
Mr	Rabothata	Mmatlala		Private Bag X447 PRETORIA 0001	slekotamrabothata@environment.gov.za
DEPARTMENT OF WATER AND SANITATION (DWS)					
Provincial Department- Northern Cape					

DISTRIBUTION OF THE DRAFT BASIC ASSESSMENT REPORT (DBAR) TO ORGANS OF STATE (OoS) FOR COMMENT					
TITLE	**SURNAME**	**NAME**	**POSITION**	**POSTAL ADDRESS**	**EMAIL ADDRESS**
Ms	Mokhoantle	Lerato	Environmental Officer	28 Central road Beaconsfield Kimberley 8300	Mokhoantlel@dws.gov.za
DEPARTMENT OF MINERAL RESOURCES (DMR) - NORTHEN CAPE					
Mr	Swart	Pieter	Regional Manager	41 Schmidtsdrift street, Telkom Building, KIMBERLEY, 8300	pieter.swart@dmr.gov.za
Ms	Mondela	Lungi	Secretary	41 Schmidtsdrift street, Telkom Building, KIMBERLEY, 8300	Lungi.Mondela@dmr.gov.za
DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES (DAFF)					
National Department					
Ms	Buthelezi	Thoko	AgriLand Liaison Office	Private Bag X120 PRETORIA 0001	ThokoB@daff.gov.za
Ms	Marubini	Mashudu	Delegate of the Minister	Delpen Building Cnr Annie Botha and Union Street Office 270 PRETORIA 0001	MashuduMa@daff.gov.za
Provincial Department- Northern Cape					
Ms	Mans	Jacoline	Chief Forester	Koelenhof 306 Schroder Street UPINGTON 8800	jacolinema@daff.gov.za

DISTRIBUTION OF THE DRAFT BASIC ASSESSMENT REPORT (DBAR) TO ORGANS OF STATE (OoS) FOR COMMENT					
TITLE	**SURNAME**	**NAME**	**POSITION**	**POSTAL ADDRESS**	**EMAIL ADDRESS**
NORTHERN CAPE PROVINCIAL DEPARTMENT OF AGRICULTURE, LAND REFORM & RURAL DEVELOPMENT					
Ms	Bloem	Nomandla	MEC	Private Bag X5018 KIMBERLEY 8300	premier@ncpg.gov.za
Mr	Van Heeden	Denver	HOD	Private Bag X6010 KIMBERLEY 8300	dvaheeden@ncpg.gov.za
NOTHERN CAPE DEPT OF ENVIRONMENT AND NATURE CONSERVATION (NC DENC)					
Mr	Fisher	Brian	Director Environmental Impact Management	Private Bag X86102 KIMBERLEY 8300	bfisher@ncpg.gov.za
Mr	Mthombeni	Thulani		Private Bag X86102 KIMBERLEY 8300	tmtho@webmail.co.za tmthombeni@ncpg.gov.za
NORTHERN CAPE PROVINICIAL DEPT OF SPORT, ARTS & CULTURE: Heritage Resources Unit					
Mr	Lenyibi	Patrick	Manager: Heritage Resources	Private Bag X5004 KIMBERLEY 8300	plenyibi@ncpg.gov.za
NORTHERN CAPE DEPARTMENT OF ROADS AND PUBLIC WORKS					
Mr	Roelofse	Jaco	Director: Planning & Design	PO Box 3132 KIMBERLEY 8300	roelofse.j@vodamail.co.za
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC Ltd (SANRAL) - WESTERN REGION					
Ms	Abrahams	Nicole	Environmental Coordinator	Private Bag X19 BELLVILLE 7535	abrahamsn@nra.co.za
SOUTH AFRICAN HERITAGE RESOURCES AGENCY (SAHRA): HEAD OFFICE					

DISTRIBUTION OF THE DRAFT BASIC ASSESSMENT REPORT (DBAR) TO ORGANS OF STATE (OoS) FOR COMMENT					
TITLE	**SURNAME**	**NAME**	**POSITION**	**POSTAL ADDRESS**	**EMAIL ADDRESS**
Ms	Higgitt	Natasha	Heritage Officer: Northern Cape	PO Box 4637 CAPE TOWN 8000	nhiggitt@sahra.org.za
SQUARE KILOMETRE ARRAY (SKA)					
Dr	Tiplady	Adriaan	Manager: Site Categorisation	PO Box 522 SAXONWOLD 2132	atiplady@ska.ac.za
SA CIVIL AVIATION AUTHORITY (SA CAA)					
Ms	Stroh	Lizell	Obstacle Specialist	Private Bag X73 HALFWAY HOUSE 1685	strohl@caa.co.za
SENTECH					
Mr	Koegelenberg	Johan	Broadcast Coverage Planner: RF Networks	Private Bag X06 HONEYDEW 2040	koegelenbergj@sentech.co.za
Ms	Pretorius	Alisha		Private Bag X06 HONEYDEW 2040	pretoriusa@sentech.co.za
TRANSNET FREIGHT RAIL					
Mr	Fiff	Sam	Environmental Manager: Freight Rail	PO Box 255 BLOEMFONTEIN 9300	sam.fiff@transnet.net
TELKOM					

DISTRIBUTION OF THE DRAFT BASIC ASSESSMENT REPORT (DBAR) TO ORGANS OF STATE (OoS) FOR COMMENT					
TITLE	**SURNAME**	**NAME**	**POSITION**	**POSTAL ADDRESS**	**EMAIL ADDRESS**
Mr	Thurling	Keverne		10 Jan Smuts Drive PINELANDS 7404	Thurling@telkom.co.za
Mr	Bester	Amanda	Wayleave Officer	Private Bag X20700 BLOEMFONTEIN 9300	WayleaCR@telkom.co.za BesterAD@telkom.co.za
Ms	van den Heever	Heleen	Ops Manager Central Region	Private Bag X20700 BLOEMFONTEIN 9300	vdheevhd@telkom.co.za
WILDLIFE AND ENVIRONMENT SOCIETY OF SOUTH AFRICA (WESSA)					
Mr	Griffiths	Morgan	Environmental Governance Programme Manager	PO Box 12444 Centrahill PORT ELIZABETH 6006	morgan.griffiths@wessa.co.za

9.9 Meetings

As mentioned, a single public participation process is being undertaken to consider all of the proposed developments which form part of the greater Umsobomvu PV project [i.e. three (3) solar PV energy facility EIAs and three (3) grid connection BAs].

During the 30-day review and comment period of the Draft Environmental Impact Assessment Report (DEIAr) for the proposed solar PV energy facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134), meetings were undertaken to present the proposed solar PV and grid connection infrastructure (substations and power lines) developments to the public and solicit comments and/or concerns[19]. Two (2) meetings were undertaken during this time, namely one (1) Public Meeting and one (1) Focus Group Meeting (FGM). Invitations to these meetings were sent out via post (in the form of invitation letters, where required), e-mail and SMS to all registered I&APs and key stakeholders (including affected and adjacent landowners) on the project database (see **Appendix 7B**). Additionally, Ward Councilors were utilised in order to distribute / share information with members of the affected communities (**Appendix 7D**). Members of the affected communities were encouraged to contact SiVEST in order to register as an I&AP on the project database and to obtain project information and/or notifications. It should be noted that that no landowners, key stakeholders / OoS or I&APs attended the FGM, while only one (1) I&AP (namely a member of the Noupoort community) attended the public meeting (**Appendix 7G**). SiVEST will however continue to engage with the landowners, key stakeholders / OoS and/or I&APs going forward in order to attempt to solicit comments etc.

Following all meetings, minutes of the meetings were compiled and forwarded to all attendees for their review and comment. The primary aim of these meetings was to:

- disseminate information regarding the proposed developments to I&APs and key stakeholders;
- provide I&APs and key stakeholders with an opportunity to interact with the EIA / BA team and the representatives from the applicant present;
- supply more information regarding the EIA and BA processes;
- answer questions regarding the proposed developments and the EIA and BA processes; and
- receive input regarding the public participation process and the proposed developments.

The above-mentioned Public Meeting and FGM were held as follows:

Table 30: Venues where Public Meeting and FGM were held

DATE	TIME	MEETING TYPE	VENUE
26 November 2019	14:00	FGM	Noupoort Combined School Hall Pretorius Street Noupoort
26 November 2019	16:30	Public Meeting	Noupoort Combined School Hall Pretorius Street Noupoort

[19] A single public participation process is being undertaken to consider all of the proposed developments which form part of the greater Umsobomvu PV project [i.e. three (3) solar PV energy facility EIAs and three (3) grid connection BAs]

As mentioned, invitations to the above-mentioned meetings were sent out via post (in the form of invitation letters, where required), e-mail and SMS to all registered I&APs and key stakeholders (including affected and adjacent landowners) on the project database (**Appendix 7B**). Additionally, Ward Councilors were utilised in order to distribute / share information with members of the affected community (**Appendix 7D**). Members of the affected communities were encouraged to contact SiVEST in order to register as an I&AP on the project database and to obtain project information and/or notifications.

The Public Meeting was held in order to provide I&APs with information regarding the proposed developments, present the environmental findings and invite I&APs to raise any further comments and/or concerns that they may have. FGMs are smaller meetings with specific groups or organisations who have similar interests in or concerns about the proposed development.

However, as mentioned, no landowners, key stakeholders / OoS or I&APs attended the FGM, while only one (1) I&AP (namely a member of the Noupoort community) attended the public meeting (**Appendix 7G**). SiVEST will however continue to engage with the landowners, key stakeholders / OoS and/or I&APs going forward in order to attempt to solicit comments etc.

It should be noted that additional meetings will not be undertaken during the DBAR's 30-day review and comment period. The affected and adjacent landowners will rather be contacted in order to solicit comments, should they have any. SiVEST will distribute the presentations and minutes of the meetings which were undertaken during the 30-day review and comment period of the DEIAr for the proposed solar PV energy facility[19] (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) and will request that the affected and adjacent landowners provide comments, if they feel this is necessary. SiVEST will also use this as an opportunity to answer any questions the landowners might have. In addition, a Ward Councilor will be utilised again in order to distribute / share information with members of the affected community. Members of the affected community will be encouraged to contact SiVEST in order to register as an I&AP on the project database and to obtain project information and/or notifications.

9.10 Comments and Response Report (C&RR)

Issues, comments and concerns raised during the public participation process to date have been captured in the Comments and Response Report (C&RR). The C&RR provides a summary of the comments received and issues raised by I&APs and key stakeholders, as well as the responses provided. This information will be used to feed into the evaluation of environmental and social impacts and has also been taken into consideration when compiling this DBAR. All comments received to date have been included in the C&RR (**Appendix 7E**).

9.10.1 Summary of Comments Received to Date

Table 31: Summary of comments received to date

I&AP / Key Stakeholder / OoS	Date received	Summary of comments
SAHRA	06-06-2019	SAHRA confirmed that they do not have a Notification of Intent to Develop (NID) form. SiVEST were advised to make use of the South African Heritage Resources Information System (SAHRIS) when lodging an application with SAHRA.
SAHRA	07-06-2019	It was confirmed that with regards to the section 38 development application process, only developments that are applied for in terms of section 38(1) of the NRHA require that the relevant Heritage Resources Authority is notified at the earliest phase via a NID document. It was stated that if an application to SAHRA is submitted via SAHRIS, the SAHRIS application acts as a NID document. It was further stated that if the application is being conducted in terms of section 38(8) of the NHRA, then no NID is required as 38(1) does not apply when a 38(8) process is undertaken.
ESKOM	29-07-2019	Eskom requirements for works at or near Eskom infrastructure was forwarded to SiVEST. Eskom setbacks document that regulates the setback distance for renewable energy plant from Eskom infrastructure was also forwarded to SiVEST. Eskom also requested a KMZ file of the affected properties and proposed Grid connections.
ESKOM	29-07-2019	It was mentioned that Eskom have had interaction with the applicant regarding this application and have a good idea of what is coming in future. Eskom just need to have the actual plans when the applicant is at the point where routes and layouts are determined, so that Eskom can interact if necessary. It was further stated that the applicant is aware of the setbacks issue and Eskom have discussed it with them previously.
Alfranzo Smit (I&AP)	09-09-2019	Requested to be register as an I&AP. Stated that he his local from the area and a Small, Medium and Micro-Enterprise (SMME) owner.
Veronique Fyfe [I&AP – G7 Renewable Energies (Pty) Ltd]	10-09-2019	Requested that G7 be added as an I&AP to the database. It was stated that Ms. Veronique Fyfe could be put down as the contact person with the email address eia@g7energies.com.
Belinda Maliti (I&AP – Inan Inkosi Trading	18-01-2020 & 21-01-2020	Requested any kind of job in the project. Project information was provided by SiVEST and Ms / Mrs. Maliti requested to be added to the project database. Contact details for Ms. / Mrs. Mailit were

I&AP / Key Stakeholder / OoS	Date received	Summary of comments
		provided and SiVEST added her to the project database accordingly.
SAHRA	29-01-2020	Follwing the BID notification, SiVEST were informed that all development applications are processed via SAHRA's online portal, the South African Heritage Resources Information System (SAHRIS) found at the following link: http://sahra.org.za/sahris/. It was further stated that SAHRA do not accept emailed, posted, hardcopy, faxed, website links or DropBox links as official submissions. SIVEST were asked to create an application on SAHRIS and upload all documents pertaining to the EA Application Process. SAHRA informed SiVEST that, as per section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of the process and the assessment must comply with section 38(3) of the NHRA. SAHRA informed SIVEST that the status of the case must be changed from DRAFT to SUBMITTED once all documents (including all appendices) have been uploaded to the case application, SiVEST were also remonded to ensure that all documents produced as part of the EA process are submitted as part of the application, and are submitted to SAHRA at the beginning of the Public Review periods. Once all these documents have been uploaded, SAHRA will be able to issue an informed comment as per section 38(4) and 38(8) of the NHRA.

A detailed C&RR (including responses to the comments above) is included in **Appendix 7E**. It should be noted that all comments received to date have been copied verbatim in the attached C&RR. Copies of all comments received to date are included in **Appendix 7D**.

10 ENVIRONMENTAL MONITORING AND AUDITING

The EMPr becomes a tool by which compliance on the proposed site can be measured against. In order to utilise this tool, environmental monitoring needs to take place with regular audits against the EMPr to ensure that all aspects are attended to.

Environmental monitoring establishes benchmarks to judge the nature and magnitude of potential environmental and social impacts.

Some of the key parameters for monitoring and auditing of the proposed development include the following *inter alia*:

- Impacts on Terrestrial Ecology;
- Impacts on Avifauna;
- Impacts to Agriculture and Soils;
- Impact on Surface Water;
- Visual impacts on the area imposed by the components of the proposed development;
- Impacts on heritage resources, including archaeology, paleontology and the cultural landscape; and
- Positive and negative socio-economic impacts; and

The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and that they are effective. Environmental and social monitoring will also enable responses to new and developing issues of concern. The activities and indicators that have been recommended for monitoring are presented in the EMPr.

The objectives of this EMPr are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- To identify measures that could optimise beneficial impacts;
- To create management structures that address the concerns and complaints of I&APs with regards to the proposed development;
- To establish a method of monitoring and auditing environmental management practices during all phases of the proposed development;
- Ensure that the construction and operational phases of the proposed development continues within the principles of Integrated Environmental Management and Environmental Management System (EMS) ISO 14001 Principles;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the proposed development;
- Ensure that the safety recommendations are complied with;
- Propose mechanisms for monitoring compliance with the EMPr and reporting thereon; and
- Specify time periods within which the measures contemplated in the EMPr are implemented, where appropriate.

The EMPr Seeks to highlight the following:

- Avoiding impacts by not performing certain actions;
- Minimising impacts by limiting aspects of an action;
- Rectifying impacts through rehabilitation, restoration, etc. of the affected environment;
- Compensating for impacts by providing substitute resources or environments;
- Minimising impacts by optimising processes, structural elements and other design features;
- Provide on-going monitoring and management of environmental impacts of a development and documenting of any digressions / good performances; and
- The EMPr is a legally binding document that all parties involved in the proposed development must be made aware of.

Environmental monitoring will be carried out to ensure that all construction activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented. The contractor shall employ an officer responsible for implementation of social / environmental requirements. This person will maintain regular contact with the local / district Environmental Officers. The contractor and applicant will have a responsibility to ensure that the proposed mitigation measures are properly implemented during the construction phase.

A monitoring programme will be implemented for the duration of the lifecycle of proposed development. This programme will include:

- Regular Audits During the Construction Phase;
- According to the EMPr, EA and permit conditions which will be conducted by the Environmental Control Officer (ECO). These audits can be conducted randomly and do not require prior arrangement with the project manager;
- Compilation of an audit report with a rating of the compliance with the EMPr. This report will be submitted to the relevant authorities;
- Annual Audits conducted during the Operational Phase; and
- Undertaken by the ECO.

The environmental monitoring program will operate through the pre-construction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose with key indicators and criteria for significance assessment.

10.1 Planning and Design Phase

- Ensures that the design of the facility responds to the identified environmental constraints and opportunities;
- Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements;
- Ensures that adequate regard has been taken of identified environmental sensitivities, as well as any landowner and community concerns and that these are appropriately addressed through design and planning (where applicable);
- Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area; and
- Ensures that the best environmental options are selected for the facility.

10.2 Construction Phase

- Ensures that construction activities are properly managed in respect of environmental aspects and impacts;
- Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents;
- Minimises the impact on the indigenous natural vegetation, protected tree species, and habitats of ecological value;
- Minimises impacts on fauna using the site; and

- Minimises the impact on heritage sites, should they be uncovered.

10.3 Operation Phase

- Ensures that operational activities are properly managed in respect of environmental aspects and impacts;
- Enables the operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents; and
- Minimises impacts on fauna.

10.4 Decommissioning Phase

At the end of the operational phase of the proposed development, the proposed development might need to be decommissioned. This would include the decommissioning of the substations as well as the overhead lines connecting the substations to the grid (i.e. the 132kV overhead power lines). Should the proposed development need to be decommissioned, the applicant will rehabilitate the project site as per the requirements in the NEMA Regulations, following the decommissioning of the project site. The aim of the decommissioning phase would be to return the site to its original pre-construction condition. In the unlikely event that decommissioning is required (i.e. PPA not renewed, facility becoming outdated or the land being required for other purposes), the decommissioning phase will be undertaken in line with the EMPr and the requirements in the NEMA Regulations, and the site will be rehabilitated to its original pre-construction condition.

Majority of the components of the proposed development are considered to be reusable or recyclable. In the event of the proposed development being decommissioned, the components will be reused, recycled or disposed of (where possible) in accordance with the relevant regulatory requirements. Certain components may also be traded or sold, should there be an active second-hand market for these components. Alternatively, in the event that sale is not possible, certain components may be used as scrap metal. It must be noted that the decommissioning phase of the proposed development will also create skilled and unskilled employment opportunities.

Monitoring should be undertaken at a number of levels (**Figure 54**). Firstly, it should be undertaken by the Contractor at work sites during construction, under the direction and guidance of the Supervision Consultant who is responsible for reporting the monitoring to the implementing agencies. It is not the Contractor's responsibility to monitor land acquisition and compensation issues. It is recommended that the Contractor employ local full time qualified environmental inspectors for the duration of the Contract. The Supervision Consultant should include the services of an independent environmental and monitoring specialist on a part time basis as part of their team.

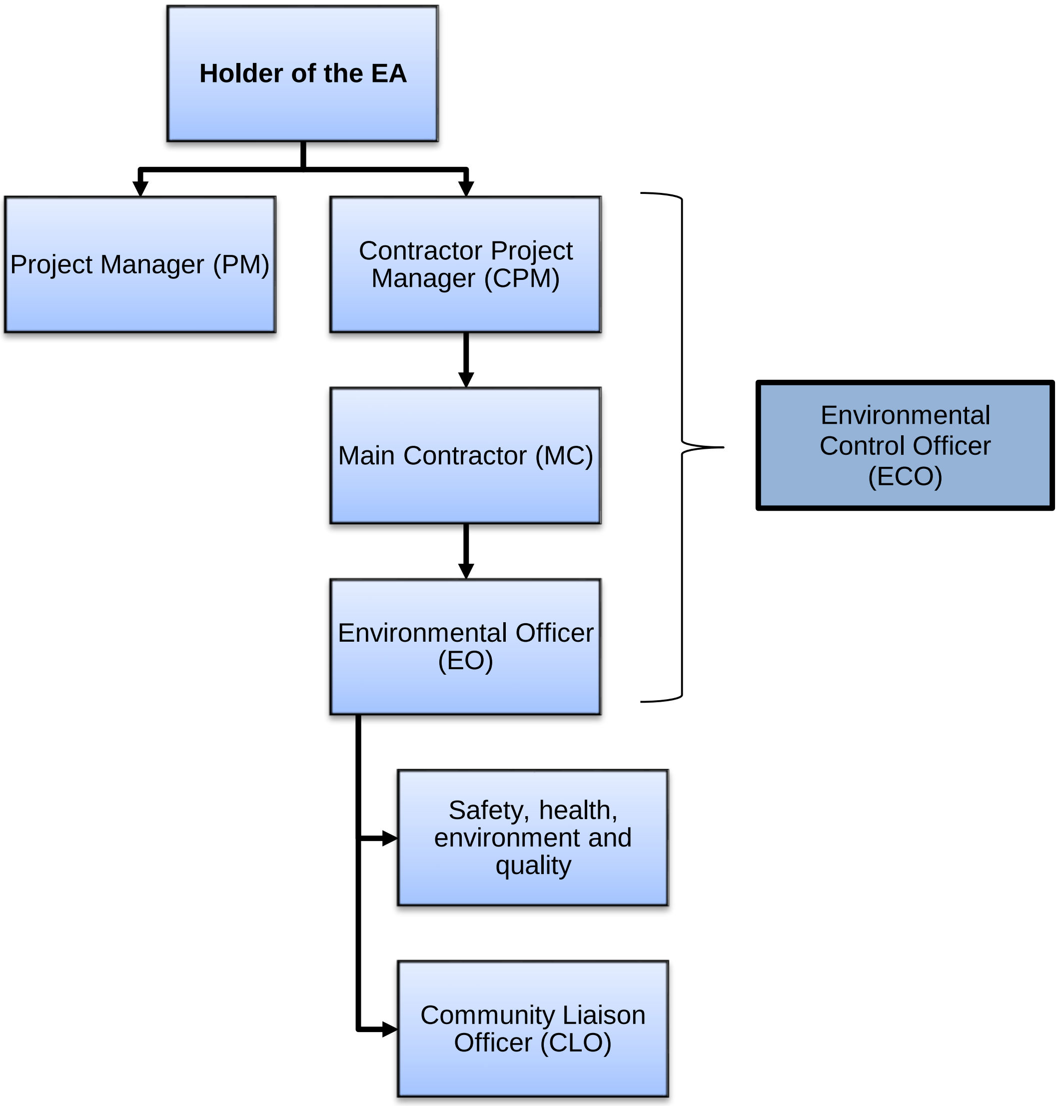

Figure 54: Organogram indicating the organisational structure

Environmental monitoring is also an essential component of project implementation. It facilitates and ensures the follow-up of the implementation of the proposed mitigation measure, as they are required. It helps to anticipate possible environmental hazards and/or detect unpredicted impacts over time.

Periodic on-going monitoring will be required during the life of the proposed development and the level can be determined once the proposed development is operational.

The Draft EMPr is included in **Appendix 8**.

11 ASSESSMENT IN TERMS OF EQUATOR PRINCIPLES

The Equator Principles (EPs) are a financial industry benchmark for determining, assessing and managing social and environmental risk in project financing. Several banks, exchanges and organisations worldwide have adopted the EPs as requirements to be undertaken for project funding on application and approval. Furthermore, certain funding institutions have not formally adopted the EPs, but require clients to be compliant with them in order to qualify for loans. The EPs are summarised below:

Principle 1: Review and Categorisation

When a project is proposed for financing, the Equator Principles Funding Institution ('EPFI') will categorise the project based on the magnitude of its potential environmental and social impacts and risks.

Principle 2: Environmental and Social Assessment

For each project assessed as being either Category A or Category B, the client / borrower must conduct a Social and Environmental Assessment ('Assessment') process to address the relevant impacts and risks of the proposed project. The Assessment should also propose mitigation and management measures relevant and appropriate to the nature and scale of the proposed project.

Principle 3: Applicable Environmental and Social Standards

The Assessment will refer to the applicable IFC Performance Standards and applicable Industry Specific Environmental, Health, and Safety (EHS) Guidelines.

Principle 4: Environmental and Social Management System and Equator Principles Action Plan

The client / borrower must prepare an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) must be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards. Where applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree to an Equator Principles Action Plan to outline gaps and commitments.

Principle 5: Stakeholder Engagement

For all Category A and Category B Projects, the EPFI will require the client to demonstrate effective Stakeholder Engagement as an on-going process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders. For projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to the risks and impacts of the Project; the Project's phase of development; the language preferences of the Affected Communities; their decision-making processes; and the needs of disadvantaged and vulnerable groups.

Principle 6: Grievance Mechanism

The EPFI will require the client, as part of the ESMS, to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the project's environmental and social performance. The grievance mechanism is required to be scaled to the risks and impacts of the Project and have Affected Communities as its primary user. It will seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate, readily accessible, at no cost, and without retribution to the party that originated the issue or concern. The mechanism should not impede access to judicial or administrative remedies.

Principle 7: Independent Review

For all Category A projects and, as appropriate, for Category B projects, an independent social or environmental expert not directly associated with the borrower must review the Assessment, AP and consultation process documentation in order to assist the EPFIs due diligence and assess EPs compliance.

Principle 8: Covenants

An important strength of the EPs is the incorporation of covenants linked to compliance. For all projects, the client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects. For Category A and B projects, the client / borrower will covenant in financing documentation:0

- To comply with the ESMPs and EPs AP (where applicable) during the construction and operation of the Project in all material respects;
- To provide periodic reports in a format agreed with the EPFI (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third-party experts, that i) document compliance with the ESMPs and EPs AP (where applicable), and ii) provide representation of compliance with relevant local, state and host country environmental and social laws, regulations and permits; and
- To decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan.

Principle 9: Independent Monitoring and Reporting

To ensure on-going monitoring and reporting over the life of the loan, EPFIs will, for all Category A projects, and as appropriate, for Category B projects, require appointment of an independent environmental and/or social expert, or require that the borrower to retain qualified and experienced external experts to verify its monitoring information, which would be shared with EPFIs.

Principle 10: Reporting and Transparency

For all Category A and, as appropriate, Category B Projects:

- The client will ensure that, at a minimum, a summary of the ESIA is accessible and available online.
- The client will publicly report GHG emission levels (combined Scope 1 and Scope 2 Emissions) during the operational phase for Projects emitting over 100,000 tonnes of CO_2 equivalent annually.

Although this report is not written in terms of the EPs, it fully acknowledges that EPs will need to be complied with should funding for the proposed development be required from a development financial institution. In general, the following documentation will need to be considered in that regard:

- The 'Equator Principles' 2013
- International Finance Corporations Performance Standards on Social and Environment, IFC, January 2012, namely:
    - Performance Standard 1: Social and Environmental Assessment and Management Systems
    - Performance Standard 2: Labour and Working Conditions

- Performance Standard 3: Pollution Prevention and Abatement
- Performance Standard 4: Community Health, Safety and Security
- Performance Standard 5: Land Acquisition and Involuntary Resettlement
- Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management
- Performance Standard 7: Indigenous Peoples
- Performance Standard 8: Cultural Heritage

- International Finance Corporation – World Bank Guidelines, General EHS Guidelines 2007.

EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice. These EHS Guidelines are applied as required by the World Bank's respective policies and standards. These General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors.

- The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs.

11.1 Assessment Results

This section details the current compliance level with which the proposed development meets with the EPs and the related Performance Standards which are outlined below.

The coding key is as follows:

Compliance Level			
Clear			
Not assessed / determined	Not compliant	Partially compliant	Compliant

Table 32: Compliance level of proposed development in terms of EPs and related performance standards

Principles	**Compliance Level**	**Reference**
General, Performance Standard 1 Environmental & Social Reporting		
1. Baseline Information		Refer to **section 3** – Technical Details and **section 6** – Description of the receiving environment
2. Alternatives (Assessment of alternatives)		Refer to **section 8**
3. Impacts and risks		Refer to **section 7**
4. Global impacts	N/A	N/A

Principles	Compliance Level	Reference
5. Legal requirements		Refer to **section 4** for legal requirements and guidelines
6. Transboundary		N/A.
7. Disadvantaged / vulnerable groups		Addressed in **Appendix 6F** as part of the Social Impact Assessment. This has also been addressed as part of the EMPr (**Appendix 8**)
8. Third party		Refer to **section 1.1** and **Appendix 6F**.
9. Mitigation measures		Addressed in **section 7**, as well as part of specialist assessments (**Appendix 6**). Also addressed as part of the EMPr (**Appendix 8**)
10. Documentation process		Refer to **section 1**, **section 4** and **section 9**
11. Action Plans		Partially addressed in **section 12**. No major Action Plans required as mostly generic mitigation measures have been required
12. Organisational capacity		Refer to **Appendix 1**
13. Training		Refer to **Appendix 1**
14. Grievance mechanism		Refer to **Appendix 1**. The applicant will commit to full compliance with this standard when financial closure has been reached. The applicant is fully aware of the implications of this standard and this information will be made available in due course as part of the development planning for the project.
15. Report content		Refer to **section 1**
Performance Standard 2, Labour & Working Conditions		
1. Human Resource Policy		Refer to **Appendix 1**. The applicant will commit to full compliance with this standard when financial closure has been reached. The applicant is fully aware of the implications of this standard and this information will be made available in due course as part of the development planning for the project.
2. Working relationship		Refer to **Appendix 1**
3. Working conditions with and terms of employment		Refer to **Appendix 1**
4. Workers organisation		Refer to **Appendix 1**

Principles	Compliance Level	Reference
5. Non-discrimination and equal opportunities		Refer to **Appendix 1**. Partly addressed in **section 7** as part of the Social Impact Assessment (**Appendix 6F**). This issue has also been addressed as part of the EMPr (**Appendix 8**)
6. Grievance mechanism		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
7. Occupational Health and Safety		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
8. Non-employee workers		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
9. Supply Chain		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
10. Labour Assessment Component of a Social and Environmental Assessment		Refer to **Appendix 1**. Addressed as part of the EMPr (**Appendix 8**)
Performance Standard 3, Pollution		
1. Pollution Prevention, Resource Conservation and Energy Efficiency		Refer to EMPr in **Appendix 8**
2. Wastes		Refer to EMPr in **Appendix 8**
3. Hazardous material		Refer to EMPr in **Appendix 8**
4. Dangerous substances		Refer to EMPr in **Appendix 8**
5. Emergency preparedness and response		Refer to EMPr in **Appendix 8**. The applicant will commit to full compliance with this standard when financial closure has been reached. The applicant is fully aware of the implications of this standard and this information will be made available in due course as part of the development planning for the project
6. Technical guidance – ambient considerations		Refer to **Appendix 1**
7. Greenhouse gas emissions		N/A. No greenhouse gas emissions will result from the proposed development apart from the manufacturing of the solar PV components and limited emissions during construction phase
Performance Standard 4, Health & Safety		
1. Hazardous materials safety		Refer to EMPr in **Appendix 8**
2. Environmental and natural resource issues		Refer to **section 7**

Principles	Compliance Level	Reference
3. Emergency preparedness and response		Refer to EMPr in **Appendix 8**. The applicant will commit to full compliance with this standard when financial closure has been reached. The applicant is fully aware of the implications of this standard and this information will be made available in due course as part of the development planning for the project
Performance Standard 5, Land Acquisition		Refer to **section 5** and **section 6**. Project needs and desirability and the background of the receiving environment are discussed
Performance Standard 6, Biodiversity		Refer to **section 6.7** and **section 7.2.2** which summarises the findings from the Terrestrial Ecology Impact Assessment
Performance Standard 7, Indigenous People		Refer to **section 9** describing public participation. In addition, **section 6.15** details the findings of the Social Impact Assessment
Performance Standard 8, Cultural Heritage		Refer to **section 6.13** and **section 7.2.7**

It is important to note that some of the issues listed per performance standard in the table above will only be addressed during the pre-construction and construction phase of the proposed development.

12 CONCLUSIONS AND RECOMMENDATIONS

Mooi Plaats Solar Power is proposing to construct the Mooi Plaats 33/132kV On-site Eskom Substation, Mooi Plaats 33/132kV Eskom Collector Substation and an associated 132kV overhead power line near Noupoort in the Northern Cape Province of South Africa. The overall objective of the proposed development is to feed the electricity generated by the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) into the national grid.

The BA process for the proposed development has been conducted in accordance with the EIA Regulations, 2014 (as amended), promulgated in terms of Chapter 5 of the NEMA. A preferred layout with preferred substation sites (on-site and collector) and overhead power line corridor route has been identified which is less environmentally sensitive and will result in the least environmental impact.

Grid connection infrastructure alternatives which include on-site and collector substation sites and 132kV power line corridors were identified and assessed during the BA process. These alternatives essentially provide for two (2) different route alignments with associated substations (on-site and collector) contained within an assessment corridor between approximately 400m and 900m wide. This is to allow for flexibility to route the power line on either side of the existing high voltage Eskom power lines. It should be noted that the substation sites are intrinsically linked to the grid connection infrastructure alternatives. The locations for the on-site and collector substation sites being proposed as part of this application have therefore been informed by the grid connection infrastructure alternatives which have been chosen as 'preferred' by the respective specialists (**section 8**). All alternatives were assessed against the 'no-go' alternative (i.e. *status quo*).

The specialist assessments undertaken as part of the BA process were conducted at a BA level and as such majority included ground-truthing verification of the proposed development footprint. The Agricultural and Soils, Geotechnical and Social specialist assessments were however undertaken via desktop means as ground-truthing verification was not deemed necessary. The Avifauna study has been undertaken over a six (6)-month period, while an intensive Terrestrial Ecology study was undertaken to further identify and define environmental constraints within the proposed development footprint. Based on the findings of the specialist assessments, the proposed layout was refined to avoid identified environmental sensitivities (where required) and informed the location of the grid connection infrastructure alternatives which were investigated and comparatively assessed as part of the BA process. Prior to submission of DBAR, preliminary power line corridor routes and substation sites were considered by the applicant. However, in order to ensure that the proposed development avoids the sensitive and 'no-go' areas identified by specialists, the preliminary power line corridor routes and substation sites were subsequently amended.

Detailed mitigation and management measures have been developed and have been put forward in the Draft EMPr (**Appendix 8**). Should this proposed development receive a positive environmental authorisation (EA), the EMPr will guide the project proponent and appointed contractor(s) through the final design, construction and operational phases of the proposed development.

The findings of the specialist assessments undertaken as part of this BA process provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed development. The findings conclude that there are no environmental fatal flaws that should prevent the proposed development from proceeding. Areas of special concern have however been identified which will require site-specific mitigation measures to reduce impacts. These are included within the Draft EMPr (**Appendix 8**) to ensure that these areas receive special attention.

It was determined during the BA process that the proposed development will result in limited potential negative impacts and certain positive impacts. A preferred layout with preferred substation sites (on-site and collector) and a preferred overhead power line corridor route has been identified which is less environmentally sensitive and will result in the least environmental impact.

A detailed public participation process is being followed during the BA process which conforms to the public consultation requirements as stipulated in the EIA Regulations, 2014 (as amended) (refer to **section 9**). In addition, all issues raised by I&APs and key stakeholders will be captured in the FBAR and where possible, mitigation measures provided in the EMPr to address these concerns.

As sustainable development requires all relevant factors to be considered, including the principles contained in section 2 of the NEMA, the DBAR has strived to demonstrate that where impacts were identified, these have been considered in the determination of the preferred layout.

A summary of the findings for each identified environmental impact evaluated in the context of the proposed development (both biophysical and social) is provided in **Table 33** below.

12.1 Summary of Findings

A summary of the findings for each identified environmental impact evaluated in the context of the proposed development (both biophysical and social) is provided in the table below.

Table 33: Summary of environmental issues identified in specialist studies

Terrestrial Ecology	There are various Acts that limit development or require permits before development can proceed. The most important of these are permits required in terms of protected species that could potentially occur on-site, including the National Environmental Management: Biodiversity Act, the Northern Cape Nature Conservation Act and the National Forests Act. Details of the description of the ecological receiving environment are summarised as follows: 1. The study area is situated in an area that is on the boundary between relatively flat plains and a low mountain range with moderately to steeply sloping topography. Habitat on-site is in a largely natural state and is in a rural environment. There is very little transformation or serious degradation on-site. 2. There are two (2) regional vegetation types occurring in the project study area, Eastern Upper Karoo (most of the area), and Besemkaree Koppies Shrubland (mountain areas). There are three (3) other national vegetation types in the vicinity, namely Southern Karoo Riviere, Tarkastad Montane Shrubland and Karoo Escarpment Grassland. Floristic components of all five (5) of these units occur in the study area, even though they are not all mapped as occurring within the study area. All these vegetation types are listed in the scientific literature as Least Threatened and none are listed in the National List of Ecosystems that are Threatened and need of protection (GN 1002 of 2011). 3. All habitat is mapped as 'Critical Biodiversity Area 2' (CBA2) or 'Critical Biodiversity Area 1' (CBA1) in the Provincial Conservation Plan and there are also patches mapped as 'Ecological Support Area' (ESA). The remaining natural vegetation on-site, therefore has high value for conservation of vegetation in the Province according to the broadscale CBA maps. 4. Habitats on-site were divided into five (5) units, namely 'Mountain Vegetation', 'Lowland Plains Vegetation', 'Low Ridges and Koppies', 'Broad Drainage Areas' and 'Mountain Stream'. The vegetation on the plains on-site was found to be a karroid dwarf shrubland that resembles the

	description for Eastern Upper Karoo, but the mountain vegetation was a mixed grassy shrubland that appears to be a floristic mix of Besemkaree Koppies Shrubland and Karoo Escarpment Grassland. The mountain vegetation has the highest local diversity and greatest variation in species composition. A map of natural habitats of the study area was produced by mapping from aerial imagery, based on information collected in the field. 5. There are no plant species occurring on-site or likely to occur on-site that are protected according to the National Environmental Management: Biodiversity Act (Act No. 10. of 2004) (NEM:BA). 6. There are a number of plant species occurring on-site that are protected according to the Northern Cape Nature Conservation Act (Act 9 of 2009). It is likely that additional protected species occur there that were not observed during the field survey. None of these are of conservation concern, but a permit is required from the Provincial authorities to destroy them. These are listed in the text in the body of this report. 7. There are no protected tree species that are likely to occur in the study area. 8. A total of 79 mammal species have a geographical distribution that includes the general study area in which the sites are found. Of the species currently listed as threatened or protected (see Appendix 5 of Terrestrial Ecology Impact Assessment Report for list of protected species), the following are considered to have a very high, high or medium probability of occurring on-site, based on habitat suitability and evidence collected in the field: the Black-footed Cat (Vulnerable), the Cape Clawless Otter (Near Threatened), the South African Hedgehog (Near Threatened), Grey Rhebok (Near Threatened), White-tailed Rat (Vulnerable), and the Spectacled Dormouse (Near Threatened). There is strong evidence to suggest that the Black-footed Cat and the Cape Clawless Otter both definitely occur on-site. 9. The study area contains habitat that is suitable for a small number of frog species. One (1) protected frog species, the Giant Bullfrog, could potentially occur on-site. 10. A total of 55 reptile species have a geographical distribution that includes the general study area in which the sites are found. No reptile species of conservation concern could potentially occur in the study area. 11. A preliminary sensitivity map of the study area was produced that identifies areas of higher sensitivity that should be taken into account during activities on-site. This includes drainage areas and associated wetland-related habitat, low ridges, parts of the mountain area, and CBA1 and CBA2 areas. The preliminary assessment of impacts indicates that all impacts are of low significance or can be reduced to low significance with mitigation, with the exception of loss of natural vegetation, for which the impact remains of medium significance after mitigation. Proposed mitigation measures include the following: ▪ shifting infrastructure positions to avoid sensitive habitats;

	▪ select infrastructure options that cause the least amount of damage to natural habitats; ▪ cross watercourses at right angles; ▪ install appropriate structures at watercourse crossings to minimise impacts on these systems; ▪ minimise vegetation clearing and disturbance; ▪ formalise a rehabilitation programme; ▪ undertaking a pre-construction botanical walk-through survey of the footprint of the selected options; ▪ obtaining permits for any protected species that may be affected; ▪ undertaking a search and rescue of plants for which it is appropriate to rescue; and ▪ compile an alien plant management plan and undertaking regular monitoring. The report concludes that there are some sensitivities in the study area related to natural habitat and to individual species, but that these can be minimised or avoided with the application of appropriate mitigation or management measures. There will be residual impacts, primarily on natural habitat, but the amount of habitat that will be lost to the proposed development is insignificant compared to the area in hectares of the regional vegetation type that occurs on-site and therefore the residual impacts are considered acceptable, on condition local sensitivities of biodiversity importance are avoided. On this basis, it is recommended that the proposed development be authorised.
Avifauna	The proposed development will have some pre-mitigation impacts on avifauna at a site and local level which will range from Medium to Low. The impact of displacement due to disturbance associated with the construction of the proposed 132kV grid connection and substations, is assessed to be Medium and can be mitigated to a Low level. The potential for displacement due to habitat destruction associated with the construction of the substations is rated as Low and could be further reduced with appropriate mitigation. The impact of bird collisions with the 132kV grid connection is rated as High and could be reduced to Medium with the application of mitigation measures. The potential impact of electrocutions is assessed to be Medium, but it can be reduced to Low with appropriate mitigation. The impact of displacement due to disturbance associated with the decommissioning of the proposed 132kV grid connection and substations, is assessed to be Medium and can be mitigated to a Low level. The cumulative impact of the proposed grid connections within a 35km radius is rated as Medium, but it can be reduced to Low with the application of appropriate mitigation. **<u>IMPACT STATEMENT</u>** From an avifaunal impact perspective, there is no objection to the proposed development of the grid connections, provided the proposed mitigation

	measures are strictly implemented. No further monitoring will be required during the operational phase.
Surface Water	Findings were based on the method for delineating wetlands and riparian habitats as per the DWAF (2005 & 2008) guidelines. At a broad level, the study site is located within the Orange Catchment. More specifically, the study area is situated within the quaternary catchments D32B & D32C. The fieldwork assessment found that there are no wetlands on the study site. However, a number of watercourses, both perennial and non-perennial, were identified throughout the entire study area. In terms of the Ecological Condition of the non-perennial, and perennial watercourses, Ecological Condition was assessed to be a class C – Moderately Modified systems. The Environmental Importance and Sensitivity Class (EISC) for the watercourses was determined. The results showed that the EISC for the watercourses were categorised as a Class B (High). The classification of high EISC was primarily due to the condition of the watercourses assessed, as well as the presence of endangered species. The buffer zone determination for the watercourses took into account the type of the proposed development, potential impacts, condition of the habitat as well as other characteristics of the watercourse. As a result, the following buffer zones were assessed and are to be implemented as far as possible: ▪ Construction Phase Buffer: 15m ▪ Operation Phase Buffer: 15m Foreseen potential negative impacts related to the proposed development were identified and assessed. The potential construction-related impacts included impacts to watercourses (-20 low pre- and -8 low post-mitigation impact rating), hydrology of the watercourses (-20 low pre- and -9 low post-mitigation impact rating) and water quality impacts (-39 medium pre- and -9 low post-mitigation impact rating). The operational impacts identified included impacts to the hydrology of the watercourse (-36 medium pre- and -18 low post-mitigation impact rating). Overall, all impacts were assessed to be low, post-implementation of mitigation measures. In terms of potentially applicable environmental and water-related legislation, listed activities were identified to be triggered in terms of NEMA (1998) and the EIA Regulations (2014, as amended) from a surface water perspective. With respect to the National Water Act (NWA) (1998), water uses (c) and (i) were identified as being potentially applicable. However, the application of the risk assessment matrix protocol as per Government Notice 509 of 2016 (No. 40229) was undertaken, the findings show that the risk of potential impacts on the watercourse was assessed to be in the LOW-risk class. Where risks were

	identified, a number of control measures have been stipulated which will assist in decreasing the level of risk to an even lower level. In accordance with the implementation of control measures, all potential risks are classed as LOW. Therefore, registration for General Authorisation (GA) can be undertaken where required and agreed upon with the Department of Water and Sanitation (DWS). The decision on whether the proposed development is to proceed will rest on environmental and water governmental departments whom will need to make a trade-off between meeting the conservation targets of the province or meeting the energy demands of the country. However, it is the opinion of the specialist that the proposed development may proceed where the relevant control measures and mitigation measures stipulated are implemented. There are a number of recommendations to be implemented for the proposed development. These include the following: ▪ A stormwater management plan for all phases of the proposed development is required to be compiled and implemented which accounts for control of increased run-off, erosion and sedimentation; and ▪ An Alien Eradication and Removal Programme is to be compiled and implemented for the duration of the proposed development. Based on the findings above, with the implementation of the control and mitigation measures stipulated, it is the opinion of the specialist that the proposed development may proceed.
Agricultural and Soils (Desktop)	It should be noted that a field investigation was not considered necessary. The assessment was based on a desktop analysis of existing soil and agricultural potential data and other data for the site, which is considered entirely adequate for a thorough assessment of all the agricultural impacts of the proposed development (see section 4.1 of the Agricultural and Soils Impact Assessment Report). The key findings of the Agricultural and Soils Impact Assessment are provided below: ▪ The proposed project area is dominated by shallow, loamy sands on underlying rock or less commonly clay. Dominant soil forms are Swartland, Hutton, Mispah, and Valsrivier. ▪ The major limitations to agriculture are the limited climatic moisture availability (low rainfall), the rugged terrain and the shallow, rocky soils. ▪ As a result of these limitations, the agricultural use of the study area is limited to low-intensity grazing only, except for some isolated patches of irrigation land. ▪ The proposed project area is classified with land capability evaluation values between 1 (very low) and 7 (low to moderate), with 6 being most predominant.

	▪ The significance of all agricultural impacts is kept low by the limited agricultural potential of the land. ▪ The only parts of the study area that do not have low sensitivity are the small patches of irrigation. These are considered no-go areas for any footprint of development that will exclude cultivation. ▪ Two (2) potential negative impacts of the development on agricultural resources and productivity were identified. These are: o Loss of agricultural land use; and o Soil erosion and degradation. ▪ One (1) potential positive impact of the development on agricultural resources and productivity was identified as: o Increased financial security of farming operations through rental income ▪ Soil erosion and degradation was assessed as having medium significance before and after mitigation. The other two (2) impacts were assessed as having low significance before and after mitigation. ▪ The recommended mitigation measures are for implementation of an effective system of stormwater run-off control; maintenance of vegetation cover; and to strip, stockpile and re-spread topsoil. ▪ There is no material difference between the significance of impacts of any of the proposed project alternatives. All proposed alternatives have an equal impact. ▪ Due to the low agricultural potential of the site, and the consequent low to medium negative agricultural impact, there are no restrictions relating to agriculture which preclude authorisation of the proposed development (including all alternatives) and therefore, from an agricultural impact point of view, the development should be authorised.
Visual	Overall, sparse human habitation and the predominance of natural vegetation cover across much of the study area would give the viewer the general impression of a largely natural setting with some pastoral elements. As such, solar PV developments and their associated grid connections would alter the visual character and contrast significantly with the typical land use and/or pattern and form of human elements present across the broader study area. The level of contrast will however be reduced by the presence of the N10 national route and existing high voltage power lines in the northern sector of the study area. The area is not typically valued for its tourism significance and there is limited human habitation resulting in relatively few potentially sensitive receptors in the area. A total of twenty-six (26) potentially sensitive receptors were identified in the combined study area, three (3) of which are considered to be sensitive receptors as they are linked to leisure/nature-based tourism activities in the area. None of the receptors are however expected to experience high levels of visual impact from the proposed grid connection infrastructure. Although the

	N10 receptor road traverses the study area, motorists travelling along this route are only expected to experience moderate impacts from the proposed Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134). An overall impact rating was also conducted in order to allow the visual impact to be assessed alongside other environmental parameters. The assessment revealed that impacts associated with the proposed grid connection infrastructure would be of low significance during both construction and decommissioning phases. Visual impacts associated with the grid connection infrastructure during operation would be of low significance. Although other renewable energy developments and infrastructure projects, either proposed or in operation, were identified within a 35km radius of the proposed development, it was determined that only one (1) of these would have any significant impact on the landscape within the visual assessment zone, namely the Umsobomvu WEF. This proposed WEF, in conjunction with the proposed associated grid connection infrastructure, will alter the inherent sense of place and introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures stipulated for each of these developments by the visual specialists. In light of this and the relatively low level of human habitation in the study area however, cumulative impacts have been rated as medium. No fatal flaws were identified for any of the grid connection infrastructure alternatives and a summary of the preference rating is provided below: ▪ Mooi Plaats grid connection infrastructure: No preference was determined for any of the substation sites. The Option 1 alternatives were rated as preferred due to the fact that the route is shorter and most almost entirely aligned with the existing power lines. It is the specialist's opinion that the visual impacts associated with the proposed grid connection infrastructure are of moderate significance. Given the low level of human habitation and the relative absence of sensitive receptors, the project is deemed acceptable from a visual impact perspective and the EA should be granted for the relevant BA application. The specialist is of the opinion that the impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.
Heritage	The Heritage Impact Assessment (HIA) consisted of a scoping phase during which background information and landscape analysis was done to determine the heritage resources that can potentially occur within the study area. This was followed up with fieldwork by a team of archaeologist and a palaeontologist with

	the aim of identifying heritage resources in the development footprint areas and to make recommendations on the management of these resources and the possible chance finds during construction activities. The fieldwork identified a total of ten (10) areas of heritage significance. Adjustments to the project layouts based on the various specialist input resulted in the total avoidance of three (3) heritage areas that was excluded from the reporting. The remaining seven (7) sites consist of three (3) large, low to medium density scatters of later stone age sites (UMS005,008 and 009). UMS004, 006 and 007 are all round stone packed enclosures. UMS007 situated in the Mooi Plaats Solar PV Energy Facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) was excluded from direct impact by design changes. UMS004 and 006 will need to be avoided during construction of the power grid through the implementation of a 30m buffer. UMS010 was identified as a fossil find spot and a 50m buffer around the fossil bearing material must be implemented. Any construction in the demarcated area must be monitored by a palaeontologist. The impact rating on the heritage resources indicated that pre-mitigation a negative high impact is projected but with the implementation of the recommended management measures this impact rating will be reduced to low negative. The results of the comparative assessment of the grid connection infrastructure alternatives provided found there to be no preference between the grid connection infrastructure alternatives. This is due to the fact that no heritage issues were identified for any of the footprints. The palaeontological sensitive area at UMS010 is the only heritage resource that influences the Options assessment, but those options affected are still favourable with the implementation of the recommended management measures. It is the specialist's considered opinion, based on the current data available, that with the consideration of the position of heritage sensitivities during the layout design and the implementation of the proposed management measures, the proposed development will have an acceptable low impact on heritage resources and can continue.
Palaeontology	The National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), states that a Palaeontological Impact Assessment (PIA) is key to detect the presence of fossil material within the planned development footprint. This PIA is thus necessary to evaluate the effect of the construction on the palaeontological resources. The proposed developments is underlain by the continental sediments of the Latest Permian sediments of the Balfour Formation (Upper Beaufort Group,

	Adelaide Subgroup) and earliest Triassic sediments of the Katberg Formation (Upper Beaufort Group, Tarkastad Subgroup, Karoo Supergroup) as well as Jurassic Karoo Dolerite. These sediments are generally mantled by a thick layer of Quaternary to Recent colluvium and alluvium. The uppermost Balfour and Katberg Formations are of extraordinary interest in that they provide some of the best existing information on ecologically complex terrestrial ecosystems during the catastrophic end-Permian mass extinction. According to the PalaeoMap of South African Heritage Resources Information System (SAHRIS), the Palaeontological Sensitivity of the Tarkastad and Adelaide Subgroups has a Very High Palaeontological Sensitivity, while that of the Quaternary superficial deposits of the Central interior is high and the Karoo dolerite (igneous rocks) is insignificant and rated as zero. A site-specific field survey of the development footprint was conducted on foot and by motor vehicle from the 24th – 28th of January 2019. Elsewhere in the Karoo Basin numerous fossils have been uncovered in these geological sediments but only two (2) sites on koppies with fossiliferous outcrops were identified. Although these localities do not currently fall in the proposed development sites, these fossiliferous sites have been identified as Highly Sensitive and No-go areas and it is recommended that a 50m buffer will be placed around these areas. In the event that construction is necessary in these sensitive areas, it is recommended that the fossils will be collected by a professional palaeontologist. Preceding excavation of any fossil material, the specialist would need to apply for a collection permit from the South African Heritage Resources Agency (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. With the above-mentioned in consideration, the proposed development, as well as all alternatives have a similar geology and therefore there is no preferences on the grounds of palaeontological fossil heritage for any specific layout among the different options under consideration. As impacts on fossil heritage usually only occur during the excavation phase, no further impacts on fossil heritage are expected during the operation and decommissioning phases of the proposed development. The impact of development on fossil heritage are usually negative but it could also have a positive impact due to the discovery of newly uncovered fossil material that would have been unavailable for scientific research. The proposed development could also provide a long-term benefit to the country by supplying renewable energy to the electricity grid. In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations, the Chance Find

	Protocol must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO 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 21 462 4509. Web: www.sahra.org.za) so that correct mitigation (e.g. recording and collection) can be carried out by a palaeontologist. 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. From a Palaeontological Heritage view there is no fatal flaws in the proposed development. However, it is recommended that the mitigation measures are included in the Environmental Management Programme (EMPr) and be fully implemented.
Social (Desktop)	**APPROACH TO STUDY** Data was gathered using the following techniques: **Collection of data** Data was gathered through: ▪ The project description prepared by the project proponent; ▪ Statistics South Africa, Census 2011 and other relevant demographic data generated by Stats SA such as the Quarterly Labour Force Survey and Mid-year population estimates; ▪ Discussions with the project proponents and Environmental Impact Assessment (EIA) Consultants; ▪ A literature review of various documents such as the relevant Municipal Integrated Development Plans (IDPs) and other specialist reports and documents; and ▪ A broader literature scan. **Impact assessment technique** The assessment technique used to evaluate the social impacts was provided by SiVEST Environmental Division and is attached in Appendix 1 of the Social Impact Assessment Report (**Appendix 6F**). **IMPACTS IDENTIFIED** The impacts are assessed in respect of the following phases of the project: ▪ Planning and design; ▪ Construction; ▪ Operational; ▪ Decommissioning; nd ▪ The 'no-go' option. **Construction phase**

	Most of the impacts discussed above apply over the short-term to the construction phase of the proposed development and include: ▪ Annoyance, dust and noise; ▪ Increase in crime; ▪ Increased risk of HIV infections; ▪ Influx of construction workers and job seekers; ▪ Hazard exposure; ▪ Disruption of daily living patterns; ▪ Disruptions to social and community infrastructure; ▪ Job creation and skills development; and ▪ Socio-economic stimulation. **Operational phase** The social impacts that apply to the operational phase of the proposed development are: ▪ Transformation of the sense of place; and ▪ Economic. o Job creation and skills development. o Socio-economic stimulation. **Decommissioning** If the proposed development were to be completely decommissioned, the major social impacts likely to be associated with this would be the loss of jobs and revenue stream that stimulated the local economy and flowed into the municipal coffers. **'No Go' Alternative** The 'no go' option would mean that the social environment is not affected as the status quo would remain. On a negative front it would also mean that all the positive aspects associated with the proposed development would not materialise. Considering that Eskom's coal-fired power stations are a huge contributor to carbon emissions, the loss of a chance to supplement the national grid through renewable energy would be significant at a national, if not at a global level. **Cumulative Impacts** In this regard, the following cumulative impacts are addressed below: ▪ Risk of HIV; ▪ Sense of place; ▪ Service supplies and infrastructure; and ▪ The economic benefit. No fatal flaws associated with the cumulative impacts are evident at a social level. The findings support the recommendations of the various reports undertaken for the different renewable energy projects in the region that, on an

	overall basis, the social benefits of renewable energy projects outweigh the negative benefits and that the negative social impacts can be mitigated. **<u>COMPARATIVE ASSESSMENT OF GRID CONNECTION INFRASTRUCTURE ALTERNATIVES (POWER LINE CORRIDORS AND ASSOCIATED SUBSTATIONS)</u>** As no social preference emerged in respect of any of the grid connection options, the other specialist reports were perused to establish if there was any preference that would have an influence on the social. Based on this analysis, the following preferences were identified and supported on a social basis: ▪ Grid Connection Option 1a = Preferred; ▪ Grid Connection Option 1b = Preferred; ▪ Grid Connection Option 2a = Favourable; and ▪ Grid Connection Option 2b = Favourable. **<u>CONCLUSION AND RECOMMENDATIONS</u>** In assessing the social impact of the proposed development, it was found that in respect of the energy needs of the country and South Africa's need to reduce its carbon emissions that the proposed development fits with national, provincial and municipal policy. Regarding the social impacts associated with the proposed development, it was found that most apply over the short term to the construction phase of the proposed development. Of these impacts, all can be mitigated to within acceptable ranges and there are no fatal flaws associated with the construction or operation of the proposed development. On a cumulative basis it is evident that the cumulative impacts associated with changes to the social environment of the region are more significant than those attached to the proposed development in isolation. On a negative front there are two (2) issues associated with developments in the region that are of most concern. The first of these issues is the change to the sense of place of an area that was once considered a pristine region of South Africa. The second is the potential, through an influx of labour and an increase in transportation to constructions sites, of the risk for the prevalence of HIV to rise in an area that has a relatively low HIV prevalence rate. In this regard, it is important that the relevant authorities recognise these issues and find ways of mitigating them to ensure that they do not undermine the benefit that renewable energy developments bring, both to the region as well as to the country as a whole. These issues are beyond a project-specific basis and as such will need to be addressed at a higher level. **Impact Statement** The project site and surrounding areas are sparsely populated with the agricultural potential of the area being low. Accordingly, the negative social

	impacts associated with the proposed grid connection infrastructure are of low to moderate significance with most occurring over the short term construction phase. The proposed development has a positive element which outweighs the negative in that it will contribute towards the supply of renewable energy into a grid system heavily reliant on coal-powered energy generation. In this sense, the proposed development forms part of a national effort to reduce South Africa's carbon emissions and thus carries with it a significant social benefit and is thus supported and should proceed. As the area is sparsely populated and the negative social impacts associated with the grid connection infrastructure are of moderate significance, it is most unlikely that any further social study will be necessary. This will, however, be dependent on the outcome of the public participation process which may result in a need to update the current report by incorporating the comments recorded and updating the social impacts accordingly.
Geotechnical (Desktop)	The desktop geotechnical assessment did not identify any fatal flaws that, from a geological and geotechnical perspective, would prevent the construction of the proposed development. The potential impacts the proposed development may have on the geology relate to soils that could be impacted by the construction activities. There may be a potential for soil erosion, due to removal of vegetation and exposure of the soils to the elements, during construction. The impacts were found to be of 'negative low impact'. Various corridor options were studied. While all options are considered suitable for development, the following option was found to be preferable from a geological and geotechnical perspective: ▪ Mooi Plaats – Grid Option 1. The geological impacts will be similar. Due the very similar bedrock geology, similar geotechnical conditions are expected across all options. From a geological and geotechnical perspective, based on the minimal negative impacts on the geology and soils and the recommendations for mitigation measures, it is recommended that the proposed development receives the 'go-ahead' from the Competent Authority.

The specialist studies above were conducted to address the potential impacts relating to the proposed development. An impact assessment was conducted to ascertain the level of each identified impact, as well as mitigation measures which may be required. The potential positive and negative impacts associated with these studies have been evaluated and rated accordingly. All of the environmental aspects above were therefore thoroughly investigated as part the BA process and it should be noted that none of the specialists recommended any further studies and/or investigations to be undertaken.

The results of the specialist studies have indicated that preferred layout alternatives contain no fatal flaws as a result of the proposed development. Additionally, the specialists investigated and comparatively assessed the grid connection infrastructure alternatives as provided in **Figure 55** below.

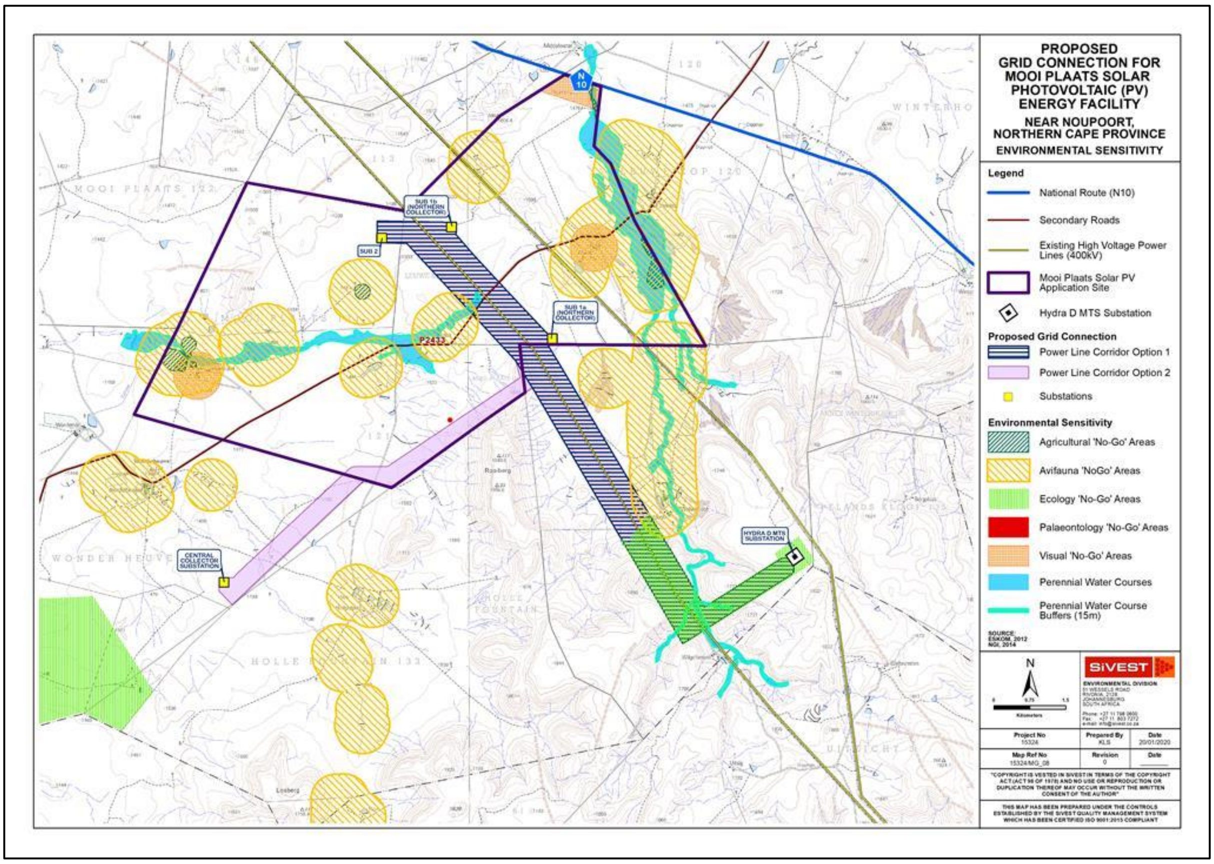

Figure 55: Proposed grid connection infrastructure alternatives in relation to environmental sensitive areas

The results of the comparative assessment of alternatives are summarised in **Table 34** below. In addition, the preferred site layout in relation to the sensitive areas identified by the specialists is indicated in **Figure 56** below.

Table 34: Summary of comparative assessment of grid connection infrastructure alternatives

ALTERNATIVE	ENVIRONMENTAL ASPECT									FATAL FLAW (YES / NO)	PREFERRED (YES /NO)
	Terrestrial Ecology	Surface Water	Visual	Geotechnical	Avifauna	Social	Palaeontology	Agricultural and Soils	Heritage		
GRID CONNECTION INFRASTRUCTURE (132kV POWER LINE AND ON-SITE AND COLLECTOR SUBSTATIONS) ALTERNATIVES											
Grid Connection Option 1a (Substation 1a and 2)	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	No Preference	No Preference	No Preference	NO	**YES**
Grid Connection Option 1b (Substation 1b and 2)	Preferred	Preferred	Preferred	Preferred	Preferred	Preferred	No Preference	No Preference	No Preference	NO	**YES**
Grid Connection Option 2a (Substation 1a and 2)	Favourable	Favourable	Favourable	Favourable	Not Preferred	Favourable	No Preference	No Preference	No Preference	NO	NO
Grid Connection Option 2b (Substation 1b and 2)	Favourable	Favourable	Favourable	Favourable	Not Preferred	Favourable	No Preference	No Preference	No Preference	NO	NO

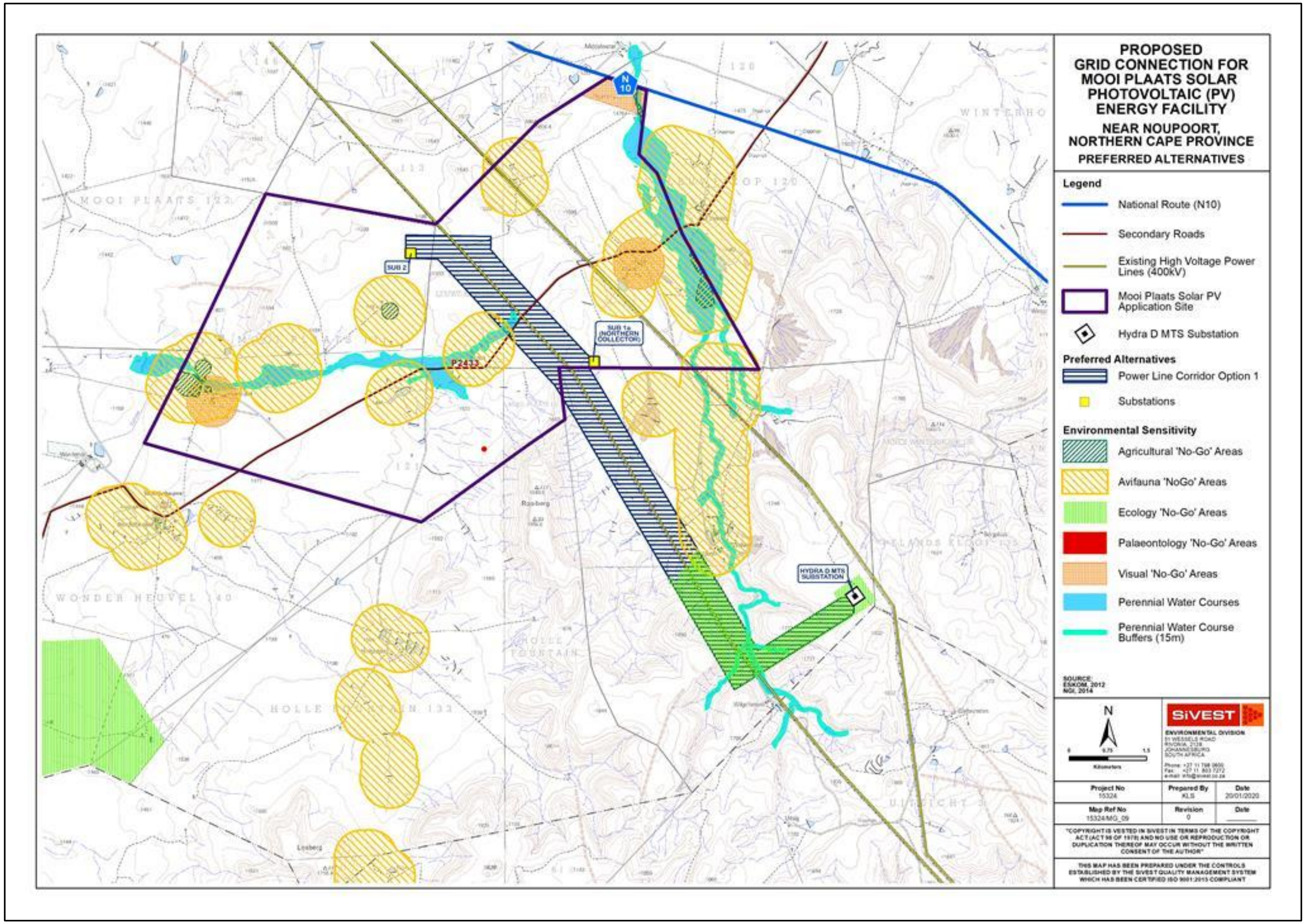

Figure 56: Preferred site layout in relation to identified environmental sensitive areas

It should be noted that micro-siting may be required within the authorised power line corridor during the detailed design phase. In addition, the alignment of the power line within the authorised power line corridor will be determined and confirmed during the detailed design phase, taking the identified sensitive areas into account. This is to enable the avoidance of any unidentified features on-site, or any design constraints when the proposed development reaches construction. As mentioned, the preferred layout provided is not the final layout for the proposed development. A final layout will be submitted to the DEFF for review and approval, along with a Final EMPr, prior to construction commencing. The specialist sensitivities and 'no-go areas' will be incorporated into the layout design when completing the final layout. Additionally, routing the power line or locating the substations within the authorised corridor would not be regarded as a change to the scope of work or the findings of the impact assessments undertaken during the BA process. This is based on the understanding that the specialists have assessed the larger area / corridor in detail and all identified sensitive areas have been excluded from this area, if possible. Therefore, moving the components within the assessed corridor would not change the impact significance. Any changes to the power line route or substation sites within the boundaries of the authorised corridor following the issuing of the EA (should it be granted) will therefore be considered to be non-substantive.

It is the opinion of the EAP that the information and data provided in this DBAR is sufficient to enable the DEFF to consider all identified potentially significant impacts and to make an informed decision on the application. Furthermore, it is the opinion of the EAP that based on the findings of the BA, that the proposed development should be granted an EA and allowed to proceed, provided the following conditions are adhered to:

- Final routing of the proposed power line within the corridor should avoid tower placement within the identified sensitive areas (as shown in **Figure 56**) located within the power line corridor and no construction activities should take place within these areas;
- All feasible and practical mitigation measures recommended by the various specialists must be incorporated into the Final Environmental Management Programme (EMPr) and implemented, where applicable;
- The Draft EMPr which accompanies this DBAR should not be approved by the DEFF as part of the EA. A Final EMPr should rather be sent to the DEFF for approval prior to construction commencing;
- The final layout should be submitted to the DEFF for approval prior to commencing with the activity; and
- Where applicable, monitoring should be undertaken to evaluate the success of the mitigation measures recommended by the various specialists.

SiVEST, as the independent EAP, is therefore of the view that:

- A preferred **Grid Connection Infrastructure** alternative (which includes an overhead power line corridor and on-site and collector substation sites) has been identified which is environmentally acceptable and will not result in significant impacts, provided that the recommended mitigation measures are implemented and the placement of substation sites and routing of the power line within the chosen corridor avoids tower placement within the identified sensitive and 'no-go' areas;
- One (1) **Grid Connection Infrastructure** alternative, with associated power line corridor route and on-site and collector substation sites, (namely **Grid Connection Option 1a**) is being

recommended to be authorised. As mentioned, the substation sites are intrinsically linked to the grid connection infrastructure alternatives. The grid connection infrastructure alternative which has been chosen as 'preferred' by the respective specialists has thus informed the location of the on-site and collector substation sites being proposed;

- A preferred **On-site Eskom Substation** site has been identified. In terms of the outcome of the comparative assessment of alternatives, **Substation 2** is being proposed as part of this application. This site is considered to be acceptable from an environmental perspective as no fatal flaws are associated with this substation site;
- A preferred **Eskom Collector Substation** site has been identified. In terms of the outcome of the comparative assessment of alternatives, **Substation 1a (Northern Collector)** is being proposed as part of this application. This site is considered to be acceptable from an environmental perspective as no fatal flaws are associated with this substation site;
- A cumulative impact assessment of similar developments in the area was undertaken by the respective specialists. Based on their findings, majority of the cumulative impacts associated with the proposed development can be kept low after the implementation of mitigation measures, with the exception of some which will be medium after the implementation of mitigation measures. Therefore, there are no high negative cumulative impacts and the proposed development should proceed from a cumulative impact assessment perspective; and
- Through the implementation of mitigation measures, together with adequate compliance monitoring, auditing and enforcement thereof by the appointed ECO as well as the competent authority, the potential detrimental impacts associated with the proposed development can be mitigated to acceptable levels.

The date on which the activity will commence cannot be determined at this stage as they are based on the timeframes dictated by the REIPPPP bid windows. The date of the next round of bid submissions has not yet been announced. The construction of the grid connection infrastructure (namely the on-site and collector substation sites and 132kV overhead power line) is dependent on being selected as a preferred bidder or entering into an offtake agreement with a different energy consumer. The proposed development will therefore require an EA of at least ten (10) years.

It is trusted that the DBAR provides adequate information to the I&APs / stakeholders to provide input and for the competent authority to make an informed decision regarding the proposed development.

12.2 Decision-Making Authority Consultation

The stages at which the competent authority will be consulted are as follows:

- Submission of the DBAR for comment;
- Submission of FBAR for decision-making; and
- Response from competent authority regarding the application.

Additional consultation may occur with the DEFF during the BA process, should the need arise.

12.3 Cumulative Impact Assessment

The potential cumulative impact of the proposed development in combination with other renewable energy facilities within a 35km radius from the proposed development has been identified and assessed per environmental aspect in **section 7.3**. In addition, mitigation measures were identified to address the cumulative impacts, where possible. The specialist reports included a detailed cumulative impact assessment, including a review of other specialist studies conducted for other renewable energy developments within a 35km radius of the proposed development. The recommendations contained in the specialist reports reflect the mitigation measures provided in the DBAR and Draft EMPr (**Appendix 8**). Cumulative impacts are also rated as part of the impact rating system and have been used to determine the significance of the impacts.

12.4 Environmental Management Programme (EMPr)

In accordance with Appendix 4 of the EIA Regulations, 2014 (as amended), a Draft EMPr has been included within the DBAR (**Appendix 8**). The EMPr includes the mitigation measures formulated by the various specialists and all information as required in Appendix 4 of the EIA Regulations, 2014 (as amended). The Draft EMPr can be found in **Appendix 8**.

12.5 Public Participation

The Public Participation during the BA process will involve the following:

Table 35: Public Participation activities still to take place

ACTIVITY	FUNCTION
Written notification to all I&APs and key stakeholders	- The availability of the DBAR for comment (including timeframes and when their input is required).
Placement of DEIAr in public domain	- DBAR will be available from the Noupoort Public Library and on SiVEST's website: *http://www.sivest.co.za/*, click on '*Downloads*' then browse to the folder '*15324 Mooi Plaats Grid*'
Meetings	Meetings undertaken during 30-day review and comment period of the DEIAr for the proposed solar PV energy facility (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) to present the proposed solar PV and grid connection infrastructure (substations and power lines) developments[19]. Additional meetings will not be undertaken during the 30-day DBAR review and comment period. Affected and adjacent landowners

ACTIVITY	FUNCTION
	will rather be contacted in order to solicit comments, should they have any. SiVEST will distribute the presentations and minutes of the meetings which were undertaken during the 30-day review and comment period of the DEIAr for the proposed solar PV energy facilities and will request that the affected and adjacent landowners provide comments, if they feel this is necessary. SiVEST will also use this as an opportunity to answer any questions the landowners might have. A Ward Councilor will also be utilised again in order to distribute / share information with members of the affected community. Members of the affected community will be encouraged to contact SiVEST in order to register as an I&AP on the project database and to obtain project information and/or notifications. See **section 9.9** of this report.
Public comment period	- Notification to I&APs and key stakeholders of the availability of the DBAR for public comment and review for a 30-day period.
C&RR	- Compilation of the C&RR.
Notification of FBAR	- Notification of I&APs and key stakeholders of the submission of the FBAR to the DEFF.
I&AP database	- Continual updating of the project database as new I&APs and key stakeholders register.
Notification of granting or refusal of Environmental Authorisation (EA)	- Informing all registered I&APs and key stakeholders of the EA and their rights to appeal, along with details of the appeal process (DEFF's appeals guidelines will be sent to all registered I&APs and key stakeholders).
Environmental Authorisation (EA) appeal period	- Receive any appeals and forward to DEFF (if required).

12.6 Proposed Project Schedule going forward

The table below represents the proposed schedule for the BA process.

Table 36: Proposed Project Schedule

	February 2020	**March 2020**	**April 2020**	**May 2020**	**June 2020**	**July 2020**	**August 2020**	**September 2020**	**October 2020**	**November 2020**	**December 2020**
Start of DBAR Comment Period	10 February 2020 – 11 March 2020										
Distribute Meeting Presentations and Minutes and Solicit Comments from Landowners	February / March 2020										
Submission of FBAR to DEFF		March / April 2020									
DEFF Decision							August / September 2020				

13 WAY FORWARD

The DBAR will be circulated for public participation for a period of 30 days (excluding public holidays), from **Monday 10 February 2020** until **Wednesday 11 March 2020**. Hard copies of the DBAR will be made available at a public venue (namely the Noupoort Public Library) and an electronic copy will also be made available on SiVEST's website (see **section 9.7**). All I&APs and key stakeholders, such as OoS / authorities, which are registered on the project database will be notified of the submission of the DBAR and the above-mentioned 30-day public review and comment period accordingly. In addition, all OoS / authorities will be sent electronic copies (on CD) of the DBAR. The 30-day public review and comment period is provided for the general public and for the I&APs and key stakeholders, as required by the EIA Regulations, 2014 (as amended). As mentioned, the affected and adjacent landowners will be contacted during the 30-day DBAR public review and comment period in order to solicit comments, should they have any. SiVEST will distribute the presentations and minutes of the meetings which were undertaken during the 30-day review and comment period of the DEIAr for the proposed solar PV energy facility[19] (part of a separate on-going EIA process with **DEFF Ref No.:** 14/12/16/3/3/2/1134) and will request that the affected and adjacent landowners provide comments, if they feel this is necessary. SiVEST will also use this as an opportunity to answer any questions the landowners might have. In addition, a Ward Councilor will be utilised in order to distribute / share information with members of the affected community (see **section 9.9**). All comments received during the 30-day DBAR review and comment period will be responded to in a C&RR, which will be included prior to sending the FBAR to the decision-making authority, namely the DEFF. Comments received on the DBAR will be taken into consideration, incorporated into the report (where possible) and will be used when compiling the FBAR. Once the FBAR has been submitted and the DEFF have acknowledged receipt of the report, the DEFF will have 107 days to either grant or refuse the EA for the proposed development.

All I&APs and key stakeholders will be provided with a second opportunity to participate in the BA process through the public participation process which will be undertaken during the BA process.

All I&APs and key stakeholders are invited to register as I&APs in order to be kept informed throughout the process. To register as an I&AP / stakeholder and/or to obtain additional information, please submit your name, contact details (telephone number, postal address and email address) and the interest which you have in the application to SiVEST Environmental Division, as per the details below:

Contact: Hlengiwe Ntuli or Stephan Jacobs
PO Box 2921, RIVONIA, 2128
Phone:(011) 798 0600
E-mail:hlengiwen@sivest.co.za / stephanj@sivest.co.za / sivest_ppp@sivest.co.za
Fax:(011) 803 7272
Websites:www.sivest.co.za

Please reference '*Mooi Plaats Grid'* in your correspondence, should your comments be project specific. SiVEST shall keep all registered I&APs informed of the BA process.

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