Figure 10. The study area on the 1964 version of the official aerial photograph (Photograph: 524_003_00863)

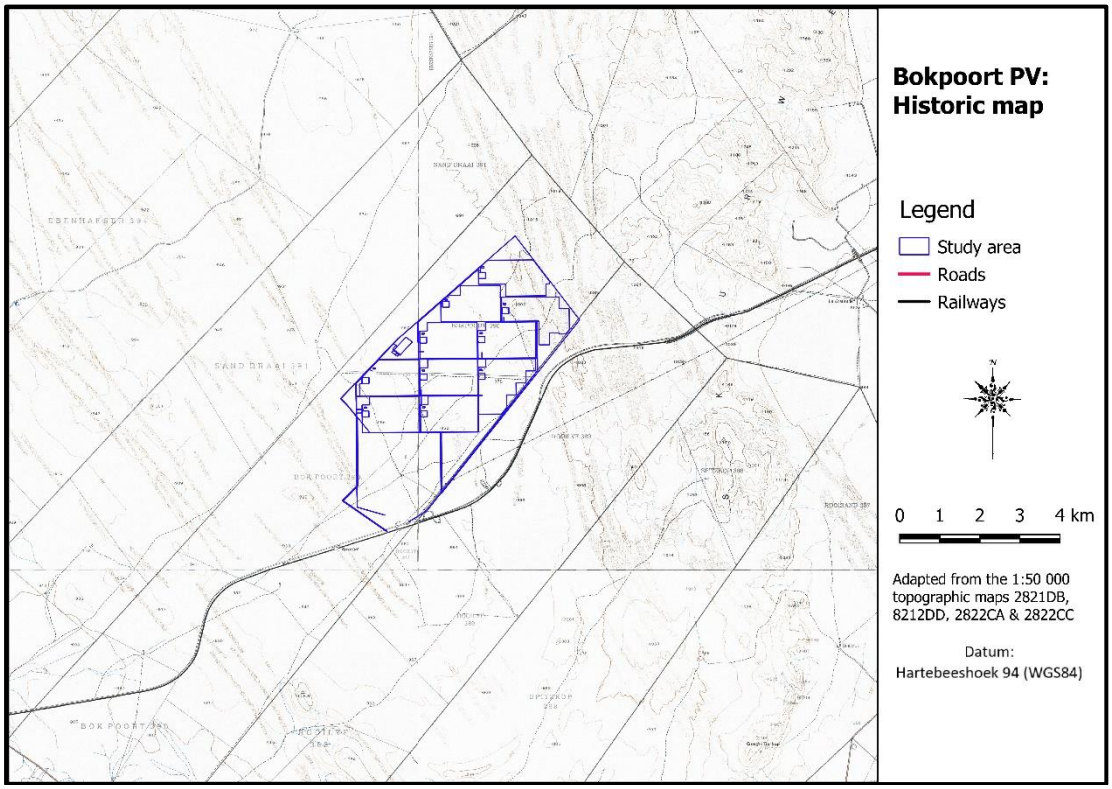

Figure 11. The study area on the 1982 version of the 1:50 000 topographic maps

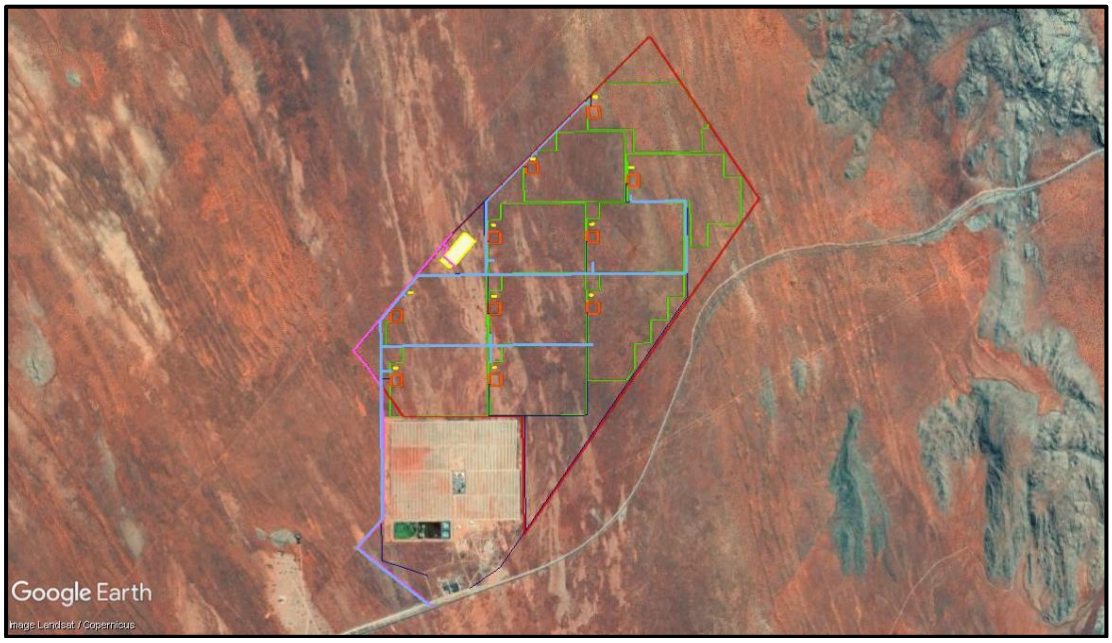

Figure 12. The study area on the 2019 aerial photograph
(Image: Google Earth)

7. SURVEY RESULTS

During the physical survey, the following sites, features and objects of cultural significance were identified in the study area (Fig. 13).

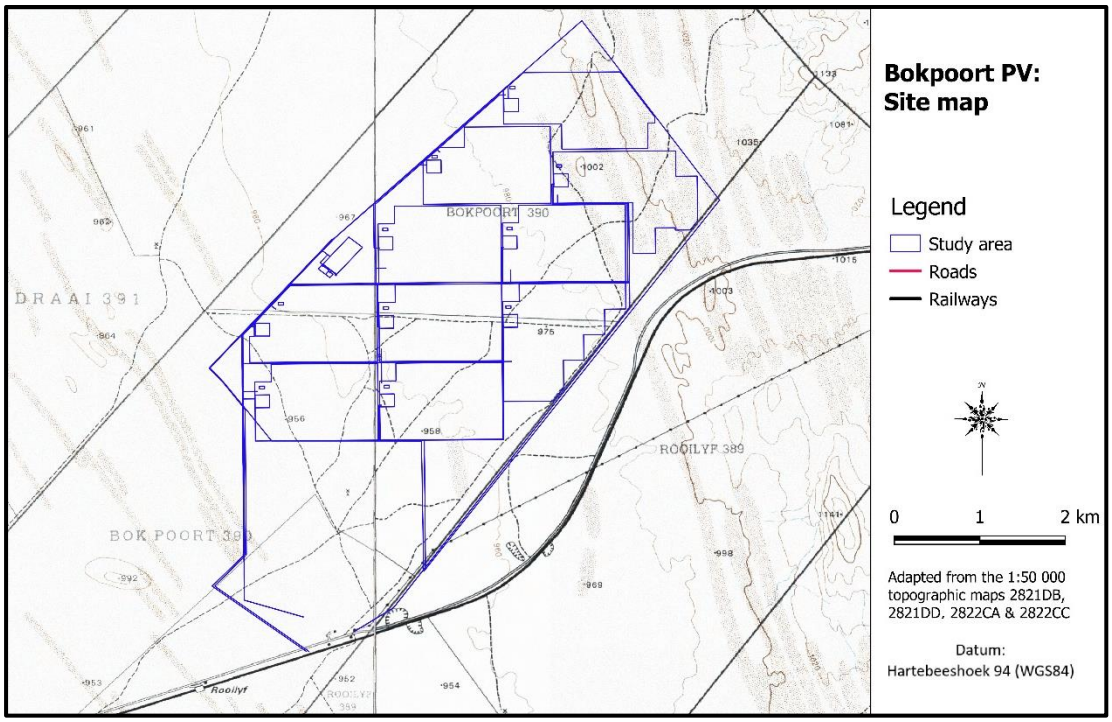

Figure 13. Location of heritage sites in the study area
(Please note that as nothing was found, nothing is indicated on the map)

7.1 Stone Age

Stone Age lithics dating to the MSA are found only as low-density surface scatters, which is confirmed by similar findings in the larger region by other researchers (Dreyer 2014, 2015; Morris 2014, 2018; van der Walt 2015; van Schalkwyk 2019). They are commonly found on the pebble plains where source material is readily available. The density of artefacts is less than 1/50m^2. The tools are mostly made from banded iron stone (jaspelite), although some quartzite and hardened shale flakes were also noted. Cores, flakes and tools are found. The tools are very rough and informal and only a few that can be described as typical, i.e. blades and scrapers, were identified.

- The low density of the lithic scatters is, on archaeological grounds, viewed to be of low significance and require no further action.

Figure 14. Some of the identified tools and flakes

7.2 Iron Age

- No sites, features or objects of cultural significance dating to the Iron Age were identified in the study area.

7.3 Historic period

- Apart from current farming related features such as water troughs, no sites, features or objects of cultural significance dating to the historic period were identified in the study area.

8. IMPACT ASSESSMENT RATINGS AND MITIGATION MEASURES

8.1 Impact assessment

Heritage impacts are categorised as:

- Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries;
- Indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment;
- Cumulative impacts that are combinations of the above.

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development and is summarised in Table 1 below:

Table 2: Calculation of the impact on the identified heritage features

Heritage sites	Significance of impact	Mitigation measures
Bokpoort II Solar Power Plant: Construction Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a
Bokpoort II Solar Power Plant: Operation Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a

8.2 Mitigation measures

Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

- For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed.

8.3 Cumulative assessment

The cumulative impact of the proposed Bokpoort project is assessed by adding impacts from this proposed development to existing and other proposed developments with similar impacts within a 60 km radius. The existing and proposed developments that were taken into consideration for cumulative impacts include a total of six other plants and are listed in Table 3. From the map 'South African Generation Projects' (Fig. 13) below, it can be seen that the Bokpoort project is located in an area where little such development has taken place, with the implication that the cumulative impact would be very low.

Table 3: Existing and planned alternative energy generation facilities in the larger region

Name	Nearest town	Technology	Capacity	Status
Bokpoort	Groblershoop	Concentrated Solar Thermal	50MW	Fully operational
Eskom	Upington	Concentrated Solar Thermal	100MW	Awaiting construction
Grootdrink	Upington	Solar PV	?	Proposed
Karoshoek	Upington	Concentrated Solar Thermal	100MW	Awaiting construction
Tewa Isitha	Upington	Solar PV	?	Proposed
Upington	Upington	Solar PV	8.9MW	Fully operational

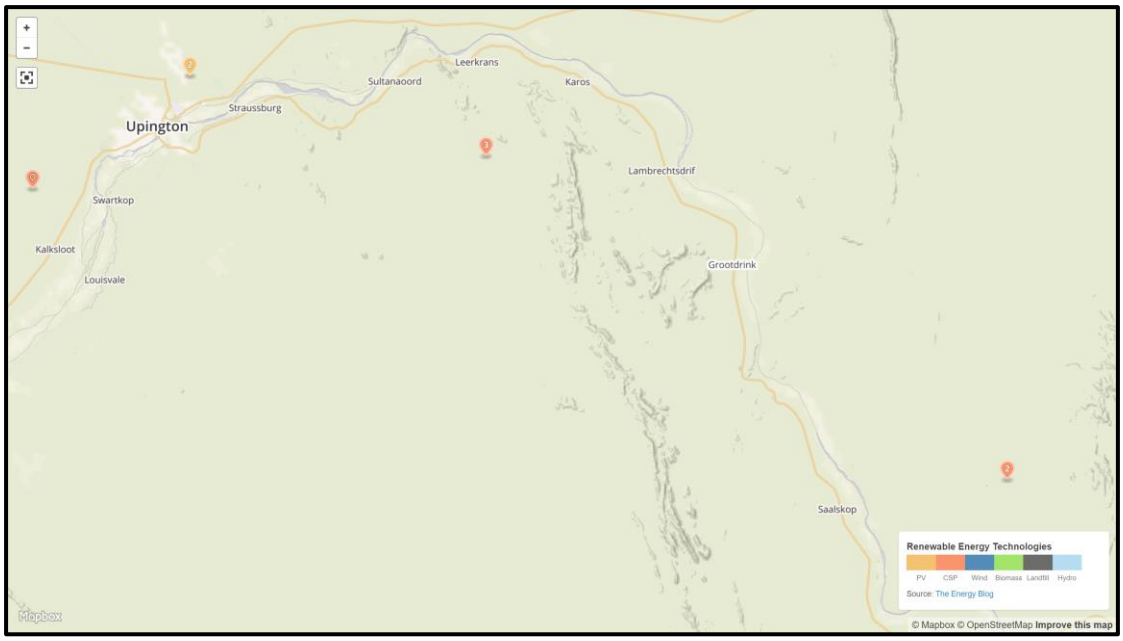

Figure 15. Map indicating the location of alternative energy generation facilities in the larger region (https://www.energy.org.za/map-south-african-generation-projects - accessed 27/01/2020)

The cultural heritage profile of the larger region is very limited. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance (Orton 2016). In addition to the Stone Age profile, there is also the colonial element. This manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines, which occurs only in limited numbers. This again has the implication that the cumulative impact would be very low.

Table 4: Cumulative impact assessment summary

Nature: Loss of or damage to sites, features or objects of cultural significance on the development site			
		Without mitigation	With mitigation
Extent		Local area (1)	Local area (1)
Duration		Permanent (5)	Permanent (5)
Intensity		Minor (2)	Minor (2)
Probability		Improbable (2)	Improbable (2)
Significance		Low (16)	Low (16)
Status (positive or negative)		Negative	Neutral
Reversibility		Non-reversible	Non-reversible
Irreplaceable loss of resources?		High	Low
Can impacts be mitigated		Yes	
Mitigation: Avoidance of site/excavation if required			
Cumulative impact: Limited loss of similar features in the larger landscape.			
Site type	**NHRA category**	**Field rating**	**Impact rating: Before/After mitigation**
Archaeological sites/material	Section 35	Generally protected: Low significance – Grade IV-C	Low (16)
			Low (16)
Burial sites and graves	Section 36	Generally protected: Medium significance – Grade IV-A	Low (16)
			Low (16)
Built environment	Section 34	Generally protected: Low significance – Grade IV-C	Low (16)
			Low (16)

9. MANAGEMENT MEASURES

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

Sources of risk were considered with regards to development activities defined in Section 2(viii) of the NHRA that may be triggered and are summarised in Table 3A and 3B below. These issues formed the basis of the impact assessment described. The potential risks are discussed according to the various phases of the project below.

9.1 Objectives

- Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.
- The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during construction activities.

The following shall apply:

- Known sites should be clearly marked in order that they can be avoided during construction activities.
- The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;

- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1).

9.2 Control

In order to achieve this, the following should be in place:

- A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage.
- Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above.
- In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.

Table 5A: Construction Phase: Environmental Management Programme for the project

Action required	Protection of heritage sites, features and objects		
Potential Impact	The identified risk is damage or changes to resources that are generally protected in terms of Sections 27, 28, 31, 32, 34, 35, 36 and 37 of the NHRA that may occur in the proposed project area.		
Risk if impact is not mitigated	Loss or damage to sites, features or objects of cultural heritage significance		
Activity / issue	**Mitigation: Action/control**	**Responsibility**	**Timeframe**
1. Removal of Vegetation 2. Construction of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1 above	Environmental Control Officer	During construction only
Monitoring	See discussion in Section 9.2 above		

Table 5B: Operation Phase: Environmental Management Programme for the project

Action required	Protection of heritage sites, features and objects		
Potential Impact	It is unlikely that the negative impacts identified for pre-mitigation will occur if the recommendations are followed.		
Risk if impact is not mitigated	Loss or damage to sites, features or objects of cultural heritage significance		
Activity / issue	**Mitigation: Action/control**	**Responsibility**	**Timeframe**
1. Removal of Vegetation 2. Construction of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1 above	Environmental Control Officer	During construction only
Monitoring	See discussion in Section 9.2 above		

10. CONCLUSIONS AND RECOMMENDATIONS

This report describes the methodology used, the limitations encountered, the heritage features that were identified and the recommendations and mitigation measures proposed relevant to this. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's comments.

The cultural landscape qualities of the region are made up of a pre-colonial element consisting of Stone Age and a much later colonial (farmer) component, which eventually gave rise to an urban component which manifest in a number of small towns and an intensive farming industry.

Identified sites

Stone Age lithics dating to the MSA are found only as low-density surface scatters, which is confirmed by similar findings in the larger region by other researchers (Dreyer 2014, 2015; Morris 2014, 2018; van der Walt 2015; van Schalkwyk 2019). The density of artefacts is less than 1/50m^2.

- The low density of the lithic scatters is, on archaeological grounds, viewed to be of low significance and require no further action.

Impact assessment and proposed mitigation measures

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

- As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.

Heritage sites	Significance of impact	Mitigation measures
Bokpoort II Solar Power Plant: Construction Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a
Bokpoort II Solar Power Plant: Operation Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a

Cumulative impact assessment

The cultural heritage profile of the larger region is very limited and consists of isolated findspots of Stone Age (MSA) tools, farmsteads and burial sites. Consequently, the cumulative impact of the proposed development is viewed to be **low**

Site type	**NHRA category**	**Field rating**	**Impact rating: Before/After mitigation**
Archaeological sites/material	Section 35	Generally protected: Low significance – Grade IV-C	Low (16)
			Low (16)
Burial sites and graves	Section 36	Generally protected: Low significance – Grade IV-A	Low (16)
			Low (16)

Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report. For this proposed project, the assessment has determined that no sites, features or objects of heritage significance occur in the study area. If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the proposed mitigation measures and the conditions proposed below.

Conditions for inclusion in the environmental authorisation:

- The Palaeontological Sensitivity Map (SAHRIS) indicate that the study area has a moderate sensitivity of fossil remains to be found and therefore a desktop palaeontological required.
- Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

11. REFERENCES

11.1 Data bases

Chief Surveyor General
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Heritage Atlas Database, Pretoria
National Archives of South Africa
SAHRA Archaeology and Palaeontology Report Mapping Project (2009)
SAHRIS Database

11.2 Literature

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11.3 Archival sources, maps and aerial photographs

1: 50 000 Topographic maps
Google Earth
Aerial Photographs: Chief Surveyor-General

12. ADDENDUM

1. Indemnity and terms of use of this report

The findings, results, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and the author reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. The author of this report will not be held liable for such oversights or for costs incurred as a result of such oversights.

Although the author exercises due care and diligence in rendering services and preparing documents, he accepts no liability and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

2. Assessing the significance of heritage resources and potential impacts

A system for site grading was established by the NHRA and further developed by the South African Heritage Resources Agency (SAHRA 2007) and has been approved by ASAPA for use in southern Africa and was utilised during this assessment.

2.1 *Significance of the identified heritage resources*

According to the NHRA, Section 2(vi) the **significance** of a heritage sites and artefacts is determined by it aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature

1. SITE EVALUATION			
1.1 Historic value			
Is it important in the community, or pattern of history			
Does it have strong or special association with the life or work of a person, group or organisation of importance in history			
Does it have significance relating to the history of slavery			
1.2 Aesthetic value			
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group			
1.3 Scientific value			
Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage			
Is it important in demonstrating a high degree of creative or technical achievement at a particular period			
1.4 Social value			
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons			
1.5 Rarity			
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage			
1.6 Representivity			
Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects			
Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class			
Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.			
2. Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific community			
3. Field Register Rating			
1.	National/Grade 1: High significance - No alteration whatsoever without permit from SAHRA		
2.	Provincial/Grade 2: High significance - No alteration whatsoever without permit from provincial heritage authority.		
3.	Local/Grade 3A: High significance - Mitigation as part of development process not advised.		

4.	Local/Grade 3B: High significance - Could be mitigated and (part) retained as heritage register site	
5.	Generally protected 4A: High/medium significance - Should be mitigated before destruction	
6.	Generally protected 4B: Medium significance - Should be recorded before destruction	
7.	Generally protected 4C: Low significance - Requires no further recording before destruction	

2.2 *Significance of the anticipated impact on heritage resources*

All impacts identified during the HIA stage of the study will be classified in terms of their significance. Issues would be assessed in terms of the following criteria:

Nature of the impact
A description of what causes the effect, what will be affected and how it will be affected.

Extent
The physical **extent**, wherein it is indicated whether:
- 1 - The impact will be limited to the site;
- 2 - The impact will be limited to the local area;
- 3 - The impact will be limited to the region;
- 4 - The impact will be national; or
- 5 - The impact will be international.

Duration
Here it should be indicated whether the lifespan of the impact will be:
- 1 - Of a very short duration (0–1 years);
- 2 - Of a short duration (2-5 years);
- 3 - Medium-term (5–15 years);
- 4 - Long term (where the impact will persist possibly beyond the operational life of the activity); or
- 5 - Permanent (where the impact will persist indefinitely).

Magnitude (Intensity)
The magnitude of impact, quantified on a scale from 0-10, where a score is assigned:
- 0 - Small and will have no effect;
- 2 - Minor and will not result in an impact;
- 4 - Low and will cause a slight impact;
- 6 - Moderate and will result in processes continuing but in a modified way;
- 8 - High, (processes are altered to the extent that they temporarily cease); or
- 10 - Very high and results in complete destruction of patterns and permanent cessation of processes.

Probability
This describes the likelihood of the impact actually occurring and is estimated on a scale where:
- 1 - Very improbable (probably will not happen);
- 2 - Improbable (some possibility, but low likelihood);
- 3 - Probable (distinct possibility);
- 4 - Highly probable (most likely); or
- 5 - Definite (impact will occur regardless of any prevention measures).

Significance
The significance is determined through a synthesis of the characteristics described above (refer to the formula below) and can be assessed as low, medium or high:

S = (E+D+M) x P; where
S = Significance weighting

E = Extent
D = Duration
M = Magnitude
P = Probability

Significance of impact		
Points	Significant Weighting	Discussion
< 30 points	Low	Where this impact would not have a direct influence on the decision to develop in the area.
31-60 points	Medium	Where the impact could influence the decision to develop in the area unless it is effectively mitigated.
> 60 points	High	Where the impact must have an influence on the decision process to develop in the area.

Confidence
This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.
- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

Status
- The status, which is described as either positive, negative or neutral.

Reversibility
- The degree to which the impact can be reversed.

Mitigation
- The degree to which the impact can be mitigated.

Nature:		
	Without mitigation	With mitigation
Construction Phase		
Probability		
Duration		
Extent		
Magnitude		
Significance		
Status (positive or negative)		
Operation Phase		
Probability		
Duration		
Extent		
Magnitude		
Significance		
Status (positive or negative)		
Reversibility		
Irreplaceable loss of resources?		
Can impacts be mitigated		

3. Mitigation measures

- *Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.*

Impacts can be managed through one or a combination of the following mitigation measures:

- Avoidance
- Investigation (archaeological)
- Rehabilitation
- Interpretation
- Memorialisation
- Enhancement (positive impacts)

For the current study, the following mitigation measures are proposed, to be implemented only if any of the identified sites or features are to be impacted on by the proposed development activities:

- (1) Avoidance/Preserve: This is viewed to be the primary form of mitigation and applies where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources. The site should be retained *in situ* and a buffer zone should be created around it, either temporary (by means of danger tape) or permanently (wire fence or built wall). Depending on the type of site, the buffer zone can vary from
    - 10 metres for a single grave, or a built structure, to
    - 50 metres where the boundaries are less obvious, e.g. a Late Iron Age site.

- (2) Archaeological investigation/Relocation of graves: This option can be implemented with additional design and construction inputs. This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated. Mitigation is to excavate the site by archaeological techniques, document the site (map and photograph) and analyse the recovered material to acceptable standards. This can only be done by a suitably qualified archaeologist.
    - This option should be implemented when it is impossible to avoid impacting on an identified site or feature.
    - This also applies for graves older than 60 years that are to be relocated. For graves younger than 60 years a permit from SAHRA is not required. However, all other legal requirements must be adhered to.
        - Impacts can be beneficial – e.g. mitigation contribute to knowledge

- (3) Rehabilitation: When features, e.g. buildings or other structures are to be re-used. Rehabilitation is considered in heritage management terms as an intervention typically involving the adding of a new heritage layer to enable a new sustainable use.
    - The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation.
    - Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric.
        - Conservation measures would be to record the buildings/structures as they are (at a particular point in time). The records and recordings would then become the 'artefacts' to be preserved and managed as heritage features or (movable) objects.
        - This approach automatically also leads to the enhancement of the sites or features that are re-used.

- (4) Mitigation is also possible with additional design and construction inputs. Although linked to the previous measure (rehabilitation) a secondary though 'indirect' conservation measure would be to use the existing architectural 'vocabulary' of the structure as guideline for any new designs.
    - The following principle should be considered: **heritage informs design**.
        - This approach automatically also leads to the enhancement of the sites or features that are re-used.

- (5) No further action required: This is applicable only where sites or features have been rated to be of such low significance that it does not warrant further documentation, as it is viewed to be fully documented after inclusion in this report.
    - Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage/remains are destroyed.

4. Curriculum vitae

Johan Abraham van Schalkwyk

Personal particulars

Qualifications

1995 DLitt et Phil (Anthropology), University of South Africa
1985 MA (Anthropology), University of Pretoria
1981 BA (Hons), Anthropology, University of Pretoria
1979 Post Graduate Diploma in Museology, University of Pretoria
1978 BA (Hons), Archaeology, University of Pretoria
1976 BA, University of Pretoria

Non-academic qualifications

12th HSRC-School in Research Methodology - July 1990
Dept. of Education and Training Management Course - June 1992
Social Assessment Professional Development Course - 1994
Integrated Environmental Management Course, UCT - 1994

Professional experience

Private Practice
2017 - current: Professional Heritage Consultant

National Museum of Cultural History
1992 - 2017: Senior researcher: Head of Department of Research. Manage an average of seven researchers in this department and supervise them in their research projects. Did various projects relating to Anthropology and Archaeology in Limpopo Province, Mpumalanga, North West Province and Gauteng. Headed the Museum's Section for Heritage Impact Assessments.
1978 - 1991: Curator of the Anthropological Department of the Museum. Carried out extensive fieldwork in both anthropology and archaeology

Department of Archaeology, University of Pretoria
1976 - 1977: Assistant researcher responsible for excavations at various sites in Limpopo Province and Mpumalanga.

Awards and grants

1. Hanisch Book Prize for the best final year Archaeology student, University of Pretoria - 1976.
2. Special merit award, National Cultural History Museum - 1986.
3. Special merit award, National Cultural History Museum - 1991.
4. Grant by the Department of Arts, Culture, Science and Technology, to visit the various African countries to study museums, sites and cultural programmes - 1993.
5. Grant by the USA National Parks Service, to visit the United States of America to study museums, sites, tourism development, cultural programmes and impact assessment programmes - 1998.
6. Grant by the USA embassy, Pretoria, under the Bi-national Commission Exchange Support Fund, to visit cultural institutions in the USA and to attend a conference in Charleston - 2000.
7. Grant by the National Research Foundation to develop a model for community-based tourism - 2001.

8. Grant by the National Research Foundation to develop a model for community-based tourism - 2013. In association with RARI, Wits University.

Publications
Published more than 70 papers, mostly in scientifically accredited journals, but also as chapters in books.

Conference Contributions
Regularly presented papers at conferences, locally as well as internationally, on various research topics, ranging in scope from archaeology, anthropological, historical, cultural historical and tourism development.

Heritage Impact Assessments
Since 1992, I have done more than 2000 Phase 1 and Phase 2 impact assessments (archaeological, anthropological, historical and social) for various government departments and developers. Projects include environmental management frameworks, roads, pipeline-, and power line developments, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments.

Appendix C7:
Palaeontology

SPECIALIST DECLARATION

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Revised layout of ICE for the authorised Bokpoort Solar Power Facility (Project DAO) near Groblershoop, Northern Cape Province

Kindly note the following:

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2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

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Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:
B-BBEE

Specialist name:
Specialist Qualifications:
Professional affiliation/registration:
Physical address:
Postal address:
Postal code:
Telephone:
E-mail:

2. DECLARATION BY THE SPECIALIST

I, **Dr John Edward Almond**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

S

N

D

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Dr John Edward Almond**, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

[redacted]

SOUTH AFRICAN POLICE SERVICE
STATION COMMANDER
CAPE TOWN
2021 -11- 22
CAPE TOWN
STATION COMMANDER
SOUTH AFRICAN POLICE SERVICE

COMPLIANCE WITH GN320 AND GN1150

Proposed Bokpoort II Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province

February 2022

COMPLIANCE OF SPECIALIST REPORT WITH REQUIREMENTS GN 320 OF 20 MARCH 2020 AND GN 1150 OF 30 OCTOBER 2020.

I have reviewed my report produced in February 2020:

Almond, JE. PALAEONTOLOGICAL IMPACT ASSESSMENT: DESKTOP STUDY - Proposed Bokpoort II Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province

Although the report was completed prior to the gazetting of the protocols referred to above, it is my opinion that the assessment and resultant report is still valid. This is based on the fact that the requirements are inherently contained in the "Minimum Standards for Heritage Impact Assessments in terms of Section 38 of the National Heritage Resources Act" issued by the South African Heritage Resources Agency as far back as 2016.

We trust you find the above in order. If there are any uncertainties or additional information required, please feel free to contact the undersigned.

The company
Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Dr John E. Almond
(Palaeontologist)
Natura ***Viva*** **c**

SPECIALIST OPINION – TWO ADDITIONAL INTERNAL COMBUSTION ENGINES (NOVEMBER 2021)

NATURA VIVA cc
Palaeontological Impact Assessments & Heritage Management,
Natural History Education, Tourism, Research

Acwa Power
Care of Lusani Madali
[redacted]
22 November 2021

ADDENDUM

Revised layout of ICE for the authorised Bokpoort Solar Power Facility (Project DAO) near Groblershoop, Northern Cape Province

1. Background

This letter serves as an additional Addendum to the original Palaeontological Heritage Assessment for the Bokpoort Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province (Almond 2020a) and to the subsequent Part 2 Amendment palaeontological heritage comments by the author (Almond 2020b, 2021). The solar facility comprises seven sites and is now known as Project DAO.

An earlier palaeontological heritage amendment comment by the author (Almond 2020b) covered the inclusion of 7x (9,9MW) ICE (Internal Combustion Engines) within the DAO project. The number of ICE was subsequently reduced from 7 to 3 as a consequence of combining the site into one. This entailed allowing the ICE EAs to lapse.

A proposed new layout for ICE for the DAO project, situated within the previously assessed area, is shown in Figure 1 below with the following specificiations:

- Generating capacity: 9.9 MW each for five sites;
- Fuel Type: LPG/LNG and Diesel;
- Stack height: 50-70m;
- Number of engines: 1 for each plot (it is subject to the engine size, various load size available in the market);
- Fuel storage tanks: 5 for each plot (subject to the tanks sizing/designing);
- Fuel volume: 500 m3 for each plot (per ICE);
- Water requirements: limited water for cooling
- Area size: 0.5 ha

2. Conclusion and Recommendations

In consideration of the proposed new layout of the ICE, there is no (zero) change to the significance rating compared with the original Environmental Impact Assessment (EIA) Palaeontological Heritage report, and no additional impacts on palaeontological heritage are envisaged. In addition to this, no new mitigation measures are required.

[redacted]

The proposed amendment is expected to have a neutral effect from a palaeontological heritage impact perspective *i.e.* no advantages or disadvantages are expected.

It is therefore suggested that the proposed revised layout for the ICE be supported, subject to the conditions and recommendations as stipulated in the original Environmental Authorisation, and according to the Environmental Management Programme and suggested mitigation measures, as provided in the original Palaeontological Heritage Assessment report.

Feel free to contact me at any time, should you have any queries.

Yours faithfully,

[redacted]

Dr John E. Almond
(Palaeontologist)
***Natura Viva* cc**

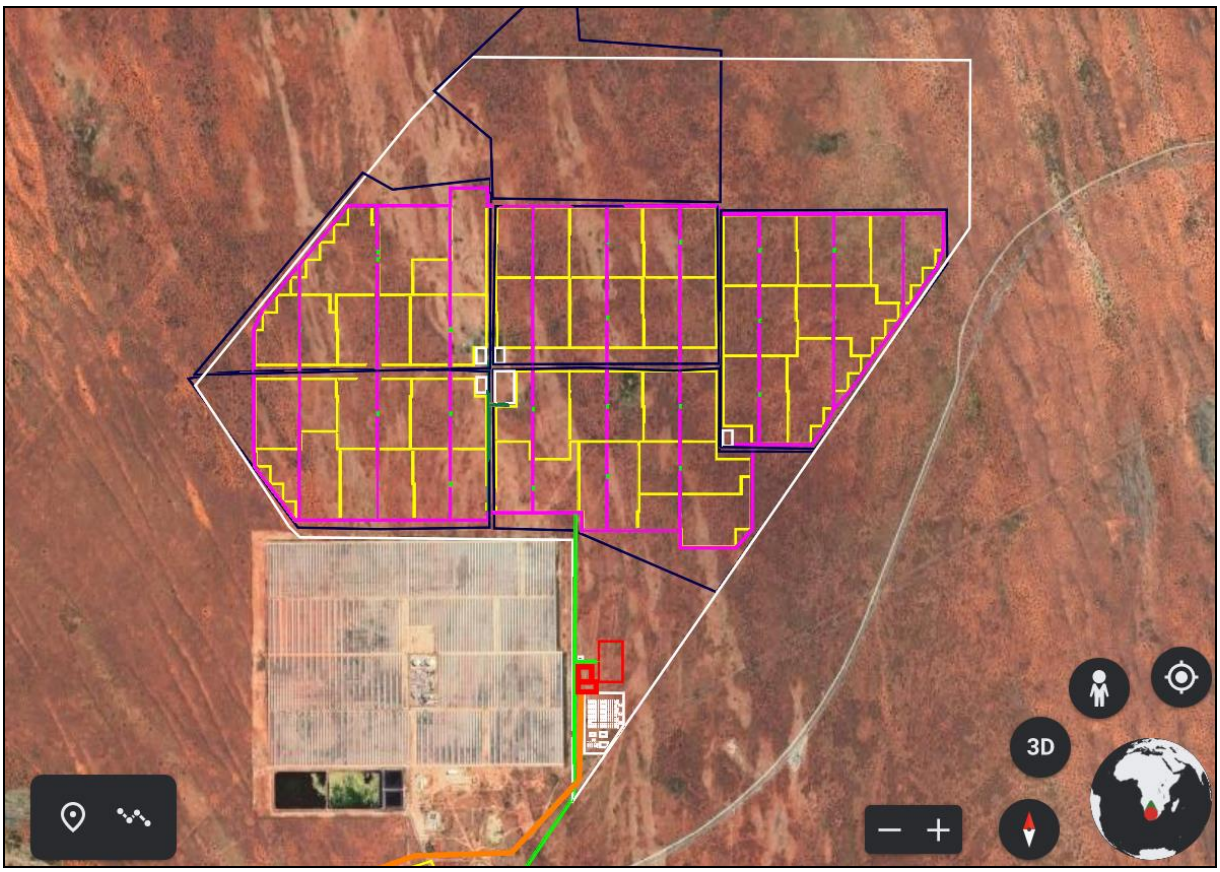

Figure 1: Satellite image of the authorised Project DAO near Groblershoop, Northern Cape Province, indicating proposed new layout of ICE (white rectangles).

REFERENCES

[redacted]

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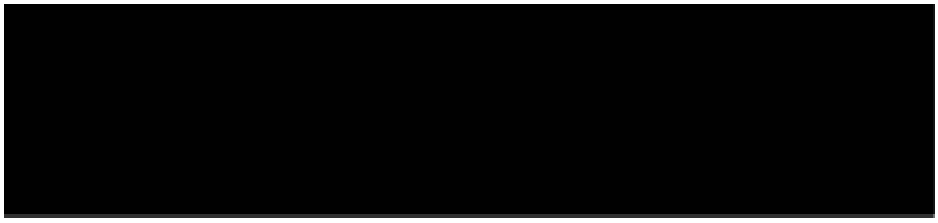
ALMOND, J.E. 2020a. Proposed Bokpoort II Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province. Palaeontological impact assessment: desktop study, 17 pp. Natura Viva cc, Cape Town.

ALMOND, J.E. 2020b. Part 2 Amendment Process for the Development of Eight 200MW PV Plants on the Farm Bokpoort in the Northern Cape Province. Palaeontological heritage comment, 3 pp. Natura Viva cc, Cape Town.

ALMOND, J.E. 2021. Part 2 Amendment Process for the Development of Eight 200MW PV Plants on the Farm Bokpoort in the Northern Cape Province. Addendum, 3 pp. Natura Viva cc, Cape Town.



PROPOSED BOKPOORT II SOLAR POWER FACILITY ON THE REMAINING EXTENT OF FARM BOKPOORT 390 NEAR GROBLERSHOOP, NORTHERN CAPE PROVINCE (FEBRUARY 2020)

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
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Date Received:	

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Proposed Bokpoort II Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province

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Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:
B-BBEE

Specialist name:

Specialist Qualifications:
Professional affiliation/registration:
Physical address:
Postal address:

Postal code:
Telephone:
E-mail:

2. DECLARATION BY THE SPECIALIST

I, **Dr John Edward Almond**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

NA

Name of Company

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Dr John Edward Almond**, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

[redacted]

Date

SOUTH AFRICAN POLICE SERVICE
STATION COMMANDER
CAPE TOWN

2020 -03- 01

CAPE TOWN
STATION COMMANDER
SOUTH AFRICAN POLICE SERVICE

PALAEONTOLOGICAL IMPACT ASSESSMENT: DESKTOP STUDY

Proposed Bokpoort II Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province

February 2020

1. EXECUTIVE SUMMARY

ACWA Power Energy Africa (Pty) Ltd is proposing to develop the Bokpoort II Solar Power Facility on the Remaining Extent (RE) of the Farm Bokpoort 390 near Groblershoop, Northern Cape. An associated, authorised water pipeline to the Orange River running along an existing servitude will also traverse the adjoining Farm Sand Draai 391. The combined power generation capacity of the Bokpoort II solar development will be up to 2000 MW that will be generated by ten x 200 MW photovoltaic (PV) facilities, two of which have already been authorised but are undergoing another Basic Assessment (BA) study for the battery storage energy system as well as the capacity increase from 75 to 200MW. The total size of the Bokpoort II Solar Power Facility is approximately 1 500 ha.

The proposed alternative energy developments are underlain by highly metamorphosed Precambrian basement rocks (schists, quartzites, gneisses) of the Namaqua-Natal Province that are entirely unfossiliferous. These are largely mantled by Late Caenozoic superficial sediments including Quaternary aeolian sands of the Gordonia Formation (Kalahari Group), calcrete pedocretes (soil limestones) and alluvium of the Orange River and its tributaries. These younger superficial sediments are generally of low palaeontological sensitivity. Potentially fossiliferous older alluvial gravels are not mapped along the banks of the Orange River close to Groblershoop where these are intersected by the proposed water pipeline.

No significant fossil heritage resources have been recorded within the Bokpoort II Solar Power Facility study area. The area is inferred to be of low sensitivity in terms of palaeontological heritage and no sensitive or no-go areas have been identified within it during the present desktop assessment. The proposed solar power facility is of LOW (negative) impact significance with respect to palaeontological heritage resources. This assessment applies to all the planned infrastructure within the project area – *including* the water pipeline to the Orange River (already authorised) as well as the short 132 kV overhead line connection to the existing Eskom Garona Substation - and applies equally to all PV plants under consideration for the Bokpoort II Solar Power Facility. Cumulative impacts associated with the ten alternative energy developments are probably low and there are no fatal flaws in the development proposal as far as fossil heritage is concerned. The no-go alternative is of neutral significance for palaeontology. Providing that the recommendations outlined below for palaeontological monitoring and mitigation are fully implemented, there are no objections on palaeontological heritage grounds to authorisation of this alternative energy project. Pending the potential discovery of significant new fossil remains during development - notably fossil vertebrate bones & teeth - no further specialist palaeontological studies or mitigation are considered necessary for this project.

In the case of any significant chance fossil finds during construction (*e.g.* vertebrate teeth, bones, burrows, petrified wood, shells), these should be safeguarded - preferably *in situ* - and reported by the ECO as soon as possible to the South African Heritage Resources Agency, SAHRA (Contact

details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). This is so that appropriate mitigation by a professional palaeontologist can be considered. Such mitigation usually involves the judicious sampling, collection and recording of fossils as well as of relevant contextual data concerning the surrounding sedimentary matrix. The palaeontologist concerned would need to apply beforehand for a collection permit from SAHRA. A tabulated Chance Fossil Finds Procedure is appended to this report.

These recommendations should be incorporated into the Environmental Management Plan (EMP) for all the Bokpoort II alternative energy developments.

2. INTRODUCTION & BRIEF

The company ACWA Power Energy Africa (Pty) Ltd is proposing to develop a solar power facility – to be known as Bokpoort II - on the Remaining Extent (RE) of the Farm Bokpoort 390. An associated water pipeline to the Orange River running along an existing servitude will also traverse the adjoining Farm Sand Draai 391. The Bokpoort II project area is situated *c*. 20 km north of the town of Groblershoop within the !Kheis Local Municipality in the ZF Mgcawu District Municipality, Northern Cape Province (Fig. 1). In 2016 ACWA Power obtained three Environmental Authorisations (EAs) for two 75 MW PV facilities as well as a 150 MW CSP facility on the property. The water main pipeline to the Orange has also already been authorised. However, it is now being proposed that, instead of the CSP facility, eight additional PV plants are developed within the same footprint. The two authorised PV facilities are undergoing another BA study for the battery storage energy system as well as the capacity increase from 75 to 200MW. The combined power generation capacity of the entire Bokpoort II solar development will be up to 2000 MW that will be generated by ten x 200 MW photovoltaic (PV) facilities.

Each of the eight proposed additional 200 Megawatt (MW) Photovoltaic (PV) Solar Developments will cover approximately 150 hectares and will comprise the following infrastructure:

- Solar PV modules that will be able to deliver up to 200 MW to the Eskom National Grid;
- Inverters that convert direct current (DC) generated by the PV modules into alternating current (AC) to be exported to the electrical grid;
- A transformer that raises the system AC low voltage (LV) to medium voltage (MV). The transformer converts the voltage of the electricity generated by the PV panels to the correct voltage for delivery to Eskom;
- Transformer substation; and
- Instrumentation and Control consisting of hardware and software for remote plant monitoring and operation of the facility.

Associated infrastructure (Figs. 2 & 3) includes:

- Mounting structures for the solar panels;
- Cabling between the structures, to be lain underground where practical;
- A new 132kV overhead powerline which will connect the facility to the National Grid via Eskom's existing Garona Substation. The powerlines vary in length and will be located within a servitude spanning 15.5m meters on both sides. The powerline towers will be 35m high;
- Battery Energy Storage System (BESS) - battery Power at Point of Connection: 150MW, area required: 16ha; the BESS will store approximately 4500m^3 of hazardous substance.;
- Internal access roads (4 – 6 m wide roads will be constructed but existing roads will be used as far as possible) and fencing (approximately 3 m in height); and
- Shared infrastructure consisting of buildings, including a workshop area for maintenance, storage (i.e. fuel tanks, etc.), laydown area, parking, warehouse, and offices (previously approved).

Since fossils preserved within the sedimentary rocks represented within the project area might be disturbed, damaged or destroyed during the construction phase of the proposed Bokpoort II development (*e.g.* during excavations or surface clearance) a desktop palaeontological heritage assessment was originally requested for this development by SAHRA (Case IDs 9659, 9699 and 9702; three letters of 27 June 2016). The present palaeontological heritage desktop study covering the entire Bokpoort II project area has accordingly been commissioned on the proponent's behalf by Royal HaskoningDHV (Pty) Ltd, Woodmead, Gauteng. The present palaeontological report contributes to a Basic Assessment process that covers:

- Eight additional 200 MW PV developments on the originally authorised CSP site.
- Two BESS sites to be included within the footprint of the approved PV 1 (Ndebele) and PV 2 (Xhosa) plants with a combined dangerous good storage volume of approximately 4500 m^3 for each additional BESS site as well as the capacity increase up to 200MW.

It is noted that:

(1) Two PV plants of 75 MW each (*i.e.* Ndebele and Xhosa) have already been authorised. These two PV plants will be subject to their own BA, for the proposed new BESS sites and capacity upgrade from 75 to 200MW. Basic Assessment processes for each of the proposed PV plants are being co-ordinated by Royal HaskoningDHV (Pty) Ltd. (Contact details: Ms Seshni Govender. Royal HaskoningDHV (Pty) Ltd. Address: Building No. 5 Country Club Estate, 21 Woodlands Drive, Woodmead, 2191. PO Box 867, Gallo Manor, 2052, Gauteng, South Africa. Tel: 087 352 1592. Mobile: 072 442 0086. E-mail: seshni.govender@rhdhv.com).

(2) The Bokpoort II site is within one of South Africa's eight Renewable Energy Development Zones (RED7 Upington area *cf* Heritage review by Fourie *et al.* 2014), and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of a number of environmental impact, economic and infrastructural factors.

2.1. Legislative context for palaeontological assessment studies

The present desktop palaeontological heritage report falls under Sections 35 and 38 (Heritage Resources Management) of the South African Heritage Resources Act (Act No. 25 of 1999), and it will also inform the Environmental Management Programme for this project.

The various categories of heritage resources recognised as part of the National Estate in Section 3 of the National Heritage Resources Act include, among others:

- geological sites of scientific or cultural importance;
- palaeontological sites;
- palaeontological objects and material, meteorites and rare geological specimens.

According to Section 35 of the National Heritage Resources Act, dealing with archaeology, palaeontology and meteorites:

(1) The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources Agency.

(2) All archaeological objects, palaeontological material and meteorites are the property of the State.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources Agency, or to the nearest local Agency offices or museum, which must immediately notify such heritage resources Agency.

(4) No person may, without a permit issued by the responsible heritage resources Agency—

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

(5) When the responsible heritage resources Agency has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—

(a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;

(b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;

(c) if mitigation is deemed by the heritage resources Agency to be necessary, assist the person on whom the order has been served under paragraph *(a)* to apply for a permit as required in subsection (4); and

(d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

Minimum standards for the palaeontological component of heritage impact assessment reports (PIAs) have been published by SAHRA (2013).

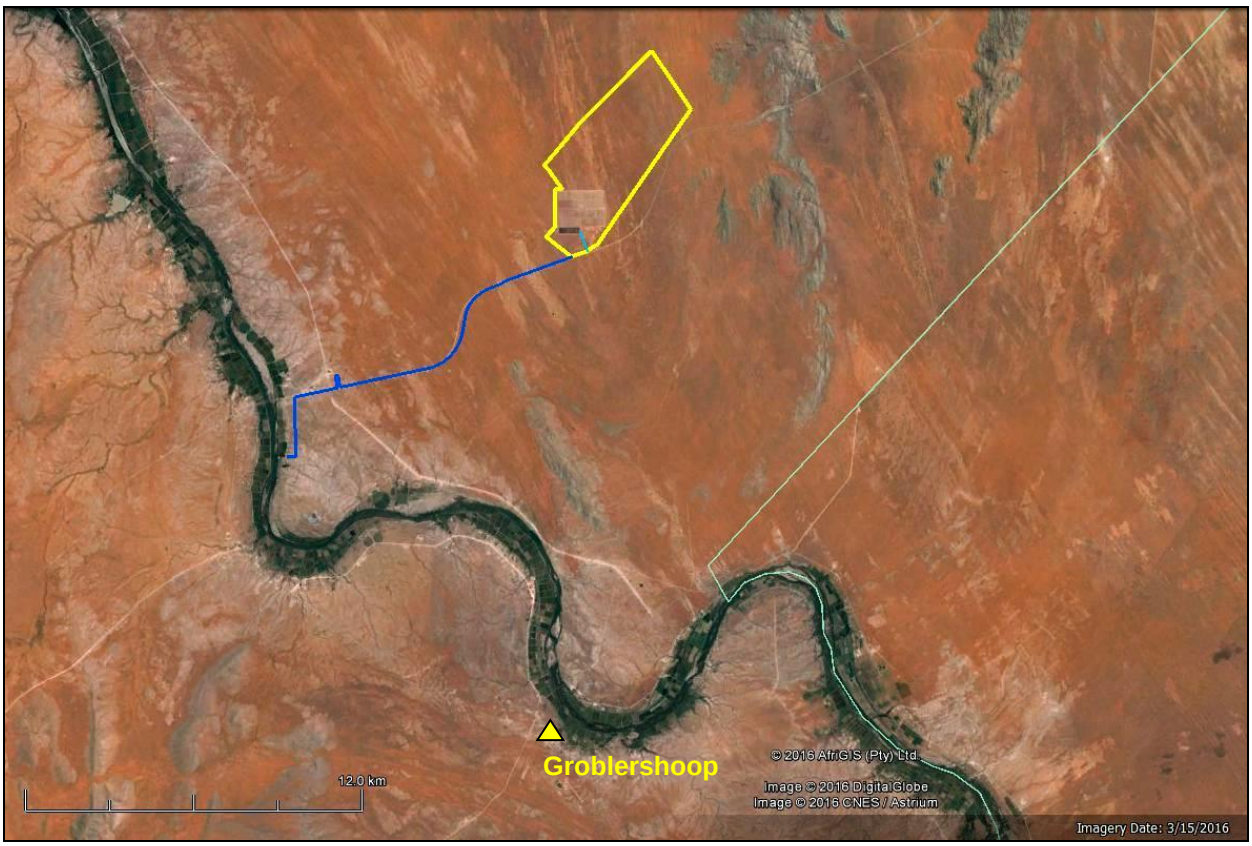

Figure 1: Google earth© satellite image showing the location of the Bokpoort II Solar Power Facility project area (yellow polygon) situated *c*. 20 km north of Groblershoop, Gordonia District, Northern Cape. The associated water pipeline to the Orange River (already authorised) is indicated by the blue line. N is towards the top of the image. Scale bar = 12 km.

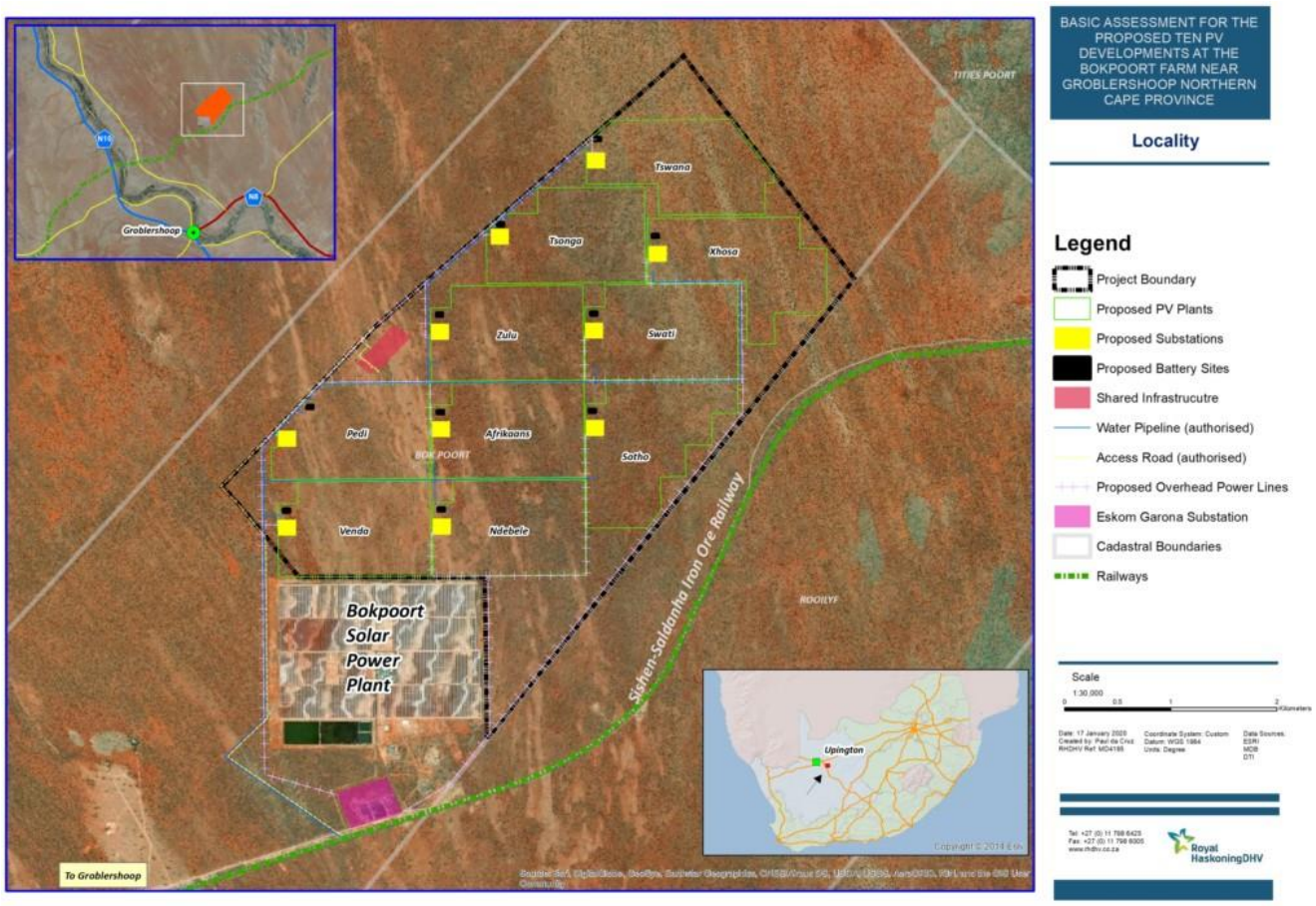

Figure 2: Google earth© satellite image of the Bokpoort II Solar Power Facility project area on the Remaining Extent (RE) of the Farm Bokpoort 390. Shown here are the project boundary (black dashed lines), 10 x PV plants (green) each with a battery site (black) and on-site substation (yellow), the existing Eskom Garona Substation (lilac), main access road (yellow) and shared infrastructure (red). The cleared area for the existing Bokpoort Solar Power Plant can be clearly seen.

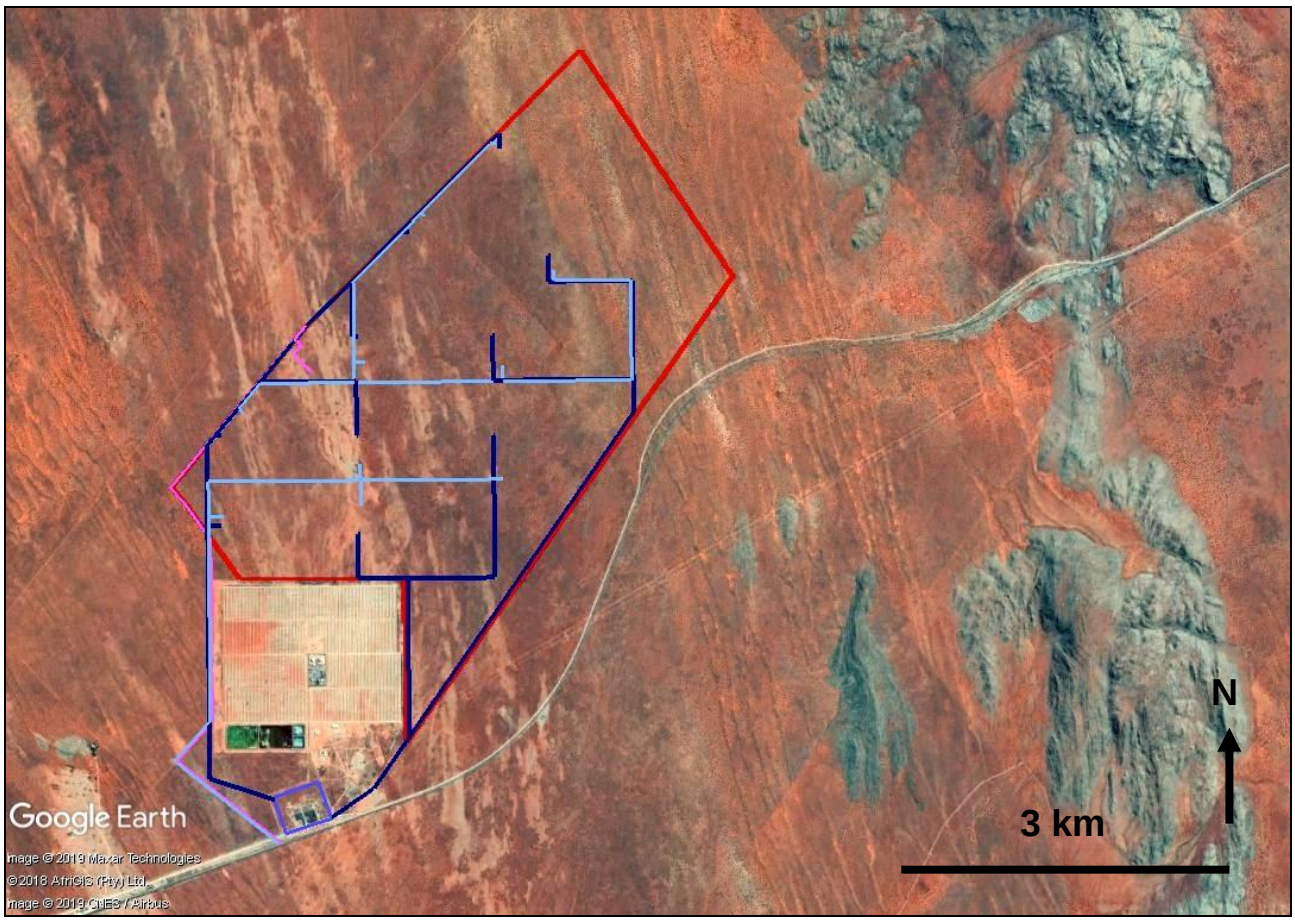

Figure 3: Google earth© satellite image of the Bokpoort II Solar Power Facility project area on the Remaining Extent (RE) of the Farm Bokpoort 390. Shown here are the project boundary (red), overhead powerlines (dark blue), water pipelines, main access road (pink) and the existing Eskom Garona Substation (lilac).

2.2. General approach used for this palaeontological impact study

This PIA report provides an assessment of the observed or inferred palaeontological heritage within the broader study area, with recommendations for specialist palaeontological mitigation where this is considered necessary. The report is based on (1) a review of the relevant scientific literature, including previous palaeontological impact assessments in the area (*e.g.* Almond 2012, 2013a, 2013b, Bamford 2016), (2) published geological maps and accompanying sheet explanations (*e.g.* Moen 2007), as well as (3) the author's extensive field experience with the formations concerned and their palaeontological heritage (*e.g.* Almond & Pether 2008).

In preparing a palaeontological desktop study the potentially fossiliferous rock units (groups, formations *etc*) represented within the study area are determined from geological maps and satellite images. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region, and the author's field experience (Consultation with professional colleagues as well as examination of institutional fossil collections may play a role here, or later following scoping during the compilation of the final report). This data is then used to assess the palaeontological sensitivity of each rock unit to development (Provisional tabulations of palaeontological sensitivity of all formations in the Western, Eastern and Northern Cape have already been compiled by J. Almond and colleagues; *e.g.* Almond & Pether 2008). The likely impact of the proposed development on local fossil heritage is then determined on the basis of (1) the palaeontological sensitivity of the rock units concerned and (2) the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged. When rock units of moderate to high palaeontological sensitivity

are present within the development footprint, a field assessment study by a professional palaeontologist is usually warranted.

The focus of palaeontological field assessment is *not* simply to survey the development footprint or even the development area as a whole (*e.g.* farms or other parcels of land concerned in the development). Rather, the palaeontologist seeks to assess or predict the diversity, density and distribution of fossils within and beneath the study area, as well as their heritage or scientific interest. This is primarily achieved through a careful field examination of one or more representative exposures of all the sedimentary rock units present (*N.B.* Metamorphic and igneous rocks rarely contain fossils). The best rock exposures are generally those that are easily accessible, extensive, fresh (*i.e.* unweathered) and include a large fraction of the stratigraphic unit concerned (*e.g.* formation). These exposures may be natural or artificial and include, for example, rocky outcrops in stream or river banks, cliffs, quarries, dams, dongas, open building excavations or road and railway cuttings. Uncemented superficial deposits, such as alluvium, scree or wind-blown sands, may occasionally contain fossils and should also be included in the field study where they are well-represented in the study area. It is normal practice for impact palaeontologists to collect representative, well-localized (*e.g.* GPS and stratigraphic data) samples of fossil material during field assessment studies. In order to do so, a fossil collection permit from SAHRA is required and all fossil material collected must be properly curated within an approved repository (usually a museum or university collection).

Note that while fossil localities recorded during field work within the study area itself are obviously highly relevant, most fossil heritage here is embedded within rocks beneath the land surface or obscured by surface deposits (soil, alluvium *etc*) and by vegetation cover. In many cases where levels of fresh (*i.e.* unweathered) bedrock exposure are low, the hidden fossil resources have to be *inferred* from palaeontological observations made from better exposures of the same formations elsewhere in the region but outside the immediate study area. Therefore a palaeontologist might reasonably spend far *more* time examining road cuts and borrow pits close to, but outside, the study area than within the study area itself. Field data from localities even further afield (*e.g.* an adjacent province) may also be adduced to build up a realistic picture of the likely fossil heritage within the study area.

On the basis of the desktop and field studies, the likely impact of the proposed development on local fossil heritage and any need for specialist mitigation are then determined. Adverse palaeontological impacts normally occur during the construction rather than the operational or decommissioning phase. Mitigation by a professional palaeontologist – normally involving the recording and sampling of fossil material and associated geological information (*e.g.* sedimentological and taphonomic data) – is usually most effective during the construction phase when fresh fossiliferous bedrock has been exposed by excavations. To carry out mitigation, the palaeontologist involved will need to apply for a palaeontological collection permit from the relevant heritage management Agency, *i.e.* the South African Heritage Resources Agency, SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). It should be emphasized that, *providing appropriate mitigation is carried out*, the majority of developments involving bedrock excavation can make a *positive* contribution to our understanding of local palaeontological heritage.

2.3. Assumptions and limitations

The accuracy and reliability of palaeontological specialist studies as components of heritage impact assessments are generally limited by the following constraints:

1. Inadequate database for fossil heritage for much of the RSA, given the large size of the country and the small number of professional palaeontologists carrying out fieldwork here. Most development study areas have never been surveyed by a palaeontologist.

2. Variable accuracy of geological maps which underpin these desktop studies. For large areas of terrain these maps are largely based on aerial photographs alone, without ground-truthing. The maps generally depict only significant ("mappable") bedrock units as well as major areas of superficial "drift" deposits (alluvium, colluvium) but for most regions give little or no idea of the level of bedrock outcrop, depth of superficial cover (soil *etc*), degree of bedrock weathering or levels of small-scale tectonic deformation, such as cleavage. All of these factors may have a major influence on the impact significance of a given development on fossil heritage and can only be reliably assessed in the field.

3. Inadequate sheet explanations for geological maps, with little or no attention paid to palaeontological issues in many cases, including poor locality information.

4. The extensive relevant palaeontological "grey literature" - in the form of unpublished university theses, impact studies and other reports (*e.g.* of commercial mining companies) - that is not readily available for desktop studies.

5. Absence of a comprehensive computerized database of fossil collections in major RSA institutions which can be consulted for impact studies. A Karoo fossil vertebrate database is now accessible for impact study work.

In the case of palaeontological desktop studies without supporting Phase 1 field assessments these limitations may variously lead to either:

(a) *underestimation* of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or

(b) *overestimation* of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering, or are buried beneath a thick mantle of unfossiliferous "drift" (soil, alluvium *etc*).

Since most areas of the RSA have not been studied palaeontologically, a palaeontological desktop study usually entails *inferring* the presence of buried fossil heritage within the study area from relevant fossil data collected from similar or the same rock units elsewhere, sometimes at localities far away. Where substantial exposures of bedrocks or potentially fossiliferous superficial sediments are present in the study area, the reliability of a palaeontological impact assessment may be significantly enhanced through field assessment by a professional palaeontologist.

In the case of the present study area near Groblershoop in the Northern Cape preservation of potentially fossiliferous bedrocks is favoured by the arid climate but bedrock exposure is very limited indeed due to cover by extensive superficial deposits (*e.g.* alluvium, sandy soils, surface gravels), especially in areas of low relief, as well as by Kalahari vegetation. Very few previous palaeontological heritage assessments have been carried out in the study region (*cf* SAHRIS website; Bamford 2016).

3. GEOLOGICAL CONTEXT

The Bokpoort II Solar Power Facility study area on the Remaining Extent (RE) of the Farm Bokpoort 390 comprises arid, low relief terrain in the Gordonia region on the north-eastern side of the Orange River some 20 km north of Groblershoop, Northern Cape (Fig. 1). The terrain within the solar facility study area slopes broadly southwards from *c*. 1010 m amsl in the north to c. 950 m amsl in the south. As clearly seen in satellite images (Figs. 1 to 3) bedrock exposure is good close to the river and along some sectors of the river bank, while away from the river the bedrocks are largely mantled with orange-brown Kalahari sands. NNW to SSE trending linear sand dunes here surround occasional emergent rocky Inselberge of basement rocks. Bedrock exposures in the vicinity are dissected by the dendritic drainage courses of small, intermittently-flowing streams.

The geology of the study area near Groblershoop is shown on the adjoining 1: 250 000 geological maps 2820 Upington and 2822 Postmasburg (Council for Geoscience, Pretoria; Fig. 4 herein). A comprehensive sheet explanation for the Upington map has been published by Moen (2007) while only a very brief explanation for the Postmasburg area is printed on the map itself. The entire study area is underlain at depth by ancient Precambrian igneous and metamorphic rocks that belong to the **Namaqua-Natal Province** of Mid Proterozoic (Mokolian) age (Cornell *et al.* 2006, Moen 2007). These metamorphosed basement rocks are approximately two to one billion years old and are entirely unfossiliferous (Almond & Pether 2008); they are only represented at surface by small bouldery outcrops (*cf* Dreyer 2015). They include a range of schistose and quartzitic units assigned to the **Brulpan Group** (*e.g.* **Groblershoop Formation** and **Prynnsburg Formation**), details of which are given by Moen (2007) as well as Cornell *et al.* (2006). Outside the present study area the Brulpan rocks are locally intruded by the **Kalkwerf Granite-gniess**, likewise unfossiliferous.

The Precambrian basement rocks within the study area are to a great extent mantled with a spectrum of coarse- to fine-grained **superficial deposits** such as rocky soils, downwasted surface gravels, colluvium (slope deposits), sheet wash, calcrete hardpans, aeolian sands and alluvium of intermittently-flowing streams. These younger deposits are generally young (Quaternary to Recent) and are largely unfossiliferous. Field photos of the study area (*e.g.* Dreyer 2015) show orange-brown Kalahari sands, exhumed calcrete hardpans and dispersed, surface gravels dominated by reworked or downwasted calcrete with minor basement quartzite and cherty clasts (these last probably derived from alluvial gravels of the Orange River).

Small patches of Late Tertiary to Quaternary **calcretes** or pedogenic limestones (T, darker yellow in Fig. 4) are mapped between the solar facility study area and the Orange River; some of these are traversed by the water pipeline servitude. Some of these calcretes may be correlated with the Pleistocene or Late Pliocene **Mokalanen Formation** of the **Kalahari Group**, while others may be of younger age (Partridge *et al.* 2006, Moen 2007). They include horizons of layered to structureless or nodular calcretes overlying basement rocks that are usually less than 3 m thick and often partially covered by wind-blown sands.

The great majority of the study area, including the water pipeline corridor, is covered by fine-grained aeolian (wind-blown) sands of the **Gordonia Formation** (**Qg**, pale yellow in Fig. 4), the youngest, Pleistocene to Recent, subunit of the Kalahari Group. Prominent NNW-SSE trending linear dunes of orange-hued sands are clearly visible on satellite images of the study area (Figs. 1 to 3). The geology of the Late Cretaceous to Recent Kalahari Group is reviewed by Thomas (1981), Dingle *et al.* (1983), Thomas & Shaw 1991, Haddon (2000) and Partridge *et al.* (2006). The Gordonia dune sands are considered to range in age from the Late Pliocene / Early Pleistocene to Recent, dated in part from enclosed Middle to Later Stone Age stone tools (Dingle *et al*., 1983, p. 291). Note that the recent extension of the Pliocene - Pleistocene boundary from 1.8 Ma back to 2.588 Ma would place the Gordonia Formation almost entirely within the Pleistocene Epoch.

According to Moen (2007) **older river terrace gravels** of possible Late Tertiary to Pleistocene age occur “all along the [Orange] river” within 2 km of the present banks and at elevations of up to 45 m (rarely as high as 85m) above the present flood plain. These older river gravels are frequently calcretised. Small patches of older terrace gravels are mapped along the eastern banks of the River Orange some 25 km north of Groblershoop but they are not indicated within the present study area. They may either be completely absent here or too small to map at 1: 250 000 scale. Field photos of the river bank where this is intersected by the existing pipeline show the presence here of disturbed, fine-grained younger alluvium.

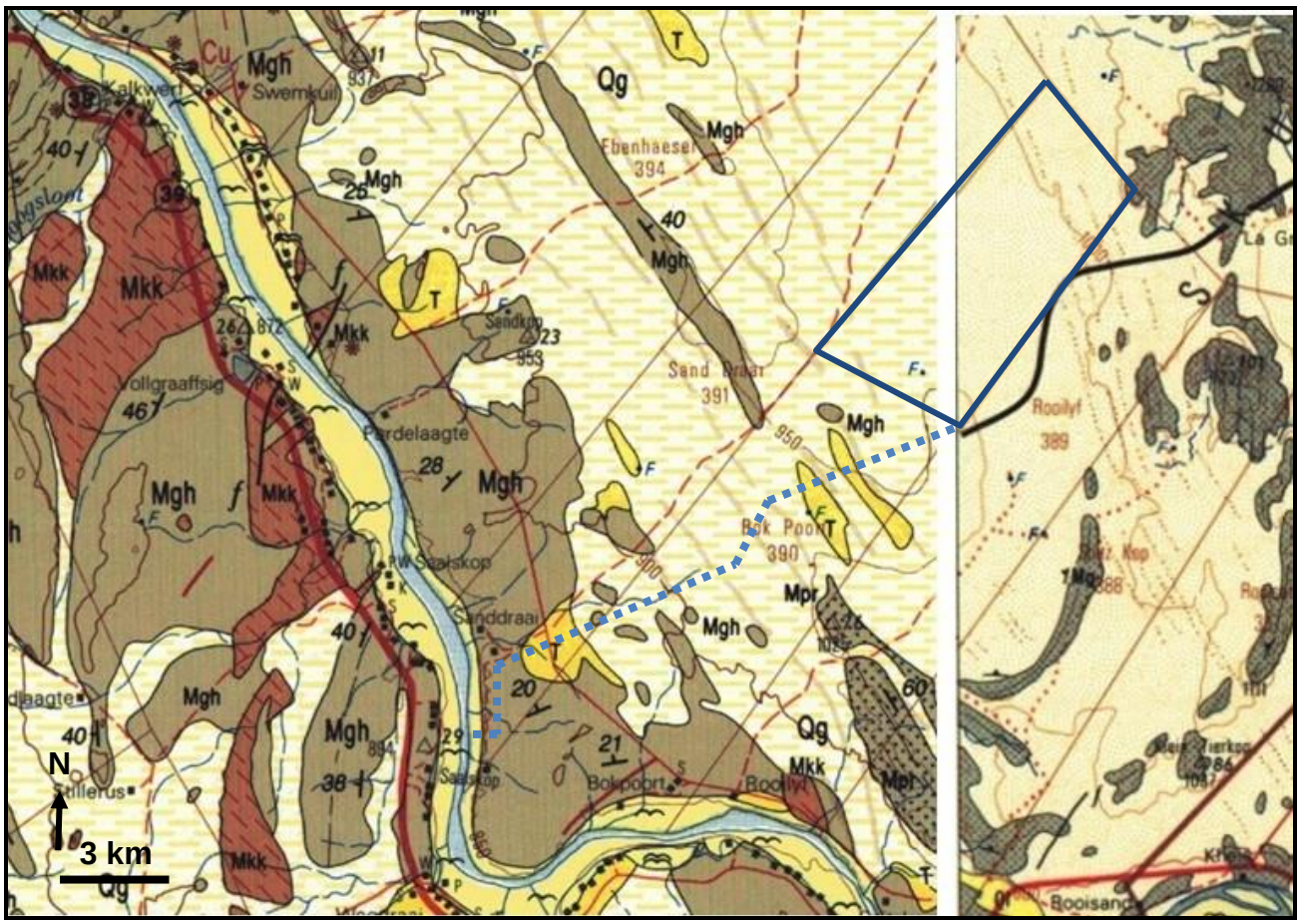

Figure 4: Extract from the adjoining 1: 250 000 geological maps 2820 Upington and 2822 Postmasburg (Council for Geoscience, Pretoria) showing the approximate location of the study area for the Bokpoort II Solar Power Facility on Farm Bokpoort 390 (dark blue polygon). The paler blue dotted line indicates the *approximate* course of the water pipeline to the Orange River.

The study area is underlain at depth by unfossiliferous Precambrian (Middle Proterozoic / Mokolian) basement rocks of the Namaqua-Natal Metamorphic Province (Mgh, Mg, Mpr *etc*, grey or grey-brown) that are assigned to the Brulpan Group and are intruded outside the study area by granite gneisses (Mkk, orange = Kalkwerf Gneiss). Superficial sediments of Late Caenozoic age include calcretes (T, bright yellow), reddish aeolian sands of the Gordonia Formation, Kalahari Group (Qg, pale yellow, with or without dashes), and alluvium of the Orange River (pale yellow with "flying bird" symbol). Small patches of older (Tertiary) terrace gravels are mapped on the eastern bank of the Orange River *c*. 25 km NW of Groblershoop, but *not* within the present study area.

4. PALAEONTOLOGICAL HERITAGE

The Precambrian metamorphic and igneous basement rocks of **the Namaqua-Natal Metamorphic Province** in the study area are entirely unfossiliferous (Almond & Pether 2008) and will therefore not be treated further here.

Late Caenozoic calcretes of the **Kalahari Group** may contain trace fossils such as rhizoliths, termite and other insect burrows, or even mammalian trackways. Mammalian bones, teeth and horn cores (also tortoise remains, and fish, amphibian or even crocodiles in wetter depositional settings) may be occasionally expected within Kalahari Group sediments and calcretes, notably those associated with ancient alluvial gravels and pans (*cf* Almond 2008a). However, these fossil assemblages are generally sparse, low in diversity, and occur over a wide geographic area, so the

palaeontological sensitivity of the calcretes within the study region is rated as low. This applies equally to the thin veneer of other surface deposits (rocky scree, stream alluvium *etc*) within this highly-arid region.

Alluvial gravels of the Orange River of Miocene and younger age are locally highly fossiliferous (*e.g.* Hendy 1984, Schneider & Marias 2004, Almond 2008a, 2009 and extensive references therein) but, as argued above, these are *not* mapped within the study area. Younger silty alluvial deposits may contain a range of terrestrial and freshwater fossils and subfossils. Freshwater snails are mentioned in particular by Moen (2007, p. 150). Stream gravels close to the west bank of the Orange River in the Groblershoop area were examined without success for palaeontological remains by Almond (2012).

5. PALAEONTOLOGICAL HERITAGE IMPACT ASSESSMENT

The Precambrian metamorphic bedrocks underling the study area at depth are unfossiliferous while the overlying Late Caenozoic superficial sediments are generally fossil-poor. As a consequence of the paucity of irreplaceable, unique or rare fossil remains within the development footprint the overall impact significance of the construction phase of the proposed solar energy project is assessed as LOW (negative) without mitigation, and VERY LOW (negative) after mitigation (See summary presented in Table 1). This assessment applies to all the planned infrastructure within the project area – *including* the water pipeline to the Orange River as well as the 132 kV overhead line connection to the Eskom Garona Substation - and applies equally to all PV plants under consideration for the Bokpoort II Solar Power Facility. There are no preferences on palaeontological heritage grounds for any particular infrastructure layout or technology alternative among the various options under consideration.

No significant further impacts on fossil heritage are anticipated during the planning, operational and decommissioning phases of the solar power facility. The no-go alternative (*i.e.* no development) would have a neutral impact on palaeontological heritage.

There are no fatal flaws in the present development proposal as far as fossil heritage is concerned. Providing that the proposed recommendations for palaeontological monitoring and mitigation outlined below are followed through, there are no objections on palaeontological heritage grounds to authorisation of this alternative energy project.

Confidence levels for this palaeontological heritage assessment are high. These conclusions are supported by previous palaeontological field assessments undertaken in the broader Kalahari study region (*e.g.* Almond 2012).

- **Cumulative impacts**

Given the low impact significance assessed for all solar energy developments concerned which are all underlain by very similar geology, it is likely that cumulative impacts associated with the Bokpoort II solar power facility are LOW. Very few palaeontological impact assessments for other developments in the wider project area near Groblershoop have been undertaken (SAHRIS website); one exception - for solar projects on the farm Sand Draai by Bamford (2016) - also concluded that the palaeontological sensitivity of the region is low.

Table 1: Assessment of impacts of the proposed Bokpoort II Solar Power Facility on fossil heritage resources within the development footprint during the construction phase of the development (*N.B.* Significant impacts are not anticipated during the operational and decommissioning phases).

Nature of impact: Disturbance, damage, destruction or sealing-in of *scientifically important* fossil remains preserved at or beneath the ground surface within the development area, most notably by surface clearance and bedrock excavations during the construction phase of the solar power facility.		
	Without mitigation	**With mitigation**
Scale	Site only (1)	Site only (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Low (2)	Improbable (1)
Significance	**Negative Low (16)**	**Negative Very Low (8)**
Status	Negative	Negative (loss of fossils) & positive (improved fossil database following mitigation)
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources	No, since the limited fossil resources concerned are also represented outside the development area (*i.e.* not unique)	No, since the limited fossil resources concerned are also represented outside the development area (*i.e.* not unique)
Can impacts be mitigated?	Yes	Yes.
Mitigation: Monitoring of all substantial bedrock excavations for fossil remains by ECO on an ongoing basis during construction phase, with reporting of any substantial new palaeontological finds (notably fossil vertebrate bones & teeth) to SAHRA for possible specialist mitigation.		
Cumulative impacts: Low, given the very similar geology of the entire Bokpoort II study region.		
Residual impacts: Negative impacts due to loss of local fossil heritage will be partially offset by *positive* impacts resulting from mitigation (*i.e.* improved palaeontological database).		

6. SUMMARY & RECOMMENDATIONS

The project areas for the proposed Bokpoort II alternative energy developments on the Remaining Extent (RE) of the Farm Bokpoort 390 near Groblershoop are underlain, at or below the surface, by highly metamorphosed Precambrian basement rocks (schists, quartzites, gneisses) of the Namaqua-Natal Province that are entirely unfossiliferous. These are largely mantled by Late Caenozoic superficial sediments including Quaternary aeolian sands of the Gordonia Formation (Kalahari Group), calcrete pedocretes and alluvium of the Orange River and its tributaries. These younger superficial sediments are generally of low palaeontological sensitivity. Potentially fossiliferous older alluvial gravels are not mapped along the banks of the Orange River close to Groblershoop where these are intersected by the proposed water pipeline.

No significant fossil heritage resources have been recorded within the Bokpoort II solar power facility study area. The area is inferred to be of low sensitivity in terms of palaeontological heritage and no sensitive or no-go areas have been identified within it during the present desktop assessment. The proposed solar power facility is of LOW (negative) impact significance before mitigation with respect to palaeontological heritage resources. This assessment applies to all the planned infrastructure within the project area – *including* the water pipeline to the Orange River (already authorised) as well as the 132 kV overhead line connection to the Eskom Garona Substation - and applies equally to all PV plants under consideration for the Bokpoort II Solar Power Facility. Cumulative impacts associated with the ten PV solar energy developments are probably low, given the similar regional geology, and there are no fatal flaws in the development

proposal as far as fossil heritage is concerned. The no-go alternative is of neutral significance for palaeontology. Providing that the recommendations outlined below for palaeontological monitoring and mitigation are followed through, there are no objections on palaeontological heritage grounds to authorisation of this alternative energy project.

Pending the potential discovery of significant new fossil remains during development - notably fossil vertebrate bones & teeth - no further specialist palaeontological studies or mitigation are considered necessary for this project.

6.1. Recommended monitoring and mitigation

In the case of any significant chance fossil finds during construction (*e.g.* vertebrate teeth, bones, burrows, petrified wood, shells), these should be safeguarded - preferably *in situ* - and reported by the ECO as soon as possible to the South African Heritage Resources Agency, SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). This is so that appropriate mitigation by a professional palaeontologist can be considered. Such mitigation usually involves the judicious sampling, collection and recording of fossils as well as of relevant contextual data concerning the surrounding sedimentary matrix. The palaeontologist concerned would need to apply beforehand for a collection permit from SAHRA. A tabulated Chance Fossil Finds Procedure is provided in Appendix 1 to this report.

These recommendations should be incorporated into the Environmental Management Plan (EMP) for each alternative energy development.

7. ACKNOWLEDGEMENTS

I am grateful to Ms Seshni Govender of Royal HaskoningDHV, Woodmead, for commissioning this study as well as for providing the necessary background information. The original cultural heritage assessment for this project by Dreyer (2015) provided a very useful resource for evaluating surface geology in the study area.

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9. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape, Limpopo, Northwest, KwaZulu-Natal, Mpumalanga and the Free State under the aegis of his Cape Town-based company *Natura Viva* cc. He has served as a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Dr John E. Almond
(Palaeontologist)
***Natura Viva* cc**

<table>
<tr><td colspan="3">Appendix 1: CHANCE FOSSIL FINDS PROCEDURE: BOKPOORT II SOLAR POWER FACILITY ON THE REMAINING EXTENT OF FARM BOKPOORT 390 NEAR GROBLERSHOOP</td></tr>
<tr><td>Province & region:</td><td colspan="2">Northern Cape, ZF Mgcawu District Municipality.</td></tr>
<tr><td>Responsible Heritage Management Agency</td><td colspan="2">SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa.
Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Precambrian Namaqua-Natal basement rocks. Kalahari Group aeolian sands, calcretes, Late Caenozoic alluvium.</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Mammalian bones, teeth and horn cores, freshwater molluscs, trace fossils in older alluvial deposits, calcrete hardpans.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
Context – describe position of fossils within stratigraphy (rock layering), depth below surface
Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
Photograph fossils against a plain, level background, with scale
Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
</table>

Appendix C8:
Visual

SPECIALIST DECLARATION

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

BASIC ASSESSMENT FOR THE DEVELOPMENT OF 8 NEW PV PLANTS & AMENDMENT OF 2 PV DEVELOPMENTS AT THE BOKPOORT FARM NEAR GROBLERSHOOP NORTHERN CAPE PROVINCE

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	[redacted]
B-BBEE	
Specialist name:	
Specialist Qualifications:	
Professional affiliation/registration:	
Physical address:	
Postal address:	
Postal code:	
Telephone:	
E-mail:	

2. DECLARATION BY THE SPECIALIST

I, _____Paul da Cruz_____, declare that –

- I act as the independent specialist (visual impact assessment) in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

[redacted]

Date
25 May 2020

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, ___Paul da Cruz_____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

[redacted]

Date

[redacted]

VISUAL ADDENDUM (FEBRUARY 2022)

Royal HaskoningDHV
Enhancing Society Together

REPORT

Visual Impact Addendum Report for the Development of 8 New PV Plants and Amendment of 2 PV Developments on the Farm Bokpoort in the Northern Cape Province

Client: ACWA Power

Reference: MD4195TPRP2001201147
Status: Final/02
Date: 2/9/2022

ROYAL HASKONINGDHV (PTY) LTD

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Document title:	Visual Impact Addendum Report for the Development of 8 New PV Plants and Amendment of 2 PV Developments on the Farm Bokpoort in the Northern Cape Province
Document short title:	Bokpoort 2 Visual Addendum
Reference:	MD4195TPRP2001201147
Status:	02/Final
Date:	2/9/2022
Project name:	Basic Assessment for the Proposed 8 New PV Developments and Amendment of 2 PV Developments on the Farm Bokpoort, Northern Cape
Project number:	MD4195
Author(s):	Paul da Cruz
Drafted by:	Paul da Cruz
Checked by:	Malcolm Roods & Prashika Reddy
Date:	09 February 22
Approved by:	LOGIS (Peer reviewer)
Date:	

Classification
Project related

Royal HaskoningDHV

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Executive Summary

Royal HaskoningDHV (RHDHV) has been appointed by ACWA Power to undertake Basic Assessment Studies for the development of eight (8) new Photovoltaic (PV) Solar Power Plants of 200MW each on the Farm Bokpoort 390 located to the north of the town of Groblershoop in the Northern Cape Province. ACWA Power previously received Environmental Authorisation for the proposed development of PV and Concentrated Solar Power (CSP) Solar Plants on the Farm Bokpoort 390. ACWA Power wishes to change the CSP component of the proposed development to PV. Previously, approval for 2 PV facilities was obtained, PV 1 (Ndebele) and PV 2 (Xhosa), however the proposal for these two sites did not include the BESS for either of the sites as well as the capacity increase from 75 to 200MW.

As part of the original basic assessment study completed in 2016, visual impact assessment studies were undertaken by Golder Associates for the three separate components of the development – the CSP component and the two (2) PV components. As the project scope and components have changed to only include PV, an addendum report for the visual assessment aspect of the environmental studies for the proposed development is required to be undertaken. A single addendum report has been prepared based on the original two PV reports, and has been updated to include:

- a consideration of the revised visual baseline of the study area;
- a revised assessment of the visual impacts associated with the proposed solar development, considering the change in the development components;

This report has also considered the Protocol contained within Government Notice No. 320 of 20 March 2020 that sets out site sensitivity verification and minimum report content requirements for specialist reports where no specific protocol has been specified. The verification of site sensitivity and land-use has accordingly been undertaken in line with the protocol.

Project Description

The site is within one of South Africa's eight renewable energy development zones and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of a number of environmental impacts, economic and infrastructural factors.

A 2000 Megawatt (MW) Photovoltaic (PV) Solar Development is proposed. The proposed PV solar facility will cover 150 ha. The proposed development will consist of the following infrastructure:

- Solar PV modules that will be able to deliver up to 200 MW to the Eskom National Grid;
- Inverters that convert direct current (DC) generated by the PV modules into alternating current (AC) to be exported to the electrical grid;
- A transformer that raises the system AC low voltage (LV) to medium voltage (MV). The transformer converts the voltage of the electricity generated by the PV panels to the correct voltage for delivery to Eskom;
- Transformer substation; and
- Instrumentation and Control consisting of hardware and software for remote plant monitoring and operation of the facility.

Associated infrastructure includes:

- Mounting structures for the solar panels will be either rammed steel piles (preferred solution in terms of piles with pre-manufactured concrete footings to support the PV panels;

- Cabling between the structures, to be lain underground where practical;
- A new 132kV overhead powerline which will connect the facility to the National Grid via Eskom's existing Garona Substation. The powerlines vary in length and will be located within a servitude spanning 15.5m meters on both sides. The powerline towers will be 35m high;
- Battery Energy Storage System (BESS) - battery Power at Point of Connection: 150MW, area required: 16ha; the BESS will store approximately 4500m^3 of hazardous substance.;
- One water pipeline connection from the river (previously authorised) and different metering points at individual PV plants;
- Internal access roads (4 – 6 m wide roads will be constructed but existing roads will be used as far as possible) and fencing (approximately 3 m in height); and
- Shared infrastructure consisting of buildings, including a workshop area for maintenance, storage (i.e. fuel tanks, etc.), laydown area, parking, warehouse, and offices (previously approved).

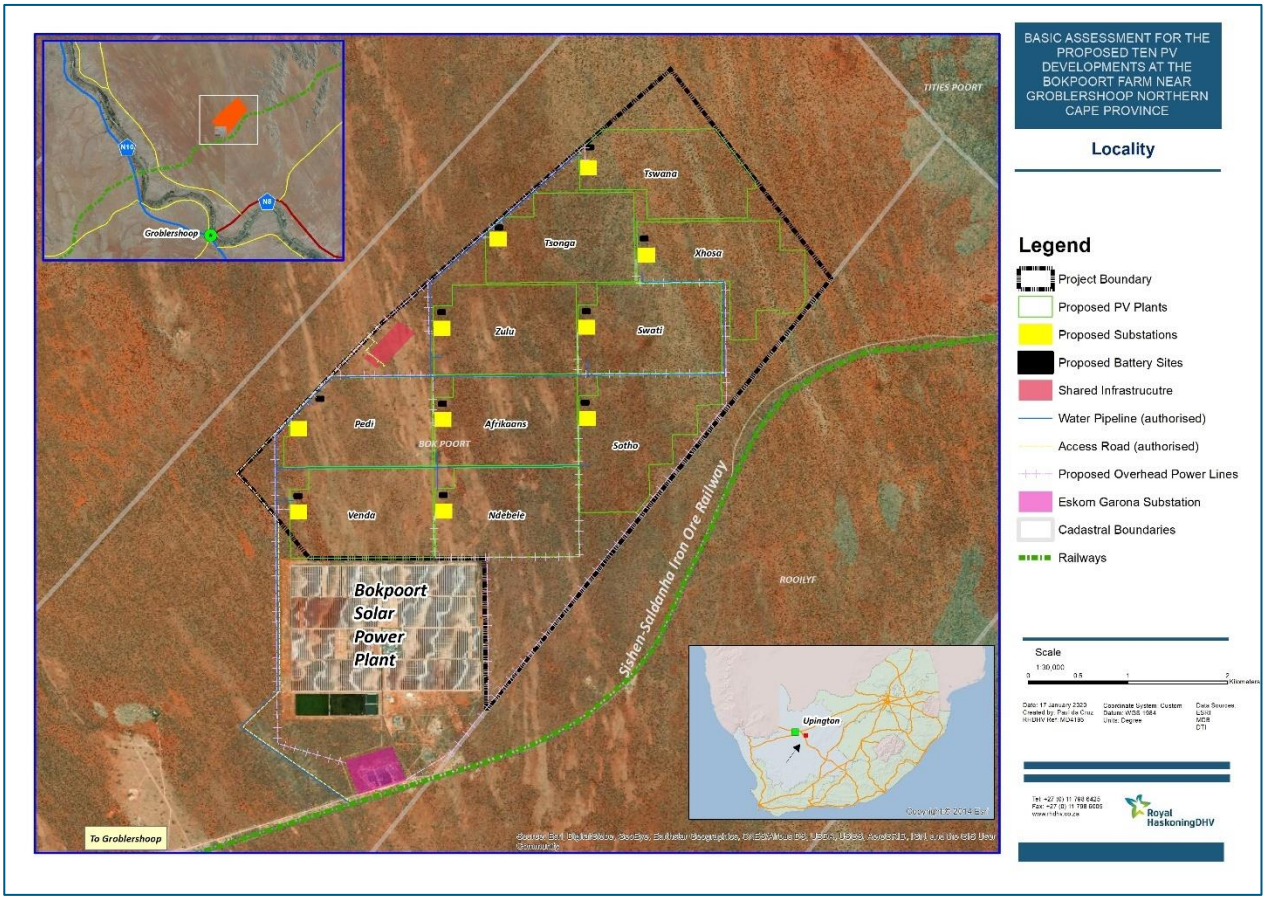

Figure i – Locality

Changes to Visual Baseline and Visual Receptor Locations

The physical aspects of the study area investigated as part of the original visual reports (i.e. topography, hydrology and rainfall, and vegetation cover) remain as described. The land use in the study area has changed little in the four year-period since the original visual reports were compiled.

Seven sensitive receptor locations are situated within a 10km radial area of the proposed development.

Table i -Static Sensitive Receptor Locations located within a 10km radius of the proposed development

Distance (radius around infrastructure)	Receptor Type	Receptor Name	Closest Distance to Proposed Development	Receptor located Within Viewshed?
0 - 5 km	Farmstead (main homestead and smaller household)	Bokpoort Farmstead	1,97km	Yes
5 - 10 km	Two Farmsteads	Eben Haeser Farmstead	7.71km	No
	Farmstead (main homestead and smaller household)	La Gratitude Farmstead	6.25km	No
	Farmstead (main homestead and 3 smaller households)	Tities Poort Farmstead	7.9km	No
	Farmstead (main homestead and 2 smaller households)	Dinas Rus Farmstead	9.34km	No
	Farmstead (2 households)	Bloubos Farmstead	10.38km	No
	Farmstead (3 households)	Hoekvalkte Farmstead	10.58km	No

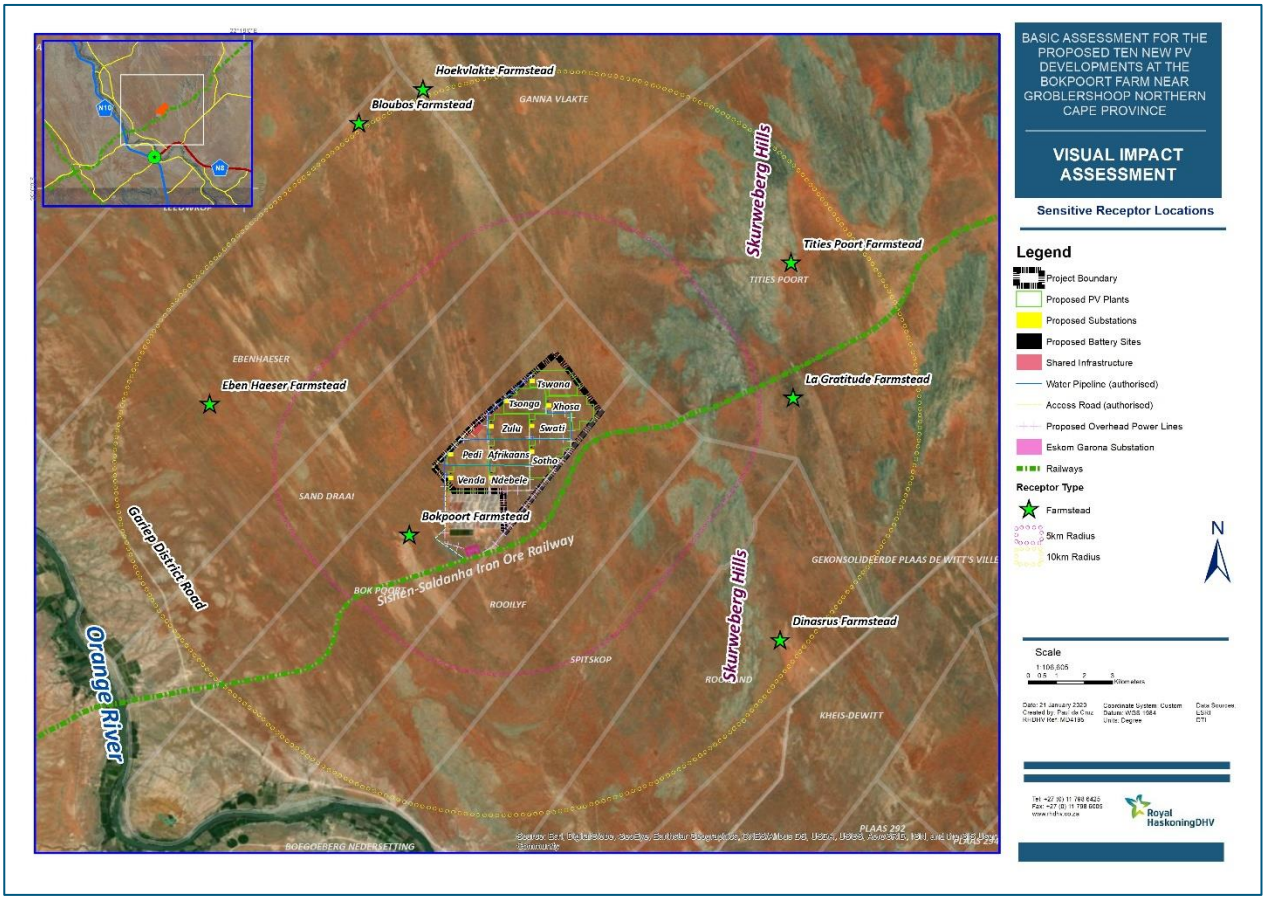

Figure ii – Sensitive Receptor locations situated within 10km of the proposed development

There are no public access transient receptor locations (i.e. roads or rail) located within the 0-5km of the development site. A very short stretch of the Gariep District Road is located within the 10km radial area of the site, but apart from this stretch of road no other transient receptor locations are situated within 10km of the development site.

Assessment of Visual Impacts

As distance is a significant factor in the experiencing of visual impacts, the site context is important in how impacts associated with the proposed development on the development site are likely to be experienced. The vast majority of receptor locations are located greater than 10km distant from the facility and are predominantly located along the Orange River (within the Orange River corridor). Accordingly, a potentially significant distance between the solar facility components and the majority of the receptor locations is present.

All but one of the (sensitive) receptor locations located within a distance of 10km of the proposed development fall into a zone of low potential visual exposure. The Bokpoort Farmstead is the only receptor location that is situated within the zone of moderate to high visual exposure. This receptor location is located within the viewsheds of the development; it is located on an isolated hillside with an aspect that faces in a northwards arc towards the development site. The raised position of the farmstead in relation to the surrounding plains entails that it is exposed to a clear view of much of the terrain. The receptor location will thus be subject to a high degree of visual exposure and thus a high level of visual intrusion. The visual intrusion factor associated with the new development would be ameliorated however by a number of factors, in particular the screening effect of vegetation around the homestead and the existing presence of the Bokpoort 1 CSP Facility as viewed from the receptor location.

Of the six other sensitive receptor locations located within a distance of 10km of the development site, ***none*** are located within the viewshed of either the northern or southern part of the development, thus meaning that none of these six receptor locations will be exposed to any views of the proposed development. Parts of the 5-10km radial area around the proposed development are located within the viewsheds of the development, in particular the viewshed of the northern part of the development which covers a greater area as the northern part of the development is located on higher-lying ground than the southern part of the development footprint. However, significant parts of the radial area fall outside of the viewshed of the development. This is largely due to the presence of hilly / mountainous terrain located within the north-eastern and eastern parts of the 10km radial area that screens much of the surrounds, preventing views towards the development site.

Beyond the 10km radial area the visual exposure factor associated with the proposed plant would be minimal and twinned with the absence of visibility of the plant in large areas where receptor locations are clustered, in particular along the Orange River corridor, the potential for visual impacts to be generated is low to minimal. Most of the Orange River corridor lies outside of the viewshed of the development, and accordingly will not be affected by the proposed development.

When non-static receptor locations are considered, the visual intrusion factor of the development will be very low to minimal. Most of the Gariep District Road is located outside of the viewshed of the development, and thus will be exposed to no visual exposure to the proposed development.

The proposed development could also be associated with other visual-related potential impacts:

- **Glint and glare**: Glint and glare can become a problematic issue associated with solar power facilities. However, as the proposed development will not be visible to the vast majority of receptor locations in the study area it will not create any glint or glare impacts. In addition, PV arrays are not typically associated

with glint or glare as the PV surfaces are non-reflective, and only the metal supports could potentially cause glare, thus greatly reducing the potential for glint or glare-related impacts.

- **Lighting impacts in the context of the night-time environment**: the night-time environment of the wider area is characterised by limited sources of lighting, especially in the area to the east of the Orange River. The Bokpoort 1 CSP Plant has introduced a set of lights into this dark environment and is the only really visible source of light on the eastern side of the Orange River (when viewed from afar). If similar lighting was developed at the proposed facility, the relative proximity of the proposed facility to the Bokpoort CSP Plant when viewed from the area to the west would effectively add to the cluster of lighting that is already visible in this part of the study area. The number of lights as visible could more than double and the development would result in the introduction of further light spill into a generally unlit night-time environment.
- **Dust plume-related visual impacts**: The generation of dust plumes could constitute a visual impact, although it would only be transient in nature. Dust plumes associated with the proposed development that could become problematic in a visual context could be generated by the clearing of vegetation on the development site during construction and by construction traffic along the access roads to the development site, which would likely be the Gariep District Road and the Transnet Access road, both of which are not tarred and from which dust would be generated. If it were to occur excessively, dust plume creation could be construed as a visual impact. The distance factor and limited viewshed ameliorate the potential impact of dust plumes generated on the site, but generation of dust plumes by a large increased volume of heavy vehicle traffic may be perceived as a negative visual intrusion in addition to negative perceptions regarding dust-related grazing impacts, as well as road safety.

Overall, the degree of visual intrusion associated with the proposed development is likely to be low at worst, with the distance between most of the receptor locations and the development site being the greatest contributing factor, twinned with the non-visibility of the development in large parts of the study area. The proposed development is thus very unlikely to result in the creation of a visual impact, or perceptions of visual impact by people inhabiting the sensitive receptor locations in the 10km radial area or moving transiently within the area. Twinned with the presence of the Bokpoort 1 CSP Plant and the Eskom Garona Substation, the proposed solar development will add to the presence of large-scale power generation infrastructure in the study area, but which due to its remote location and the low density of human settlement will not generate any degree of visual exposure beyond that which is very low, thus being unlikely to generate any visual impacts.

From a visual impact assessment perspective the proposed development (activity) is acceptable and should be authorised as the development will not adversely affect the visual receiving environment in a significant manner;

Mitigation

A number of mitigation measures have been recommended to be implemented, **and must be included as conditions in the Environmental Authorisation for the Development:**

- Clearing of vegetation on the construction site musty be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in atmospheric conditions (wind) creating large dust plumes on the site.
- Regular dust abatement measures must be applied on the construction site, as detailed in the development's EMPr.
- Lighting of the plant at night must be limited to security lighting (where this is necessary). It is acknowledged that emergency operational lighting may be required, but this must not be permanently lit, only being lit when such emergency operational lighting is required.

- The height of any lights should be limited; more lights of lower height should be installed rather than fewer floodlights that would be visible from a wider area.
- All lighting must be downward, and inward facing (towards the plant), to avoid light spill into surrounding areas.
- Speed limits for construction vehicles, in particular heavy trucks travelling along the site access roads (including the Gariep District Road and the Transnet Railway Road), must be set, and must be rigorously enforced. It is recommended that speed limits of <50km/hr be set, especially in the vicinity of (i.e. within 500m) of households / farmsteads located close to the Gariep District Road.

Impact Rating Matrix Assessment

Aspect / Impact	Construction - Significance Rating before Mitigation	Construction - Significance Rating after Mitigation	Operation- Significance Rating before Mitigation	Operation - Significance Rating after Mitigation	Decommissioning- Significance Rating before Mitigation	Decommissioning - Significance Rating after Mitigation
Visual Impacts Associated with the Development Components	Low	Low	Low	Low	Low	Low
Lighting-related Impacts	N/A	N/A	Low	Low	N/A	N/A
Generation of Dust Plumes from the construction footprint	Low	Low	N/A	N/A	Low	Low
Generation of Dust Plumes from construction traffic on access routes	Low	Low	N/A	N/A	Low	Low

Acronyms

Acronym	Acronym description
CSP	Concentrated Solar Power
PV	Photovoltaic
RHDHV	Royal HaskoningDHV

Glossary

Glossary Term	Glossary Text
Aeolian	Wind-borne – i.e. referring to wind-borne and deposited materials, and erosion caused by wind
Glare	The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility
Glint	Glint is a brief flash of light.
Micro-topography	Small scale variations in the height and roughness of the ground surface; in the context of this report the definition includes structures such as buildings and larger-sized vegetation that can restrict views
Viewshed	A viewshed is an area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point

Specialist Declaration

I, **Paul da Cruz**, declare that I –

- act as a specialist consultant in the field of Visual Impact Assessment
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014 (as amended in 2017);
- have and will not have any vested interest in the proposed activity proceeding;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- undertake to disclose, to the competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2014 (as amended in 2017); and
- will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

PAUL DA CRUZ

Expertise of Specialist

Paul da Cruz of RHDHV is a very experienced visual impact assessment practitioner, having undertaken visual impact assessments on a number of large development projects. Paul's key list of visual impact assessment experience at RHDHV is listed below.

Paul da Cruz Visual Impact Assessment (VIA) Experience at Royal HaskoningDHV (SSI) – April 2012 to present time:

- Visual and Tourism Study: Addendum Report to the Thyspunt Transmission Lines EIA Visual and Tourism Specialist Studies to Assess the impacts of the proposed lines on the Elands River Valley
- Visual Impact Assessment (VIA) for the Matimba Continual Ashing EIA (Eskom Generation), Lephalale, Limpopo
- VIA for the expansion of Mining Activities at the Black Mountain Mine, Springbok Area, Northern Cape
- VIA for the proposed Valleyview housing Development, eMalahleni, Mpumalanga
- VIA for the Eskom Underground Coal Gasification (UCG) Project, Amersfoort, Mpumalanga
- VIA for the Lydenburg-Merensky 132kV power line, Limpopo-Mpumalanga
- VIA for the Mining Rights Application for the Ekangala Quarry near Bronkhorstspruit
- VIA for the Eskom Mbumbu-Tsakane 132kV Power line in the Acornhoek area, Mpumalanga
- VIA for the proposed SANRAL P166 Bypass Road in Mbombela, Mpumalanga

- Visual Impact Assessment Screening Study for the proposed Transnet Waterberg Haul Line Railway Project (Lephalale to Ermelo)
- VIA for the proposed Sanddraai Solar Power Plant at Groblershoop, Northern Cape
- VIA for the upgrading of the Mkuze Airport, KwaZulu-Natal
- VIA for the Proposed NEO1 Solar Power Plant in Mafeteng, Lesotho

Older Visual Impact Experience:

- VIA for the proposed relocation of the Skukuza Conference Centre, Kruger National Park
- VIA for the proposed re-commercialisation of the Skukuza Airport, Kruger National Park
- VIA for the proposed development of residential apartments in Ramsgate, KZN
- Strategic Visual Impact Assessment Study for the Marula Region Strategic Environmental Assessment, Kruger National Park
- VIA for the redevelopment of the Newmarket Racecourse, Alberton, Gauteng
- VIA for a new Eskom Transmission Substation, Malelane, Mpumalanga
- VIA for the Thyspunt Transmission Lines Integration Project, Eastern Cape
- VIA for proposed Eskom Distribution Power lines, Delareyville – Kophela, North West
- VIA for the Spoornet Coallink Power line Projects in KZN and Mpumalanga
- VIA for a Solar Power Plant Project in Kimberley, Northern Cape
- VIA for the Mookodi Integration Project, proposed power lines and substations in the Vryburg / Stella Area, North West (project currently underway)
- VIA for a wind farm project in Noupoort, Northern Cape
- VIA for a wind farm project in the Prieska (Copperton) area, Northern Cape

1 Introduction

Royal HaskoningDHV (RHDHV) has been appointed by ACWA Power to undertake Basic Assessment Studies for the development of eight (8) new Photovoltaic (PV) Solar Power Plants of 200MW each on the Farm Bokpoort 390 located to the north of the town of Groblershoop in the Northern Cape Province. ACWA Power previously received Environmental Authorisation for the proposed development of PV and Concentrated Solar Power (CSP) Solar Plants on the Farm Bokpoort 390. ACWA Power wishes to change the CSP component of the proposed development to PV. Previously, approval for 2 PV facilities was obtained, PV 1 (Ndebele) and PV 2 (Xhosa), however the proposal for these two sites did not include the BESS for either of the sites as well as the capacity increase from 75 to 200MW.

As part of the original basic assessment study completed in 2016, visual impact assessment studies were undertaken by Golder Associates for the three separate components of the development – the CSP component and the two PV components. As the project scope and components have changed to only include PV, an addendum report for the visual assessment aspect of the environmental studies for the proposed development is required to be undertaken. A single addendum report has been prepared based on the original two PV reports.

1.1 Aims of the Study

The aims of the study are to undertake:

- a consideration of the revised visual baseline of the study area;
- a revised assessment of the visual impacts associated with the proposed solar development, considering the change in the development components;

1.1.1 Project (Study Area) Location and Description

The site is within one of South Africa's eight renewable energy development zones and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of a number of environmental impact, economic and infrastructural factors.

A 2000 Megawatt (MW) Photovoltaic (PV) Solar Development is proposed in total over the area. The proposed PV solar facility will cover 150 ha each. The proposed development will each consist of the following infrastructure:

- Solar PV modules that will be able to deliver up to 200 MW to the Eskom National Grid;
- Inverters that convert direct current (DC) generated by the PV modules into alternating current (AC) to be exported to the electrical grid;
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- Cabling between the structures, to be lain underground where practical;
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- Battery Energy Storage System (BESS) - battery Power at Point of Connection: 150MW, area required: 16ha; the BESS will store approximately 4500m^3 of hazardous substance.;
- One water pipeline connection from the river (previously authorised) and different metering points at individual PV plants;
- Internal access roads (4 – 6 m wide roads will be constructed but existing roads will be used as far as possible) and fencing (approximately 3 m in height); and
- Shared infrastructure consisting of buildings, including a workshop area for maintenance, storage (i.e. fuel tanks, etc.), laydown area, parking, warehouse, and offices (previously approved).

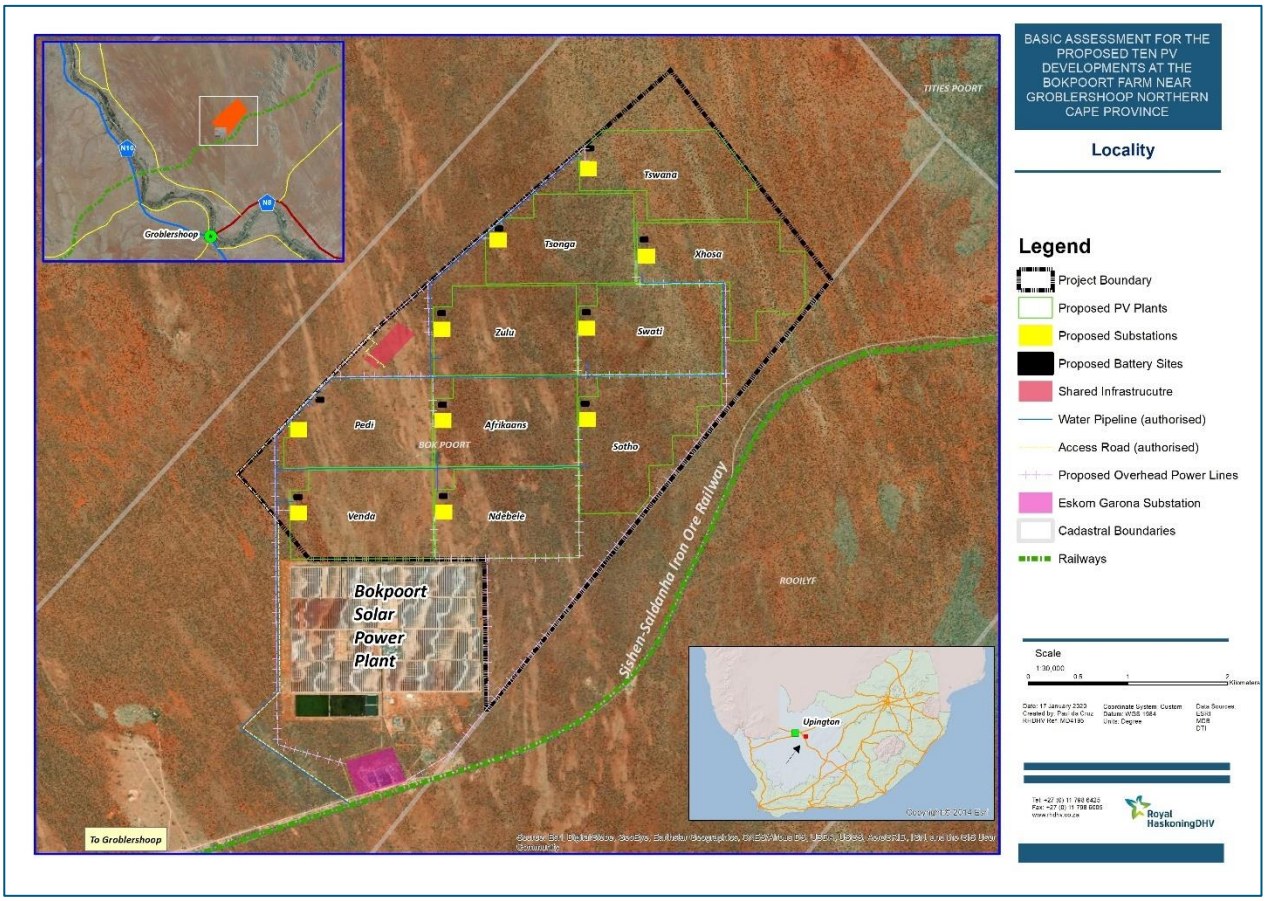


Figure 1 – Locality Map

1.2 Assumptions and Limitations

This is addendum report is not a stand-alone visual impact report and has been prepared to update the two (2) visual impact reports prepared by Golder Associates for the original basic assessment process completed in 2016. As such this report assumes that the original two visual impact assessment reports adequately and accurately described the baseline visual environment of the study area and accurately undertook the assessment of viewsheds associated with the proposed development.

This addendum report has utilised the original reports' assessment of viewsheds associated with the original northern and southern PV plants. These viewsheds were generated for the northern and southern PV plants respectively. As the overall footprint of the development has not changed, and as the design (height) of the PV components has not changed markedly these viewsheds represent the northern and southern extents of the current development. Accordingly, the viewsheds are an accurate representation of the southern and northern extents of the ten proposed PV facilities.

It should be noted that the 'experiencing' of visual impacts is subjective and largely based on the perception of the viewer or receptor. The presence of a receptor in an area potentially affected by the proposed solar power development does not thus necessarily mean that a visual impact would be experienced.

It has been assumed that households and farmsteads located within the study area are sensitive receptors – i.e. receptor locations at which a perception of visual impact could be generated. Existing Power Generation / power transmission infrastructure and the people that work at such locations in the study area have not been classified as being sensitive receptors in a visual impact context.

1.3 Site Sensitivity Verification

Government Notice No. 320 of 20 March 2020 sets out site sensitivity verification and minimum report content requirements for specialist reports where no specific protocol has been specified. The Protocol states that prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration identified by the national web based environmental screening tool (screening tool), where determined, must be confirmed by undertaking a site sensitivity verification.

According to GN 320, the site sensitivity verification must be undertaken through the use of:
(a) a desk top analysis, using satellite imagery;
(b) a preliminary on-site inspection; and
(c) any other available and relevant information.

The outcome of the site sensitivity verification must be recorded in the form of a report that--
(a) confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
(b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
(c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations of 2014 (as amended in 207) (EIA Regulations).

Screening Reports for two of the site components (Sotho and Afrikaans) were generated in November 2021 using the web based environmental screening tool (Appendix 2). As part of the Proposed Development Area Environmental Sensitivity, a number of environmental themes were identified in the screening reports. Visual

and landscape sensitivity is not one of the environmental themes that was highlighted in the reports. Of the socio-cultural themes identified, the archaeological and cultural heritage theme (low sensitivity) is the closest related theme to visual sensitivity, however although cultural heritage sensitivity has a visual impact aspect, the two themes are distinct. The screening reports thereby do not provide an assessment of visual and landscape sensitivity of the site.

Accordingly the use of desktop assessment (analysis of satellite imagery), as supported by an on-site inspection have been used to verify the pre-assessment site sensitivity, as required by the Protocol. In the context of the current report (an addendum report to a set of earlier visual impact reports), visual sensitivity is related to the location of visual sensitive receptors (Section 2.2) and to the assessment of changes to landscape physical characteristics and land-use (Section 2.1), as land-use in particular is closed aligned to visual sensitivity. .

In terms of the requirements of Section 1.3 of the Protocol:

- Section 2.1 of this report discusses the current use of the land and environmental sensitivity such as new developments or infrastructure, the change in vegetation cover or status, etc.
- Section 2.1. contains evidence (i.e. photographs) of the verified use of the land .

As such, although a site verification report was not undertaken, this report fulfils the requirements of the Protocol contained in GN320.

1.4 Methodology

The Methodology adopted in the two (2) visual impact reports prepared by Golder Associates for the original basic assessment process completed in 2016 is detailed in Section 2.0 of each report.

For the addendum study, the following methodology has been adopted:
Changes to the visual baseline of the study area, and to the visual receptor locations within the study area have been investigated, in order to acquire an understanding of the current visual baseline of the receiving environment. This has been investigated in the context of developments that have occurred since the original visual assessments were competed in 2016. An updated list of static visual receptor locations within a 10km radius of the proposed development has been compiled.

The assessment of visual impacts associated with the proposed development have then undertaken. The nature of visual impacts has been explored and the generic visual impacts associated with photovoltaic solar power plants are detailed. An analysis of the degree of visual intrusion caused by the proposed PV Facility at receptor locations in the study area has been undertaken through the assessment of the likely visibility of the proposed development components at receptor locations, based on the viewsheds generated as part of the original visual impact assessments has been undertaken. As part of the assessment of visual impacts, the assessment of the following aspects has been undertaken:

- Glint and glare
- Lighting (night-time assessment)
- Dust plumes created by construction vehicles and vegetation clearing

As part of the assessment of impacts, relevant mitigation measures, if applicable, have been detailed.

2 Changes to Visual Baseline and Visual Receptor Locations

2.1 Landscape Physical Characteristics and Landuse

This part of the report investigates any changes to the visual baseline in the area that may have occurred since the undertaking of the original visual studies (in 2016), which if affected, could affect the experiencing of visual impacts associated with the proposed development.

The physical aspects of the study area investigated as part of the report (i.e. topography, hydrology and rainfall, and vegetation cover) remain the same as described in the original reports. Land-use change can often occur more rapidly than changes to a landscape's physical attributes, although vegetation cover change often occurs in conjunction with land-use change. The land-use in the study area has changed little in the four year-period since the original visual reports were compiled. Away from the Orange River corridor the predominant land-use in the wider study area and including the majority of the Bokpoort Farm remains livestock rearing, predominately sheep. The Orange River valley / corridor is predominated by the presence of irrigated agriculture, with the establishment of grape (sultana) vineyards evidently becoming more common. Game farming and hunting still occur in the Kalahari Oryx Game Farm located to the north and north-west of the Bokpoort Farm. The Bokpoort (1) CSP plant remains the only energy generation-industrial facility in the wider area with no other solar or wind power generation facilities having been constructed to date. There appears to have been little to no growth in settlements in the study area, with Groblershoop remaining a small rural town along with a handful of smaller settlements located close to the Orange River corridor.

The ensuing photographs indicate (and serve as a verification of) the landuse on the site at the time of the assessment in 2019.

Figure 2 - Landuse Photograph 1

View into the south-eastern part of the development site showing natural Karoo shrubveld vegetation used to graze livestock from the Transnet Rail Road on the site's eastern boundary, with the view of the Bokpoort 1 solar power plant (off-site) in the background

Figure 3 – Landuse Photograph 2

View of duneveld on the northern part of the development site, with this part of the site being vacant and consisting of natural vegetation utilised for livestock grazing.

Figure 4 – Landuse Photograph 3

View of gravel plains on the north-western part of the development site, with this part of the site being vacant and consisting of natural vegetation utilised for livestock grazing.

Figure 5 – Landuse Photograph 4

View of karroid grassland on sandy soils in the central part of the development site, with this part of the site being vacant and consisting of natural vegetation utilised for livestock grazing.

Based on the verification of land-use on the site (at the time of the compilation of the report in 2019/20), due the presence of an existing solar power plant located adjacent to the development site, and based on, the nature of the site and its surrounds as being vacant and utilised solely for livestock grazing, the pre-assessment of visual sensitivity is that the development site and its immediate surrounds have a low visual sensitivity.

2.2 Visual Receptors

The original visual reports listed the number of structures within a 10km radius of the site. As the area beyond 10km of the development site would be very unlikely to be subject to any form of visual exposure to the development (refer to Figure 5), this addendum report focusses on a 10km radius of the development site. This addendum report has identified all *sensitive* receptor locations in the 10km radial area (Table 1).

Table 1 -Static Sensitive Receptor Locations located within a 10km radius of the proposed development site

Distance (radius around infrastructure)	Receptor Type	Receptor Name	Closest Distance to Proposed Development	Receptor located Within Viewshed?
0 - 5 km	Farmstead (main homestead and smaller household)	Bokpoort Farmstead	1,97km	Yes
5 - 10 km	Two Farmsteads	Eben Haeser Farmstead	7.71km	No
	Farmstead (main homestead and smaller household)	La Gratitude Farmstead	6.25km	No
	Farmstead (main homestead and 3 smaller households)	Tities Poort Farmstead	7.9km	No
	Farmstead (main homestead and 2 smaller households)	Dinas Rus Farmstead	9.34km	No
	Farmstead (2 households)	Bloubos Farmstead	10.38km	No
	Farmstead (3 households)	Hoekvalkte Farmstead	10.58km	No

In the context of visual impact assessment, it is important to note that not all structures can be considered to be sensitive receptors to the development, especially where the structures are associated with the undertaking of a similar activity or process to the proposed development that would not be associated with any degree of visual sensitivity. The original reports listed seven (7) structures as being located within a 5km radius around the site, all of which were listed as households. However only two are non-industrial or non-power generation-related, being the Bokpoort Farmstead and an associated farmworker's dwelling. The remainder are located either at the Bokpoort CSP Plant or at the Eskom Garona Substation. As such these other structures and the people working within them are unlikely to display any degree of visual sensitivity and accordingly only one sensitive receptor location exists within a 5km radius of the development footprint.

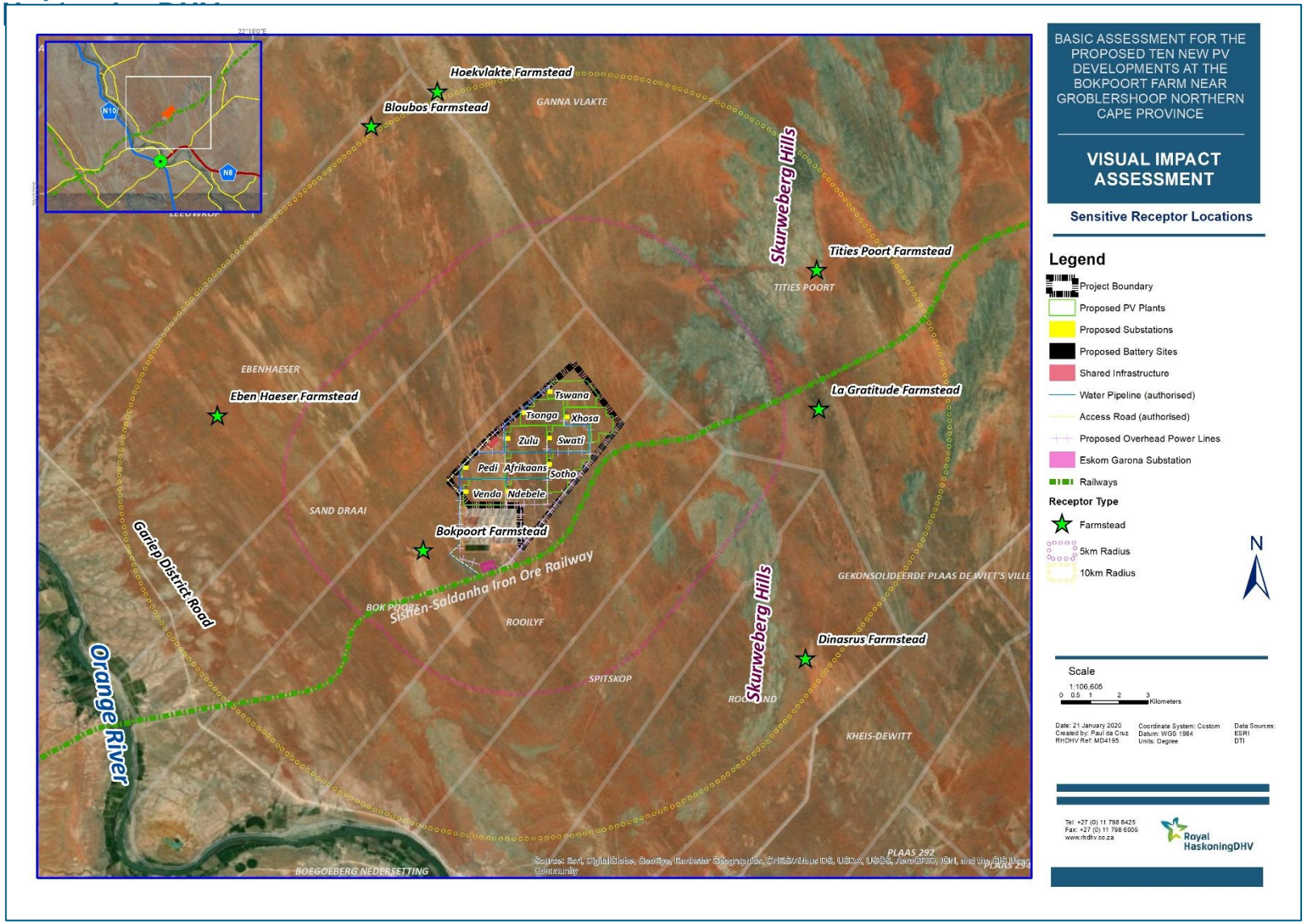


Figure 6 – Location of Sensitive Receptor Locations within a 10km radius

Within a 5-10km radius, the original report identified a further 15 structures. The assessment completed for this addendum report identified six (6) *sensitive* receptor locations within the 5-10km radius[1] (Figure 6). All of these are farmsteads, with each farmstead typically consisting of a number of households.

There are no public access transient receptor locations (i.e. roads or rail) located within the 0-5km radial area of the development site (Figure 6). The Transnet Railroad is located within the radial area however this is a non- public access road and access is limited to employees of Transnet, and for the stretch of the road from the Gariep Road to the Bokpoort CSP Plant, to people working at the Solar Power Plant. This road is thus not considered as a route on which potential sensitive receptors could travel. The Transnet Railway is not a passenger railway, only transporting iron ore (raw materials) from Sishen to Saldanha. As such the railway can also not be considered to be a transient receptor location.

Only a short stretch of the Gariep District Road enters the 10km radial area (Figure 6). This is the primary and only public access road located on the eastern side of the Orange River corridor in the area and which is located within the area surrounding the proposed development. The road runs from the N8 National Road east of Groblershoop north-westwards, running largely parallel to the course of the river, in the direction of the small settlement of Gariep and eventually linking to the N14 National Road and Olifantshoek to the north. The road also provides access to the only other road bridge across the Orange River between Groblershoop and Upington. As such the Gariep Road is an important public route that carries local traffic in the area to the north-east of Groblershoop.

3 Impact Assessment

3.1 Generic aspects of visual impacts associated with developments and structures

Before exploring the site-specific impacts associated with the proposed development, it is necessary to explore some generic aspects of visual impact associated with new developments such as the proposed solar power development.

- Size and footprint of an object/ development

Size of a new object / series of objects placed into a landscape is an important determinant in terms of visibility. The larger a structural feature, the more it is likely to be visible. Spatial footprint is also an important factor, as the larger the spatial footprint of a development, the more it will be likely to occupy a large portion of a landscape, thus having a greater potential to alter the visual character of the landscape.

- Viewing distance

The distance of the viewer / receptor location away from an object is the most important factor in the context of the experiencing of visual impacts. Beyond a certain distance, even large structural features tend to be much less visible and are difficult to differentiate from the surrounding landscape. The visibility of an object is likely to decrease exponentially with increasing distance away from the object, with maximum impact being exerted on receptors at a distance of 500m or less. The impact decreases exponentially as one moves away from the source of impact, with the impact at 1000m being a quarter of the impact at 500m away (see Figure 7 below). At 5000m away or more, the impact would be negligible.

[1] *The Hoekvalkte and Bloubos Farmsteads are located just outside of the 10km radial area but have been included in this assessment*

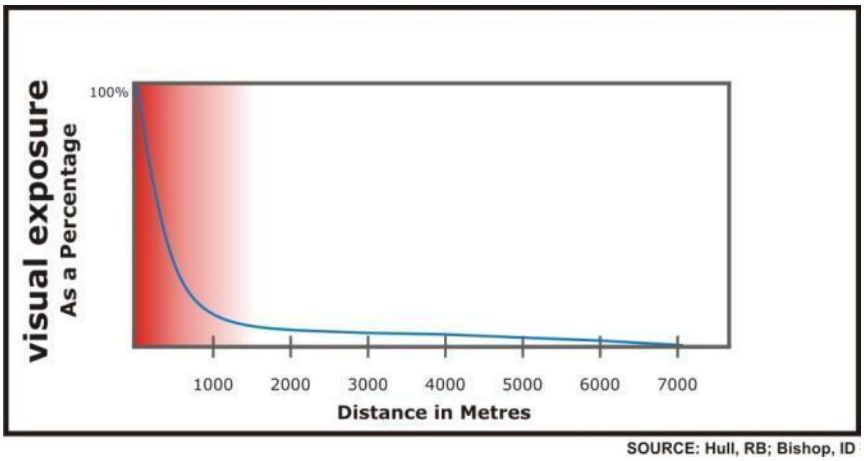


Figure 7 - Diagram Illustrating Diminishing Visual Exposure over Distance

- Presence of receptors

It is important to note that visual impacts are only experienced when there are receptors present to experience the impact; thus, in a context where there are no human receptors or viewers present there are not likely to be any visual impacts experienced.

- Viewer perception

As described above, value can be placed in a landscape in terms of its aesthetic quality, or in terms of its sense of identity or sense of place with which it is associated. If no such values are held with respect to a landscape, there is less likely to a perception of visual impact if the landscape is visually altered. Development within a landscape may not be perceived negatively at all if the development is associated with progress or upliftment of the human condition. The perception of visual impacts is thus highly subjective and thus involves 'value judgements' on behalf of the receptor. The context of the landscape character, the scenic / aesthetic value of an area, and the types of land use practiced tend to affect the perception of whether new developments are considered to be an unwelcome intrusion. Sensitivity to visual impacts is typically most pronounced in areas set aside for the conservation of the natural environment (such as protected natural areas or conservancies), or in areas in which the natural character or scenic beauty of the area acts as a draw card for visitors (tourists) to visit an area, and accordingly where amenity and utilitarian ecological values are associated with the landscape.

When landscapes have a highly natural or scenic character, amenity values are typically associated with such a landscape. Structural features such as industrial / power generation developments and related infrastructure are not a feature of the natural environment but are rather representative of human (anthropogenic) change to a landscape. Thus, when placed in a largely natural landscape, such structural features can be perceived to be highly incongruous in the context of the setting, especially if they affect or change the visual quality of a landscape. It is in this context of incongruity with a natural setting that new developments are often perceived to be a source of visual impact.

- Landform (topographical) and micro-topographical context

The landform context of the environment in which the object is placed is an important factor. The location of the feature within the landform setting – i.e. in a valley bottom or on a ridge top is important in determining the relative visibility of the feature. In the latter case, the feature would be much more visible and would 'break' the horizon, if a viewer was located 'inferior' (lower than) to the object in the topographical context. Similarly, the landform context in which the viewer is located is important in that topography can inherently

block views towards an object if the viewer is located in a setting such as a steep-sided valley or on an aspect facing away from the object.

The micro-topography within the landscape setting in which the viewer and object are located is also important; the presence of micro-topographical features and objects such as buildings or vegetation that would screen views from a receptor position to an object can remove any visual impact factor associated with it.

- Landscape development context

The presence / existence of other anthropogenic objects associated with the built environment may influence the perception of whether a new development is associated with a visual impact. Where buildings and other infrastructure exists, the visual environment could be considered to be already altered from a natural context and thus the introduction of a new structural feature into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible.

- Receptor type and nature of the view

Visual impacts can be experienced by different types of receptors, such as people driving along roads, or people living / working in the area in which the structural feature is visible. In turn, the receptor type affects the nature of the typical 'view' of a potential source of visual impact, with views being permanent in the case of a residence or other place of human habitation, or transient in the case of vehicles moving along a road. The nature of the view experienced affects the intensity of the visual impact experienced.

- Weather and visibility

Meteorological factors, such as weather conditions (presence of haze, or heavy mist) which would affect visibility can impact the nature and intensity of a potential visual impact associated with a structural feature.

3.2 Generic Visual Impact Issues related to Solar Power Plants

3.2.1 Impacts associated with large-scale solar power facilities

It is important to note that the development and associated environmental assessment of solar power plants in South Africa is relatively new, and thus it is valuable to draw on international experience. Thus, this section of the report draws on international literature and web material to describe the generic impacts associated with solar power.

In general, solar power generating facilities need to occupy a very large area in comparison to other types of power generation facilities relative to the level of power output generated (Sullivan *et al*, 2012). This is an important component of the visual aspect of solar power plants as they can occupy large parts of a landscape, especially when viewed from an elevated position.

The large size, strong regular geometry of solar facilities, and the use of mirrors or glass panels with metal supporting structures, may result in high visual contrast being created that is visible for long distances in many instances (Sullivan *et al*, 2012). In favourable viewing conditions, large facilities can be visible from a distance of 16km or greater; it should be noted however that viewed from such long distances, the facilities may not be recognisable as solar facilities (Sullivan, *et al*, 2012). Built structures associated with solar power facilities would introduce complex, rectilinear geometric forms and lines and artificial looking textures and colours into the landscape; these would typically contrast markedly with natural appearing landscapes (US Department of Interior, 2013).

Previous studies have indicated that the ancillary infrastructure such as power blocks, substations, or cooling towers are also important in contributing towards observed visual contrasts and visual intrusion, particularly in the case of concentrating solar facilities (Sullivan *et al*, 2012). The visual impacts associated with this ancillary infrastructure is most pronounced in the case of views towards facilities from a low angle or low elevation, where the viewer is on the same, or lower horizontal plane as the facility. From low viewing angles, taller structures such as cooling towers extend far above the much lower collector arrays, creating a vertical contrast, and being particularly prominent if they extend above the horizon. If metallic (or containing metallic components), these can also be associated with glinting or glare.

A commonly expressed concern is whether glint or glare would negatively affect aircraft flying above the facility. It should be noted that in recent times several large-scale solar projects have been completed and constructed at or near certain major airports in the USA (such as Denver International Airport or the Oakland FedEx International Airport Hub) without any reports of such problems (Power Engineers, 2010). It should be noted however that the solar power facilities at these airports are solar panel facilities that are typically low in reflectivity.

As most solar power plants tend to be located in vacant or uninhabited areas due to space availability, the landscape context is often natural; in this context the solar field could be considered to be a visual intrusion that possibly acts to alter the visual environment, especially if the pre-development visual context is natural. The level of visual exposure to the power plant (and potential visual intrusion of the facility) is dependent on the location of the solar fields in relation to receptor locations.

The proposed PV structures will rotate on an axis and are proposed to be a maximum of 4m in height above the ground (approximate in height to a 1-1.5 storey building). The low profiles of these solar collector arrays of PV facilities entail that these are typically able to be fully or partially screened by desert vegetation in flat landscapes where viewpoints are not elevated (U.S Department of the Interior, 2013). These typically however require very flat terrain and the solar field for these facilities is typically completely cleared and levelled (US Department of Interior, 2013); this relates to the clearing of vegetation as discussed below in section 3.2.2.

3.2.2 Vegetation clearing

One of the important potential indirect impacts of a solar power development relates to the clearing of natural vegetation. Clearing of vegetation could result in the potential loss of vegetative screening, which would result in the opening of views. Importantly in a visual contrast context the clearing of vegetation could result in the exposure of soils which could contrast with the colour of surrounding natural vegetation as well as potentially creating significant changes in form, line, colour, and texture for viewers close to the solar field. Lastly (especially in arid settings in which solar power plants are often developed) vegetation removal could result in windblown dust which could constitute an indirect visual impact (US Department of the Interior, 2013).

The proposed development will require the clearing of vegetation over most of the development footprint. The plant footprints will need to be graded and terraced where necessary, in order to provide a level surface for foundations. This practice of clearing vegetation will intensify the visibility of the solar energy facility, particularly in locations where natural woody vegetation would exist, but to a lesser degree when the proposed facility is located on land where woody vegetation does not occur.

3.2.3 Lighting

Due to the nature of solar power plants which would primarily be operational during sunlit (daylight) hours, lighting (at night) is not a major operational component of such facilities. However solar power generation facilities would include exterior lighting around buildings, parking areas, and other work areas, as well as security and other lighting around and on support structures (e.g., the control building) (US department of the Interior, 2013). In the context of a natural setting in which there would be little to no lighting, visible lighting at solar power generation facilities could constitute light pollution, especially in settings where land-uses and activities (e.g. ecotourism establishments) which value the absence of lighting in a natural setting. Maintenance activities conducted at night, such as mirror or panel washing might require vehicle-mounted lights, which could also contribute to light pollution (US department of the Interior, 2013). Light pollution impacts associated with utility-scale solar facilities include sky glow, light trespass, and glare (US department of the Interior, 2013).

3.3 Degree of visual intrusion caused by the proposed PV Facility at receptor locations

As distance is a significant factor in the experiencing of visual impacts (refer to section 3.1 above), the site context is important in how impacts associated with the proposed development on the development site are likely to be experienced. As detailed in the original PV visual impact reports for the proposed development, the vast majority of receptor locations are located greater than 10km distant from the facility and are predominantly located along the Orange River (within the Orange River corridor). Accordingly, a potentially significant distance between the solar facility components and the majority of the receptor locations is present. In this addendum report distance banding from the proposed facility footprint has been used to determine the zone of likely visual exposure to the facilities into which the respective receptor locations would fall. Increasing distance from the proposed facility footprint has been used to give an indication of the likely visibility or potential degree of visual exposure to the solar plant developments from different parts of the study area. The following zones (distance bandings) have been utilised:

- <2km – zone of high potential visual exposure
- 2km-5km – zone of moderate potential visual exposure
- 5km-10km – zone of low potential visual exposure
- >10km – zone of marginal / negligible visual exposure

It is very important to note that all but one of the (sensitive) receptor locations located within a distance of 10km of the proposed development fall into the zone of **low potential visual exposure**. The Bokpoort Farmstead is the only receptor location that is situated within the zone of moderate to high visual exposure. This receptor location is located within the viewshed of the development (Figures 8&9); it is located on an isolated hillside (Figure 10) with an aspect that faces in a northwards arc towards the development site. The raised position of the farmstead in relation to the surrounding plains entails that it is exposed to a clear view of much of the terrain (refer to Figure 10).

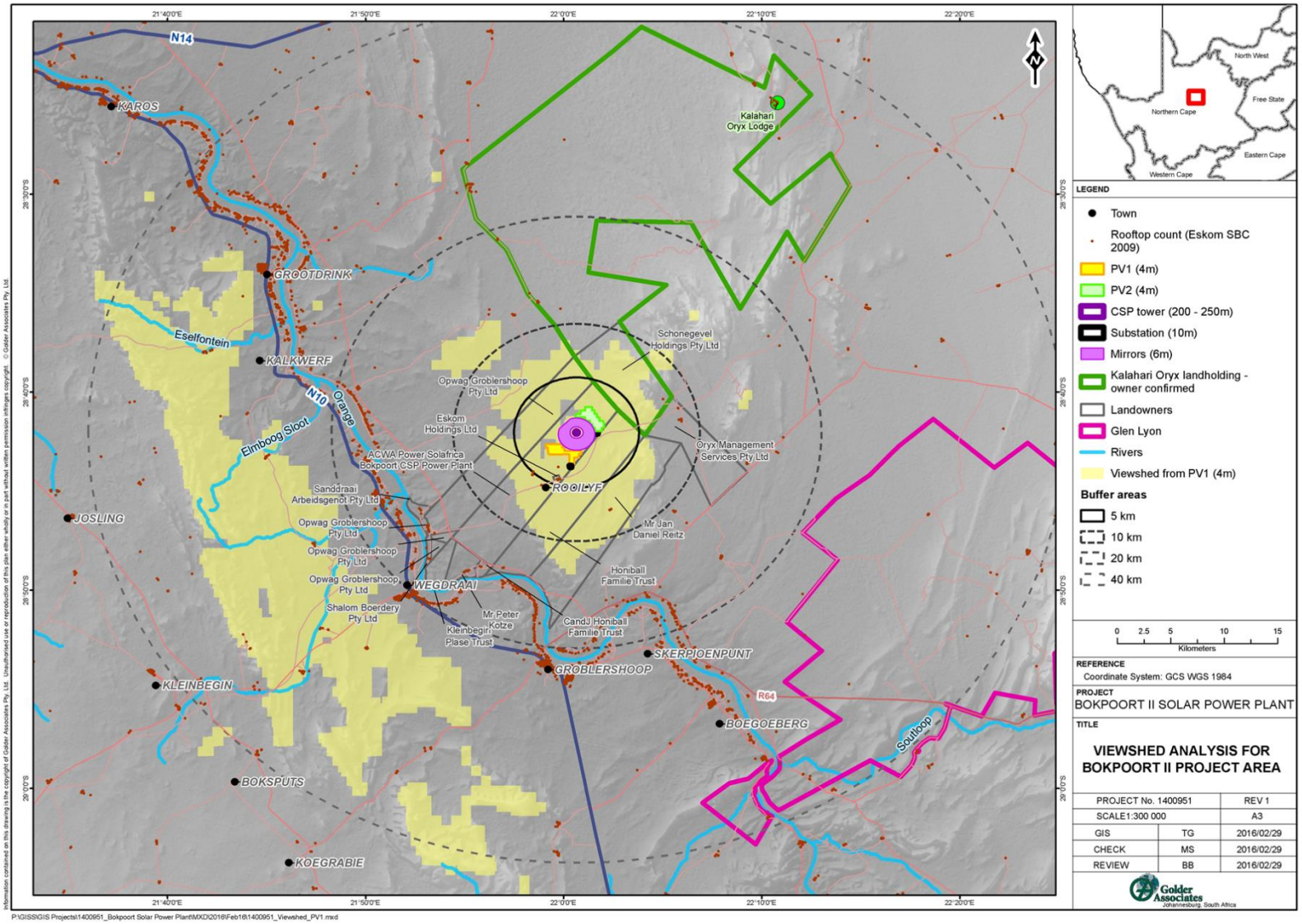


Figure 8 – Original Viewshed Analysis for the southern part of the development

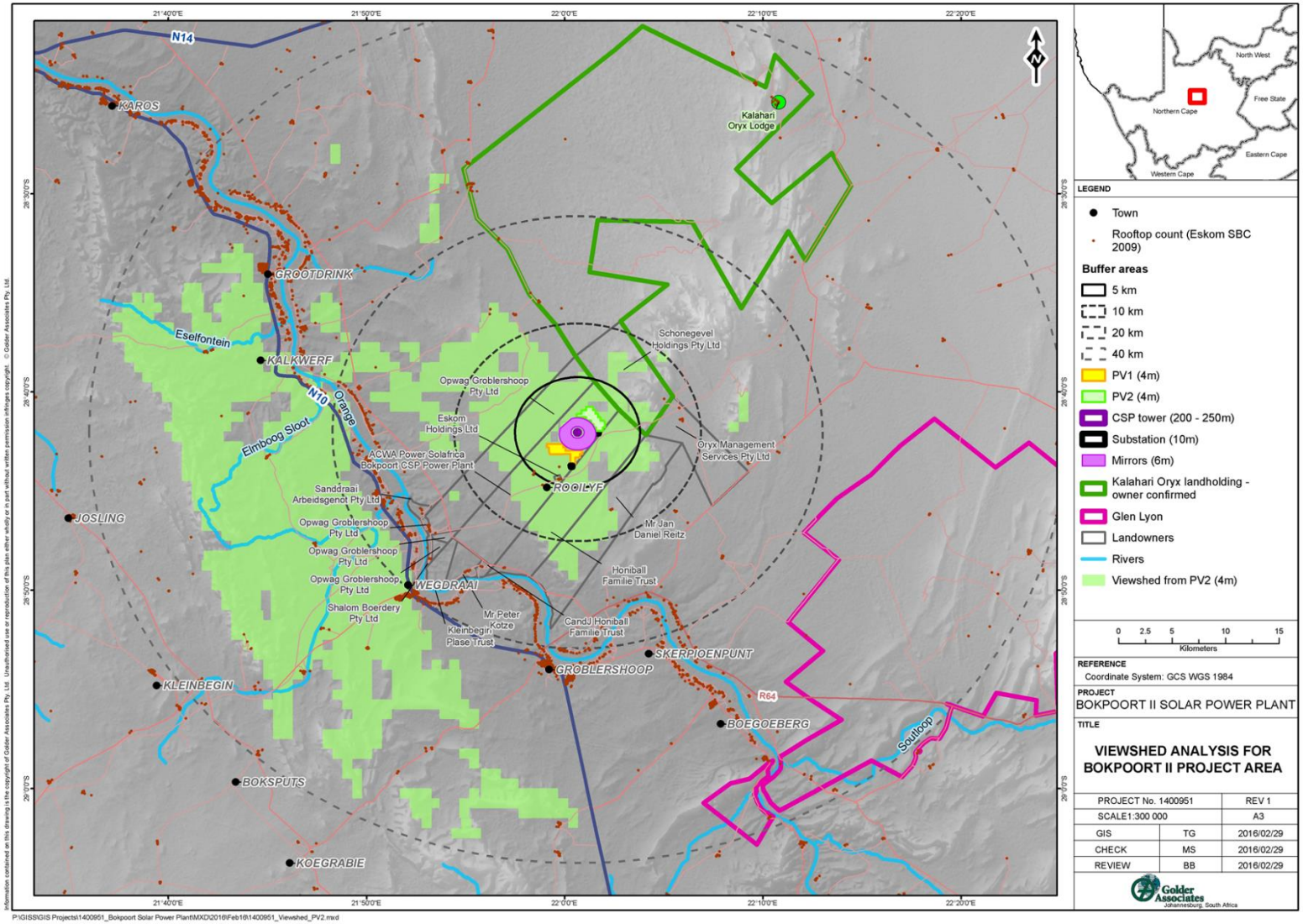


Figure 9 – Original Viewshed Analysis for the northern part of the development

The receptor location will thus be subject to a high degree of visual exposure and thus a high level of visual intrusion. The visual intrusion factor associated with the new development would however be ameliorated by a number of factors; firstly, the new development would be viewed in the context of existing views of the Bokpoort 1 CSP Plant. As the ten (10) proposed PV plants would be located directly adjacent to the existing solar power plant, these would be viewed as an extension of the existing solar plant in the context of a view of the landscape that has already been transformed from a completely natural context. In addition, the vegetation (large mature trees) located around the farmstead would be effective in screening the receptor from views to the surrounding areas.

Figure 10 – The Bokpoort Farmstead viewed from the Sanddraai Property to the west.*
* Note the elevated position of the farmstead in relation to the surrounding terrain

Of the six other sensitive receptor locations located within a distance of 10km of the development site, ***none*** are located within the viewshed of either the northern or southern part of the development (Figures 8&9), thus meaning that **none of these 6 receptor locations will be exposed to any views of the proposed development**. Parts of the 5-10km radial area around the proposed development are located within the viewsheds of the development, in particular the viewshed of the northern part of the development which covers a greater area as the northern part of the development is located on higher-lying ground than the southern part of the development footprint. However significant parts of the radial area fall outside of the viewshed of the proposed development (Figures 8&9). This is largely due to the presence of hilly / mountainous terrain located within the north-eastern and eastern parts of the 10km radial area. This higher-lying terrain screens much of the 10km radial area in which the receptors are located, blocking views towards the site footprint.

Beyond the 10km radial area, the visual exposure factor associated with the proposed plant would be minimal and twinned with the absence of visibility of the plant in large areas where receptor locations are clustered, in particular along the Orange River corridor would result in a negligible visual impact. Most of the Orange River corridor lies outside of the viewshed of the development, and accordingly will not be visually affected by the proposed development.

When non-static receptor locations are considered, the visual intrusion factor of the development will be very low to negligible. The only public access located in the 10km radial area is a short section of the Gariep District Road. This, and the other stretches of the road are located outside of the viewsheds of the development (Figures 8&9), and thus will be exposed to no visual exposure to the proposed development.

Figure 11 View towards the development from the raised portion of the Gariep District Road.

Overall, the degree of visual intrusion associated with the proposed development components is likely to be low at worst, with the distance between most of the receptor locations and the development site being the greatest contributing factor, twinned with the non-visibility of the development in large parts of the study area. The proposed development is thus very unlikely to result in the creation of a visual impact, or perceptions of visual impact by people inhabiting the sensitive receptor locations in the 10km radial area or moving transiently within the area. Twinned with the presence of the Bokpoort 1 CSP Plant and the Eskom Garona Substation the proposed solar development will add to the presence of large-scale power generation infrastructure in the study area, but which due to its remote location and the low density of human settlement will not generate any degree of visual exposure beyond that which is very low, thus being unlikely to generate any visual impacts.

3.3.1 Glint and Glare analysis

As described in section 3,3,1 above, glint and glare can become problematic aspects of a solar power plant. As described above the proposed development will not be visible to the vast majority of sensitive receptor locations in the study area and thus will not create any glint or glare impacts at these locations. Where it is visible, the proposed development would be located at a significant distance from much of the study area from which it potentially could be viewed. In addition, PV arrays are not typically associated with glint or glare as the PV surfaces are non-reflective, and only the metal supports could potentially cause glare, thus greatly reducing the potential for glint or glare-related impacts. Thus, glint and glare associated with the proposed development is unlikely to be a visual impact-related issue.

3.3.2 Assessment of lighting impacts associated with the Proposed Development

In order to assess the impact of lighting at the proposed solar power station facility, it is necessary to explore the nature of the night-time environment in the study area.

Most parts of the study area are highly rural in nature with a very low density of human settlement. Accordingly, the night-time environment within the wider area is thus characterised by few sources of artificial lighting. Where these occur, these are highly localised. The location of the viewer is important as viewers located in low-lying terrain settings (such as in the Orange River valley) would not be able to view the lights in the surrounding area. However viewers in higher-lying settings, such as certain of the receptor locations on higher-lying ground closer to the N10 national road west of the Orange River valley would be able to view a greater area, and thus see the light sources in this wider area (including the ground to the east of the river).

The primary sources of lighting are floodlights that illuminate on a permanent (nightly) basis in a number of the small settlements located along the N10 including Wegdraai, Saalskop and Grootdrink to the north as well as in certain parts of Groblershoop and the settlement of Boegoeberg to the south. A number of these very tall floodlights provide general illumination for these respective settlements in the absence of (lower) street lighting. The height of these lights makes them highly visible in an otherwise dark night-time context. When viewed from a high point the effect is of ‘islands of light’ in an otherwise very dark, unlit night-time context.

The Bokpoort 1 CSP Plant has introduced a further set of lights into this dark environment and is the only really visible source of light on the eastern side of the Orange River (when viewed from afar). The Bokpoort 1 CSP Plant is located relatively far from the Orange River and cannot be discerned from the higher points on the western side of the Orange River during the day. However, a set of lights at the power plant is visible from higher-lying terrain to the west of the river. A collection of lights is visible at the plant’s location. These lights are likely to be tall, floodlight-type lights in order to be viewed from the higher lying areas to the west of the river. This set of lights adds to the few sources of lighting visible in the wider area.

It should be noted that it is not known what type of lighting is planned at the proposed facility. However if similar type of lighting was developed at the proposed facility, the relative proximity of the proposed facility to the Bokpoort 1 CSP Plant when viewed from the area to the west would effectively add to the cluster of lighting that is already visible in this part of the study area. The number of lights as visible could more than

double. The degree of visibility of lighting would depend on the height of the lights, the degree of illumination (strength) and their orientation. It is important to note that lighting at the proposed plant may not become a permanent feature of the light time environment if it is not operated on a permanent (nightly) basis, and only used in case of emergency maintenance requirements.

3.3.3 Dust Plume-related Visual Impacts

The generation of dust plumes could constitute a visual impact, although it would only be a transient impact that is dependent on atmospheric factors such as wind. Dust plumes associated with the proposed development that could become problematic in a visual context could be generated in two ways:

- By the clearing of vegetation on the development site during construction, leaving the underlying soils exposed, and through the subsequent movement of construction vehicles or through bulk earth moving activities.
- By construction traffic along the access roads to the development site, which would likely be the Gariep District Road and the Transnet Access road, both of which are not tarred and from which dust would be generated.

The study area is located in an arid environment, and thus the generation of dust is not necessarily incongruent in this setting. Dry, hot conditions can create dust plumes or whirlwinds. However, if it were to occur excessively, dust plume creation could be perceived as a visual impact. The risk of excessive dust creation relates to the potential vegetation clearing across the entire development footprint, rather than the phased clearing of vegetation. It is accepted that vegetation across most of the development footprint will need to be cleared but should the entire development footprint be cleared of vegetation at the start of the construction period, this will leave the underlying soils exposed over a very large area for a relatively long period of time. In particular in the northern parts of the site where sandier soils as opposed to gravelly substrate is encountered, the risk of mobilisation of this substrate by wind would be high.

The visual impacts associated with such increased dust plume creation would be ameliorated by the same factors that will ameliorate the degree of visual impact associated with the proposed PV plant infrastructure – i.e. the remote location of the site twinned with the topographical characteristics of the area that entail that the development site would not be visible from large parts of its surrounds and the distance of sensitive receptors from the site. In this regard dust plumes generated on the development site are unlikely to be perceived as a source of visual impact, nonetheless mitigation needs to be applied to prevent this impact from occurring.

The Gariep District Road is an unsurfaced (untarred) road, and accordingly, dust is typically generated by vehicles travelling along it. The road surface is comprised of material that originates from calcrete and thus fine white dust is mobilised by vehicles moving along the road. Dust generation on the road, however, has in the past proved to be a contentious issue in the context of the construction of the Bokpoort Solar Power Plant and the large number of construction vehicles that travelled along the road and which generated large volumes of dust. The objections from local farmers and landowners were centred on the adverse impacts of the depositing of large volumes of fine dust on the vegetation surrounding the road that allegedly greatly reduced the palatability of the vegetation and the overall grazing capacity of the veld. The transport of components of the proposed PV plant developments by road would result in a highly significant daily increase in the volume of heavy vehicle traffic along the road, which would last for much of the duration of the construction period. In this context the generation of dust plumes by a large increased volume of heavy vehicle traffic may be perceived as a negative visual intrusion in conjunction with negative perceptions regarding dust-related grazing impacts, as well as road safety concerns.

A different set of receptors to those potentially affected by the development footprint would potentially be exposed to the dust plumes generated by construction traffic along the Gariep District Road. If construction traffic approached the development site from the south-east – i.e. from the N8 National Road – a number of farmsteads, including three farmsteads located close to the road, and a greater number along the opposite side of the Orange River – would be exposed to the regular dust plumes generated by construction vehicles. Though not necessarily significant as an impact on its own, the visual intrusion of the dust plumes could be perceived to have significant nuisance value in combination with negative perceptions of adverse effects on vegetation and concerns relating to road safety. It is important that mitigation be implemented to reduce the impact and extent of dust generated by the large numbers of construction vehicles that will need to use this road to access the site.

Dust plumes generated along the Transnet Rail access road could have a similar visual effect, but apart from a short stretch of the road located close to the Gariep District Road. This road is remote from any areas of public access and dust plume-related impacts will be mitigated by the distance factor in a similar manner to dust plumes generated on the development site.

3.4 Mitigation Measures

Due to the remote location of the proposed development and the low degree of visual intrusion anticipated with the plant, detailed design-related mitigation measures are not required. However, mitigation measures are specified for a number of other aspects of the proposed development, particularly for dust creation, lighting and construction access which could potentially be associated with potential visual impacts, as detailed below.

3.4.1 Vegetation Clearing

- It is strongly recommended that clearing of vegetation only be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in atmospheric conditions (wind) creating large dust plumes on the site.
- Regular dust abatement measures must be applied on the construction site, as detailed in the development's EMPr.
- If high wind conditions are forecast for the area, bulk earthworks, in particular in the sandy, northern parts of the site characterised by parallel-running dunes should ideally not be undertaken in order to reduce the mobilisation of large volumes of dust.

3.4.2 Lighting-related mitigation measures

Lighting at the plant could potentially exert a visual impact, especially if floodlight-type lighting was to be developed at the plant. Accordingly, the following mitigation measures should be implemented with regards to lighting:

- Lighting of the plant at night should be limited to security lighting (where this is necessary). It is acknowledged that emergency operational lighting may be required, but this should not be permanently lit, only being lit when such emergency operational lighting is required.
- The height of any lights should be limited; more lights of lower height should be installed rather than fewer floodlights that would be visible from a wider area.

- All lighting should be downward, and inward facing (towards the plant), to avoid light spill into surrounding areas.

3.4.3 Mitigation measures for dust creation on access roads

- Speed limits for construction vehicles, in particular heavy trucks, must be set, and must be rigorously enforced. It is recommended that speed limits of <50km/hr be set, especially in the vicinity of (i.e. within 500m) of households / farmsteads located close to the Gariep District Road. Lower speeds will limit dust plume creation.
- Speed limits and dust abatement measures must be applied along both the Gariep District Road and along the Transnet Rail access road.
- Dust abatement measures must be applied along all non-tarred access routes (e.g. dust suppression with water). These must be focussed on stretches of the access routes located within 500m of households and farmsteads located close to the access road.
- Consideration must be given to timing the movement of construction traffic to and from the site during cooler periods of the day during which dust suppression with water would be more effective due to lower temperatures and lower evaporation rates.

3.4.4 Other visual mitigation measures

- Within linear servitudes and on the development site, all cleared areas during the construction phase that will not form part of the plant footprint, including power line and pipeline servitudes should be rehabilitated and replanted with grass or low shrubs with non-invasive root systems, in order to avoid the creation of areas devoid of vegetation that may be visible from receptor locations.
- Where applicable and depending on Eskom's requirements, it is recommended that the monopole power line tower be used (as opposed to the steel lattice tower) in order to reduce the visibility of power line towers. Wooden power line tower poles are also preferable to steel lattice tower types.

3.5 Impact Rating Matrix

3.5.1 Visual Impacts associated with the proposed development components (proposed PV Plant)

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• The construction site would not be visible to the vast majority of the receptor locations in the study area, and thus would not cause any visual impact for the majority of the study area	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability:** **Possible** (0.5) **Significance: Low (-2.5)**	• It is strongly recommended that clearing of vegetation only be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in a large visual contrast compared to the surrounding vegetation.	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Short term (-1) **Probability:** **Possible** (0.5) **Significance: Low (-2)**
Operations	• The PV arrays would not be visible to the vast majority of the receptor locations in the study area, and thus would not cause any visual impact for the majority of the study area.	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Long term (-4) **Probability:** **Possible** (0.5) **Significance: Low (-4)**	• Within linear servitudes and on the development site, all cleared areas during the construction phase that will not form part of the plant footprint, including power line and pipeline servitudes should be rehabilitated and replanted with grass or low shrubs with non-invasive root systems, in order to avoid the creation of areas devoid of vegetation that may be visible from receptor locations.	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Long term (-4) **Probability:** **Possible** (0.5) **Significance: Low (-4)**
Decom-missioning		**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability:** **Possible** (0.5) **Significance: Low (-2.5)**		**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability:** **Possible** (0.5) **Significance: Low (-2.5)**
Cumulative	• The proposed development will be located immediately adjacent to the Bokpoort Solar Power Facility, so when	**N/A**	N/A	**N/A**

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
	viewed from the surrounds it will form part of a visual environment that is already transformed from a natural context. The proposed development will add to the transformation of the landscape in the local area, thus increasing the cumulative visual effect on the landscape. However the remoteness of the location lowers the overall cumulative visual impact in a wider study area context.			

3.5.2 Lighting-related Impacts

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• No lighting impacts are anticipated in the construction phase as all construction is expected to occur during daylight hours.	N/A	N/A	N/A
Operations	• Lighting at the Solar Power Plant could create a visual impact on the night-time environment by introducing new sources of lighting to a relatively unlit night-time environment. This impact would be more pronounced if lighting sources were permanently lit at night and if floodlight-type lighting was used.	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Long term (-4) **Probability: Possible** (0.5) **Significance: Low (-4)**	• Lighting of the plant at night should be limited to security lighting (where this is necessary), and emergency operational lighting must only be lit when required. • The height of any lights should be limited; more lights of lower height should be installed rather than fewer floodlights that would be visible from a wider area. • All lighting should be downward, and inward facing (towards the plant), to avoid light spill into surrounding areas.	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Long term (-4) **Probability: Possible** (0.5) **Significance: Low (-3.5)**
Decom-missioning		N/A	N/A	N/A

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Cumulative	• The proposed development will be located immediately adjacent to the Bokpoort Solar Power Facility and lighting at the new plant would increase the number of lighting sources able to be viewed from this area. Permanent lighting at the new plant would thus increase the number of light sources, albeit in a cluster rather than adding diffuse lighting sources to the landscape, further altering the overall dark night time environment to a more lit one.	**N/A**	As above for operation	N/A

3.5.3 Generation of Dust Plumes from Construction at the plant footprint

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• The construction site would not be visible to the vast majority of the receptor locations in the study area, and thus dust plumes generated at the construction site would be unlikely to cause any visual impact for the majority of the study area	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability: Possible** (0.5) **Significance: Low (-2.5)**	• It is strongly recommended that clearing of vegetation only be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in large-scale mobilisation of unconsolidated substrate by wind. • Dust suppression measures must be implemented on the construction site. • Bulk earthworks must not occur on (forecast) very windy days.	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Short term (-1) **Probability: Possible** (0.5) **Significance: Low (-2)**
Operations	N/A			
Decom-missioning	As above, for Construction	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2)	As above for construction	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2)

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
		Probability: **Possible** (0.5) **Significance: Low (-2.5)**		**Probability:** **Possible** (0.5) **Significance: Low (-2.5)**
Cumulative	• Generation of dust plumes is not incongruous to this hot arid environment, but the area surrounding the development site is not characterised by the large-scale generation of large dust plumes on a regular basis. Such an impact would not further an existing impact.	**N/A**	N/A	**N/A**

3.5.4 Generation of Dust Plumes from Construction Traffic on the access roads

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• Large numbers of heavy construction vehicles will need to access the site along public access routes to transport infrastructure components to the site. Such a large number of vehicles will greatly increase the volumes of traffic compared to the ambient traffic volumes on the Gariep District Road. Each vehicle could create a dust plume that could constitute visual intrusion or nuisance factor that could be negatively perceived by adjacent landowners in addition to concerns regarding vegetation impacts and road safety.	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability: Highly Probably** (0.75) **Significance: Low (-4.5)**	• Dust suppression measures must be implemented, especially on road stretches located within 500m of households / farmsteads located close to the access route. • Speed limits must be kept as low as possible and strictly enforced.	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-1) **Probability:** **Possible** (0.5) **Significance: Low (-2)**
Operations	N/A		•	

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Decom-missioning	As above, for Construction	**Intensity:** Moderately Low (-2) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability: Highly Probably** (0.75) **Significance: Low (-4.5)**	As above for construction	**Intensity:** Low (-1) **Extent:** Local (-2) **Duration:** Medium Short (-2) **Probability: Possible** (0.5) **Significance: Low (-2.5)**
Cumulative	• Generation of dust plumes by vehicles travelling along the Gariep District Road is typical of the study area visual environment due to the unsurfaced nature of the road. However there is currently a very low volume of traffic along this road and vehicle-generated dust plumes are accordingly highly intermittent. The increase in dust plume generation would thus not constitute a cumulative impact.	**N/A**	N/A	**N/A**

4 Conclusion

The proposed development is likely to be associated with a low to minimal degree of visual impact due mainly to the distance factor, twinned with the non-visibility of the development in large parts of the study area. The proposed development is thus very unlikely to result in the creation of a visual impact, or perceptions of visual impact by people inhabiting the sensitive receptor locations in the 10km radial area or moving transiently within the area.

Accordingly from a visual impact assessment perspective the proposed development (activity) is acceptable and should be authorised as the development will not adversely affect the visual receiving environment in a significant manner;

The following mitigation measures must be included as conditions of the environmental authorisation for the development:

- Clearing of vegetation on the construction site must be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in atmospheric conditions (wind) creating large dust plumes on the site.
- Regular dust abatement measures must be applied on the construction site, as detailed in the development's EMPr.
- Lighting of the plant at night must be limited to security lighting (where this is necessary). It is acknowledged that emergency operational lighting may be required, but this must not be permanently lit, only being lit when such emergency operational lighting is required.
- The height of any lights should be limited; more lights of lower height should be installed rather than fewer floodlights that would be visible from a wider area.
- All lighting must be downward, and inward facing (towards the plant), to avoid light spill into surrounding areas.
- Speed limits for construction vehicles, in particular heavy trucks travelling along the site access roads (including the Gariep District Road and the Transnet Railway Road), must be set, and must be rigorously enforced. It is recommended that speed limits of <50km/hr be set, especially in the vicinity of (i.e. within 500m) of households / farmsteads located close to the Gariep District Road.

No monitoring requirements for inclusion in the EMPr or environmental authorisation are proposed.

5 References

- Powergen Engineers, 2010, Panoche Valley Solar Farm Project - Glint and Glare Study; Report prepared for Solargen Energy
- Sullivan, R.G., Kirchler, L.B., McCoy, C., McCarty, J., Beckman, K., and Richmond, P, 2012, Visual Impacts of Utility-scale Solar Energy Facilities on Southwestern Desert Landscapes. National Association of Environmental Professionals 37th Annual Conference, Portland OR, May 21–24, 2012.
- United States Department of the Interior. 2013. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands. Bureau of Land Management. Cheyenne, Wyoming. 342 pp, April.

Appendix 1

Curriculum Vitae of Author

Curriculum Vitae

Paul da Cruz

Associate

Advisory Group: Smart Mobility; Environmental Services Knowledge Group

Paul offers a varied set of skills and a wide set of experience in different disciplines. He performs the role of an environmental specialist in the disciplines of freshwater (wetland) assessment, visual impact assessment and avifaunal assessment, as well as EIA project management. As the GIS specialist for the Environmental Team he undertakes GIS-based spatial analysis and has developed a GIS-based screening tool for EIA Regulation Listing Notice 3 Activities. Paul also undertakes ECO environmental auditing.

Paul's extensive wetland assessment experience was gained during work undertaken for the Mondi wetlands project and ensuing work in the consulting field in South Africa over 15 years.

He worked in the UK for three years in regulatory and water resources assessment roles for both the Environment Agency in England and SEPA. During this period he gained excellent experience and skills relating to catchment management planning, hydro-ecological risk assessment, water resource regulations and water resources strategies.

Nationality
South African / Portuguese

Years of Experience
19 years

Years with Royal HaskoningDHV
9 years

Qualifications
1998 BA (Hons) Geography and Environmental Studies, University of Witwatersrand, Johannesburg, South Africa

Professional Registrations
EAPASA
SACNASP (Cert.Sci.Nat)

Memberships
Wetland Society of South Africa

Professional experience at RHDHV (selected key projects)

Development of Environmental Management Frameworks and Exclusion Standards for: John Taolo Gaetsewe, Waterberg and uMkhanyakude Districts

> Start Date: 2019
> Client: Department of Agriculture, Land Reform and Rural Development

Position: Technical Lead for the Waterberg EMF

- Assigned Tasks: Report Writing and Supervision of all Waterberg EMF technical deliverables.
- Participated in the Stakeholder Consultation for the Project
- Part of the core sub-team responsible for developing the exclusion standards methodology and deliverables for the project.

Environmental Impact Assessment for the Establishment of a Solar Based Electricity Generation System – 100MWp Photovoltaic Plant at the Tubatse Ferrochrome Smelter, Steelpoort

> Start Date: 2021
> Client: Samancor Chrome Ltd

Position: Specialist

- Assigned Tasks: Undertook the scoping and EIAR-phase avifaunal studies.
- Provided visual impact inputs to the EIA Report
- Provided GIS analysis and mapping support for the Project

Basic Assessment for the proposed Planning & Design for the Maintenance and/or Upgrade of the Patrol Roads and Fencing on the Borders between RSA, Swaziland & Mozambique – Phases 1& 2

> Start Date: 2017
> Client: National Department of Public Works

Position: BA Project Manager for Phase 1 and Freshwater (Wetland) Specialist for the Phase 1&2 Projects

- Assigned Tasks: Undertook the wetland component of the Freshwater Study for the project (Phases 1&2).
- Managed the Basic Assessment Process for the Phase 1 component (KZN-Mozambique border)
- Provided GIS analysis and mapping support for the Phases 1&2 BA and WULA Processes
- Undertook the Application for Amendment of the Phase 1 Environmental Authorisation (2020)

ESIA for the proposed NEO1 20MW Photovoltaic Power (PV) Generation Development Project in Mafeteng, Lesotho

> Start Date: 2018
> Client: One Power Consortium

Position: Freshwater (Wetland) Specialist

- Assigned Tasks: Undertaking the Freshwater Study for the ESIA
- Compilation of a Post-authorisation wetland rehabilitation plan and monitoring protocol
- Undertaking the Visual Impact Assessment for the ESIA.

EIA for the P166 Bypass Road in Mbombela

> Start Date: 2012
> Client: Endecon Ubuntu (SANRAL)

Position: EIA Project Manager and Specialist

- Assigned Tasks: Managed the EIA, including tasks such as overseeing the public participation process and compiling the EIA Report.
- As a specialist undertook the Visual and Surface Water Specialist Studies

EIA for the Underground Coal Gasification (UCG) Project at the Majuba Power Station, Mpumalanga

> Start Date: 2008
> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the detailed wetland impact and functional assessments.
- Updating of the visual impact assessment.

Royal HaskoningDHV

Environmental Impact Assessment (EIA) and Waste Management Licence for the Matimba Power Station Ash Disposal Facility, South Africa

> Start Date: 2012

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the Visual Specialist Study in support of the EIA
- Undertook the Surface Water Specialist Study for the Water Use Licence.

Basic Assessment for the Proposed Ten New PV Solar Developments at the Bokpoort Farm near Groblershoop, Northern Cape

> Start Date: 2019

> Client: ACWA Power

Position: Specialist

- Undertook the surface water specialist study

EIA for the proposed 100MW Concentrated Solar Power Plant in Groblershoop, South Africa

> Start Date: 2014

> Client: Lereko Metier Capital Growth Fund Manager (Pty) Ltd

Position: Specialist

- Assigned Tasks: Undertook the visual impact assessment study
- Undertook the surface water specialist study

Proposed Forest Park Apartments Residential Development in La Lucia, eThekwini Municipality

> Start Date: 2019

> Client: Penguin Property Investments

Position: Specialist

- Assigned Tasks: Undertook the Freshwater Study (Wetland and Riparian Delineation)

Construction of the LongLake Logistics Park Development, Modderfontein, Johannesburg

> Start Date: 2019

> Client: Fortress Investments

Position: Environmental Control Officer (ECO)

- Assigned Tasks: Undertaking the ECO (environmental auditing) of the construction site for a period of 12 months.

Geometric Improvements to 11 Intersections in the City of Johannesburg

> Start Date: 2019

> Client: Johannesburg Roads Agency (JRA)

Position: Environmental Control Officer (ECO)

- Assigned Tasks: Compiled EMPrs for the Northern and Southern Contract Sites
- Undertook the ECO (environmental auditing) of the intersection upgrade sites.

Development of Precinct Plans for the Port Elizabeth and East London Airports

> Start Date: 2019

> Client: Airports Company South Africa (ACSA)

Position: Specialist

- Assigned Tasks: Undertaking the Surface Water and Terrestrial Ecology Component of the Precinct Planning

Development of Precinct Plans for the Ekurhuleni Metropolitan Municipality

> Start Date: 2017

> Client: Ekurhuleni Metropolitan Municipality

Position: Specialist

- Assigned Tasks: Undertook the Surface Water and Terrestrial Ecology Component of the Precinct Planning

Royal HaskoningDHV

Route Determination for Various K-Route Roads in Gauteng Province

> Start Date: 2017

> Client: Gauteng Department of Roads and Transport

Position: Freshwater Specialist

- Assigned Tasks: Undertaking the Surface Water Component of the Environmental Screening Studies of the various planned routes

Basic Assessment and Water Use Application for decommissioning and replacement of a section of the Firham-Platrand Power Line, Mpumalanga

> Start Date: 2017

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertaking the Freshwater (wetland) study for the BA and WUA processes, including the compilation of a wetland rehab plan and risk assessment

Basic Assessment for the Development of a Battery Storage Site (Substation) near Mount Fletcher, Eastern Cape

> Start Date: 2018

> Client: Eskom Holdings Limited

Position: Freshwater Specialist

- Assigned Tasks: Undertook the Freshwater Study (wetland assessment) for the Project

Basic Assessment and Water Use Application for the new Lydenburg - Merensky 132kV Power Line, South Africa

> Start Date: 2013

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertaking the Surface Water, Avifaunal and Visual Studies for the Basic Assessment

Basic Assessment for the Proposed Waterborne Sewer in Mayflower Village, South Africa

> Start Date: 2014

> Client: Mpumalanga Department of Rural Development

> Position: Specialist

- Assigned Tasks: Undertook the surface water (wetland delineation) specialist study for the Basic Assessment

Basic Environmental Impact Assessment for the Development of Mzinti Feedlot at Nkomazi Local Municipality, South Africa

> Start Date: 2014

> Client: Mpumalanga Department of Rural Development

Position: Specialist

- Assigned Tasks: Undertook the surface water (wetland delineation) specialist study for the Basic Assessment

Basic Assessment for the Eskom 132kV Power Line from Mbumbu Substation to the Proposed Tsakani Substation, Mpumalanga, South Africa

> Start Date: 2014

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the visual and surface water specialist studies as part of the Basic Assessment.

Kwameyi-Teekloof Water Supply - Wetland Delineation Study, South Africa

> Start Date: 2014

> Client: Isambulluo Environmental Consultants (Sibgem Management and Consulting Engineering)

Position: Project Manager & Specialist

- Assigned Tasks: Undertook the wetland assessment and delineation study for a proposed bulk water supply project in the Harding area, KZN

Design, Construction & Rehabilitation Work at Rietspruit Dam, Ventersdorp, South Africa

> Start Date: 2014

> Client: Department of Water Affairs and Forestry

Position: Specialist

- Assigned Tasks: Undertook a wetland delineation assessment as part of an environmental screening study

Impendle Bulk Water Supply Investigation, KZN

> Start Date: 2011

> Client: uMgungundlovu District Municipality

> Project Value: R185,000,000.00

Position: Specialist

- Assigned Tasks: Undertook wetland assessments (Wetland Health and Functionality Assessments) in support of the Water Use Licence

Royal HaskoningDHV

75MW CSP project in Bokpoort, South Africa

> Start Date: 2013

> Client: ACWA Power Solafrica Bokpoort CSP Power Plant (Pty) Ltd

Position: Specialist

- Assigned Tasks: Undertook the Surface Water Study for a proposed water pipeline, in support of the BA

Gamma-Kappa 765kV Power Line EIA, South Africa

> Start Date: 2012

> Client: Nzumbulo Heritage Solutions

Position: Surface Water Specialist

- Assigned Tasks: Undertook the Surface Water Study.

Luiperdshoek Basic Assessment (BA) and Water Use Licence Application (WULA) for Eskom, South Africa

> Start Date: 2012

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the Avifaunal study in support of the Basic Assessment

Basic Assessment (BA) and Environmental Management Programme Report (EMPR) Amendment for Black Mountain Mine, South Africa

> Start Date: 2012

> Client: Black Mountain Mining (Pty) Ltd

Position: Specialist

- Assigned Tasks: Visual Impact Assessment Specialist Input.

Basic Assessment (BA) for the proposed 23 km 132KV line from Kliphoek to Panbult, South Africa

> Start Date: 2012

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the Wetland and Avifauna Specialist Studies

Ekangala Quarry Mining Application and S24G Rectification

> Start Date: 2012

> Client: City of Tshwane Metropolitan Municipality

Position: Specialist

- Assigned Tasks: Undertook the wetland delineation study and compiled the Wetland Rehabilitation Plan

Wetland Assessment Specialist Study for proposed Letaba NDP projects in Limpopo Province

> Start Date: 2012

> Client: Nzumbulo Heritage Solutions

- Assigned Tasks: Undertook the Surface Water Study.

Mooidraai - Smitskloof 132/22kV Environmental Impact Assessment, South Africa

> Start Date: 2012

> Client: Eskom Holdings SOC Ltd

Position: Specialist

- Assigned Tasks: Undertook the Avifaunal Study

EIA for the proposed Upgrade to the Mkuze Airport

> Start Date: 2016

> Client: Umhlosinga Development Agency (KZN Treasury)

Position: Visual Impact Specialist

- Assigned Tasks: Undertook the Visual Impact Assessment for the Project

Royal HaskoningDHV

Appendix 2

DFFE Screening Tool Reports

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: TBD

Project name: Afrikaana ICE

Project title: Afrikaans ICE

Date screening report generated: 23/11/2021 14:27:04

Applicant: ACWA Power

Compiler: RHDHV

Compiler signature:

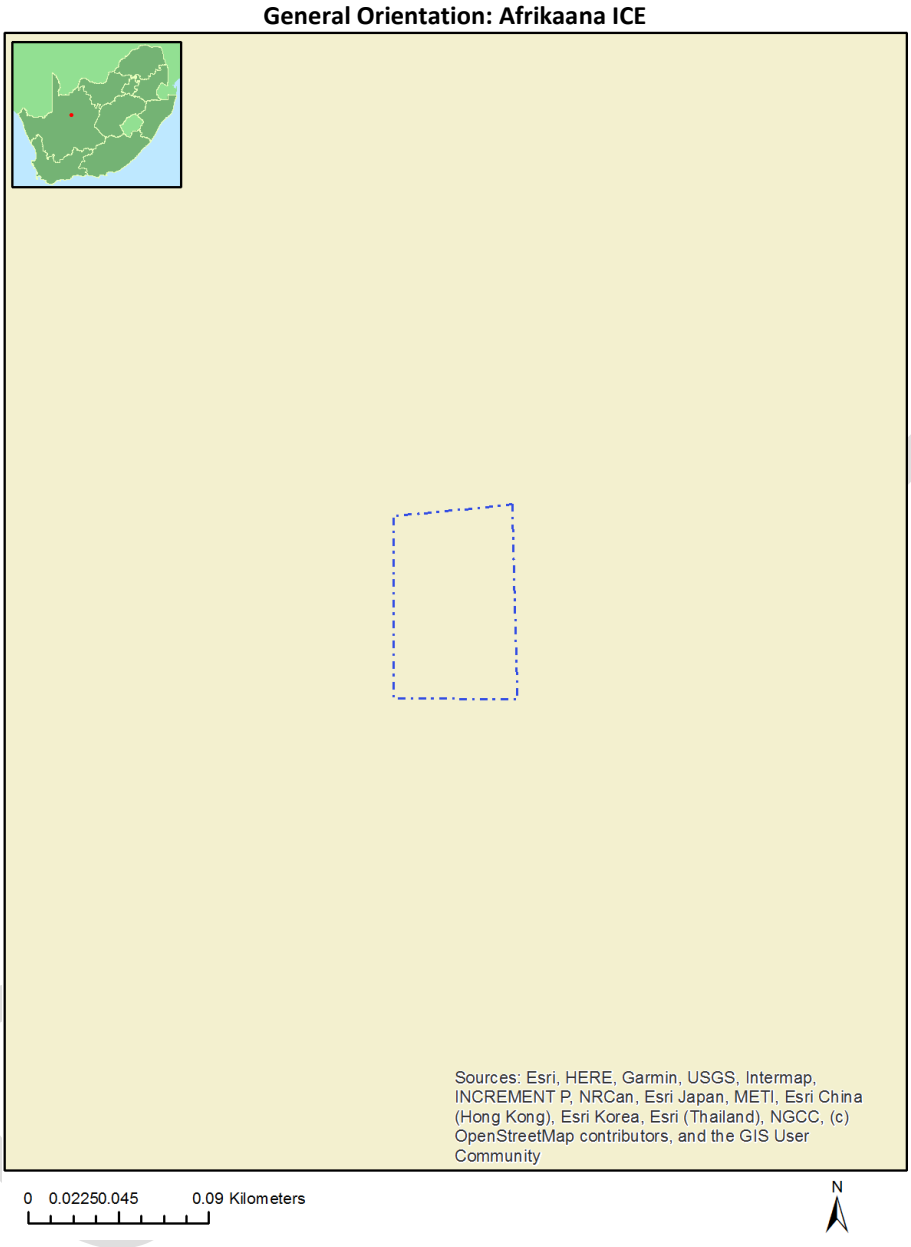
.....

Application Category: Utilities Infrastructure|Electricity|Generation|Non Renewable|Hydrocarbon|Petroleum

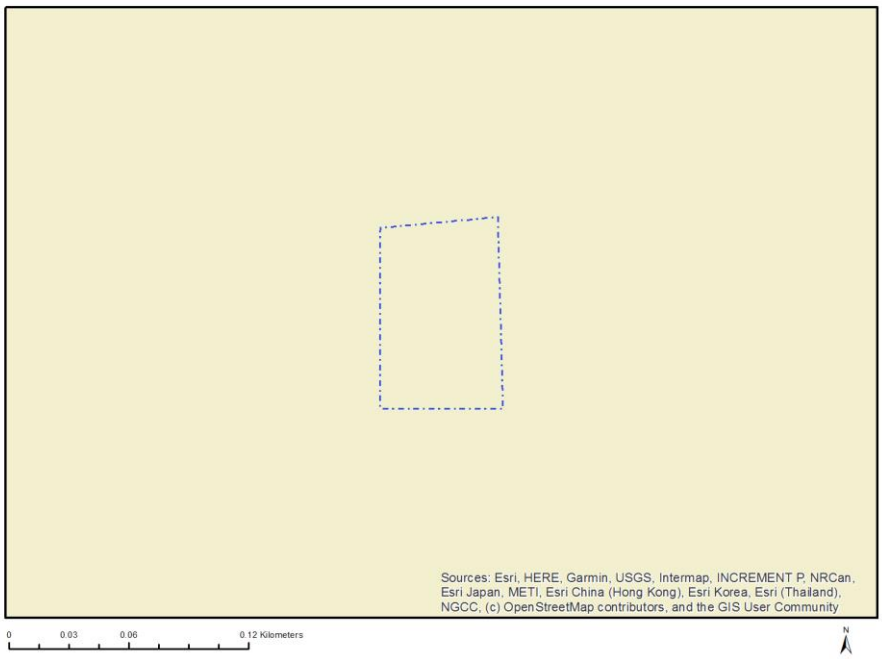
Table of Contents

Proposed Project Location

Orientation map 1: General location



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	BOKPOORT	390	0	28°45'6.43S	21°57'44.97E	Farm
2	BOKPOORT	390	0	28°42'26.6S	22°0'14.79E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

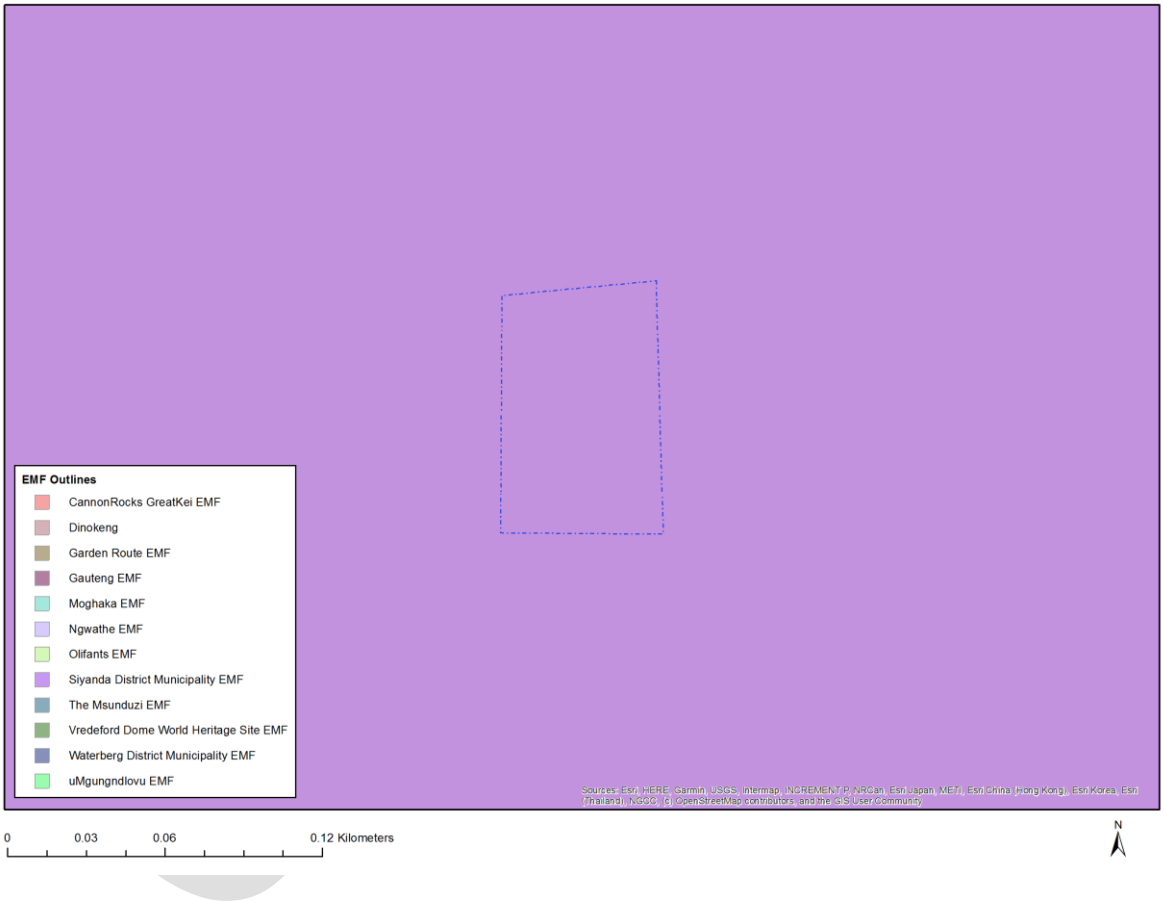
Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/1/2145/AM1	Solar PV	Approved	0
2	14/12/16/3/3/2/802	Solar PV	Approved	0
3	14/12/16/3/3/1/2143	Solar PV	Approved	0
4	14/12/16/3/3/2/880	Solar PV	Approved	0
5	12/12/20/1920	Solar CPV	Approved	0
6	14/12/16/3/3/1/2150	Solar PV	Approved	0

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

7	14/12/16/3/3/1/2145	Solar PV	Approved	0
8	14/12/16/3/3/1/2148	Solar PV	Approved	0
9	14/12/16/3/3/2/805	Solar PV	Approved	0
10	14/12/16/3/3/1/2151	Solar PV	Approved	0
11	14/12/16/3/3/1/2146	Solar PV	Approved	0
12	14/12/16/3/3/1/2142	Solar PV	Approved	0
13	14/12/16/3/3/2/804	Solar PV	Approved	0
14	14/12/16/3/3/2/881	Solar PV	Approved	0
15	12/12/20/2583	Solar PV	Approved	29
16	14/12/16/3/3/2/879	Solar CSP	Approved	0
17	14/12/16/3/3/2/801	Solar CSP	Approved	0
18	14/12/16/3/3/2/803	Solar PV	Approved	0
19	14/12/16/3/3/2/800	Solar CSP	Approved	0

Environmental Management Frameworks relevant to the application



Environmental Management Framework	LINK
Siyanda District Municipality EMF	https://screening.environment.gov.za/ScreeningDownloads/EMF/SIYANDA_EMF_REPORT_2008.doc

Environmental screening results and assessment outcomes

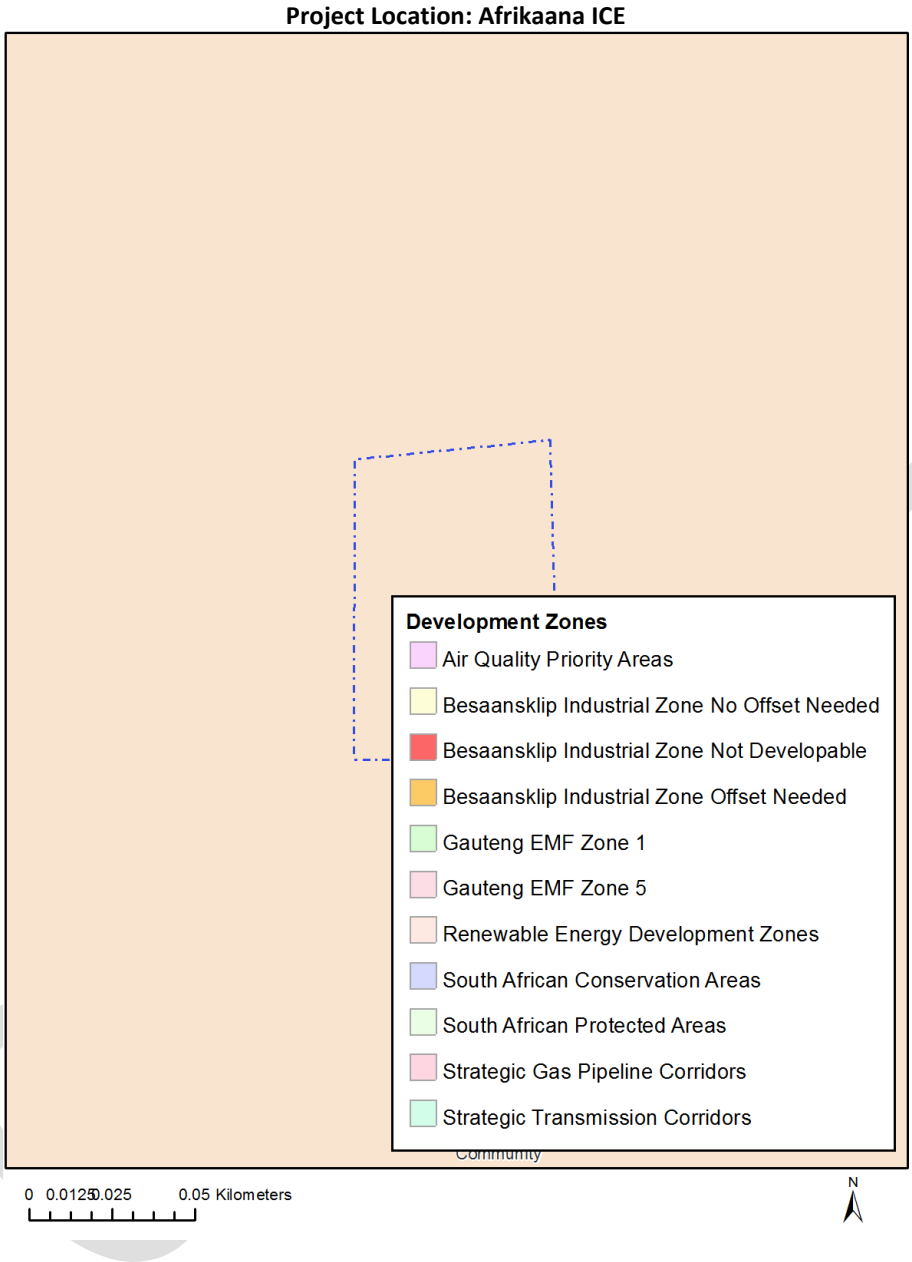
The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Electricity|Generation|Non Renewable|Hydrocarbon|Petroleum**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Strategic Transmission Corridor-Northern corridor	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_EGI.pdf
Renewable energy development zones 7-Upington	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_REDZ.pdf

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones



Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme				X
Animal Species Theme			X	

Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme				X
Defence Theme				X
Paleontology Theme			X	
Plant Species Theme				X
Terrestrial Biodiversity Theme				X

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
7	Hydrology	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols

	Assessment	/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf
9	Traffic Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Climate Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Health Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
13	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
14	Ambient Air Quality Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
15	Air Quality Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
16	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
17	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

Unable to obtain map image.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

Unable to obtain map image.

Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP)

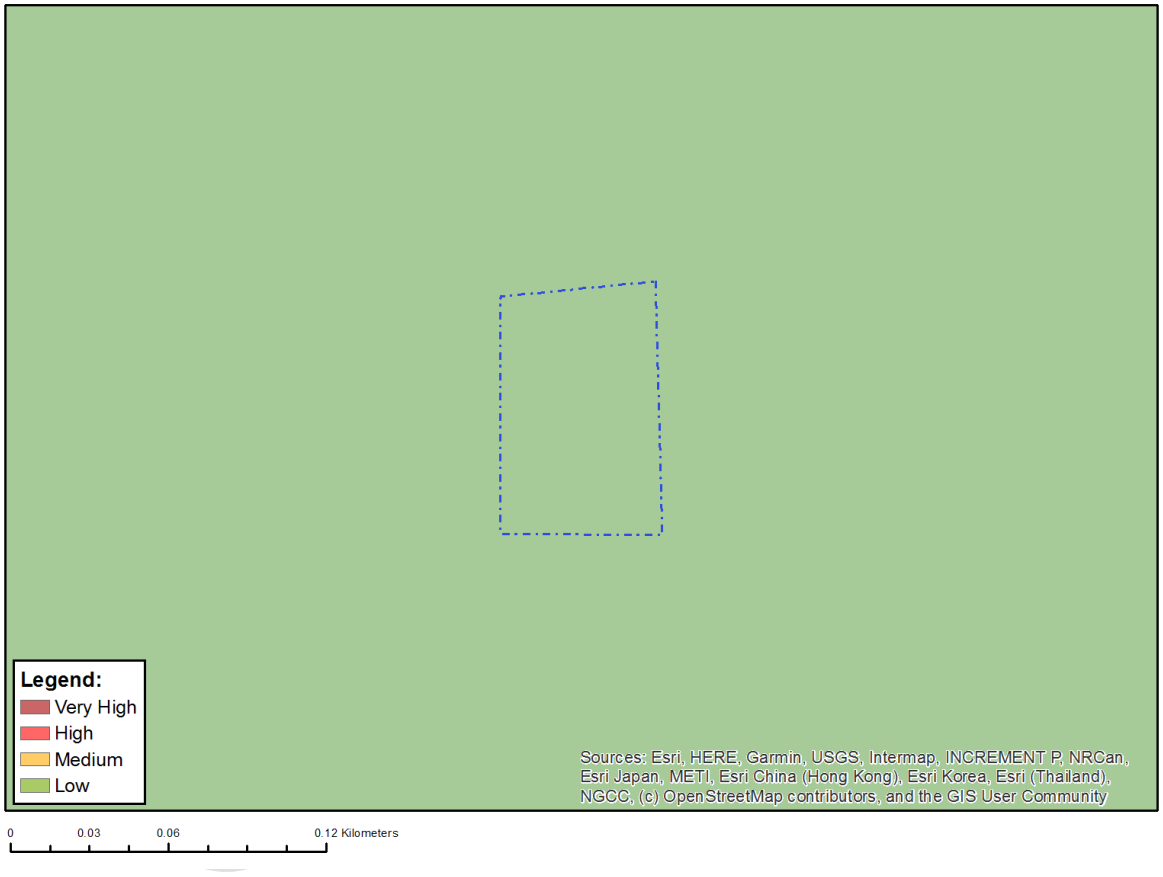
or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Aves-Neotis ludwigii

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

Unable to obtain map image.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

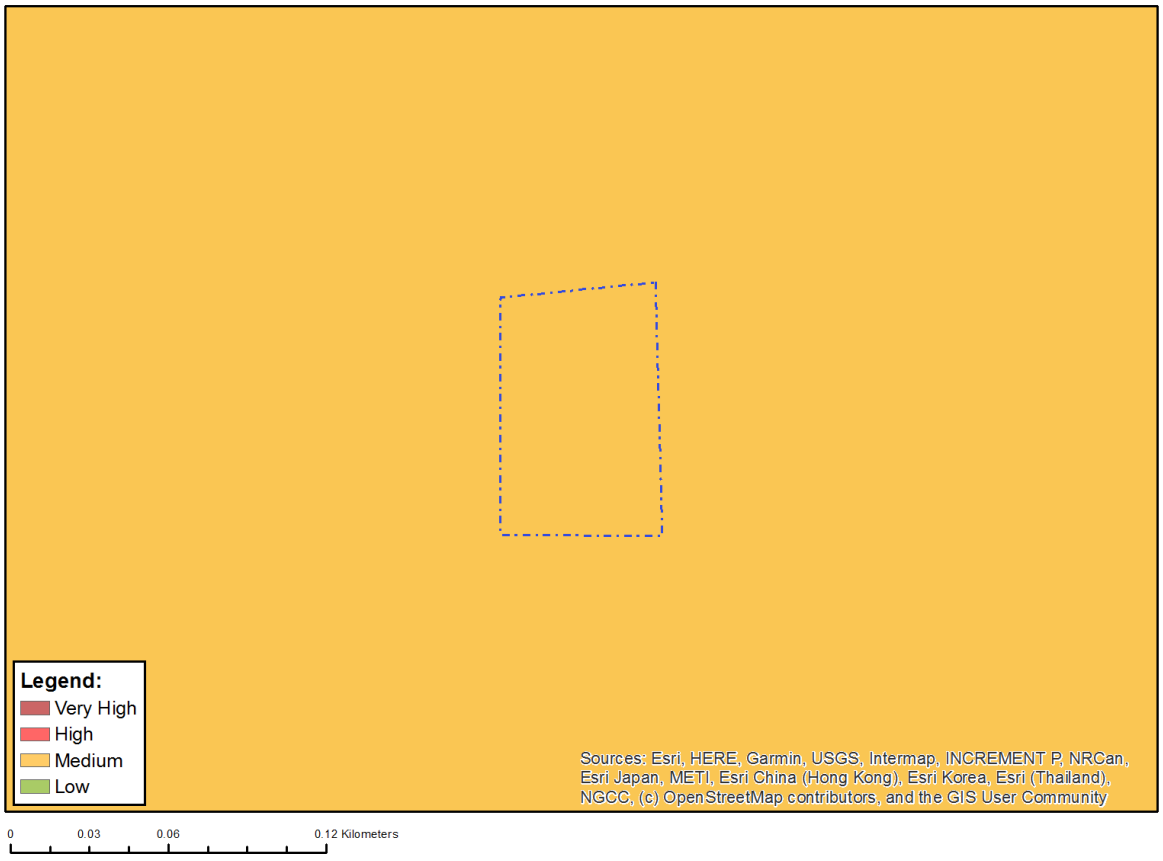
MAP OF RELATIVE DEFENCE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: TBD

Project name: Sotho ICE

Project title: Sotho ICE

Date screening report generated: 23/11/2021 14:52:27

Applicant: ACWA Power

Compiler: RHDHV

Compiler signature:

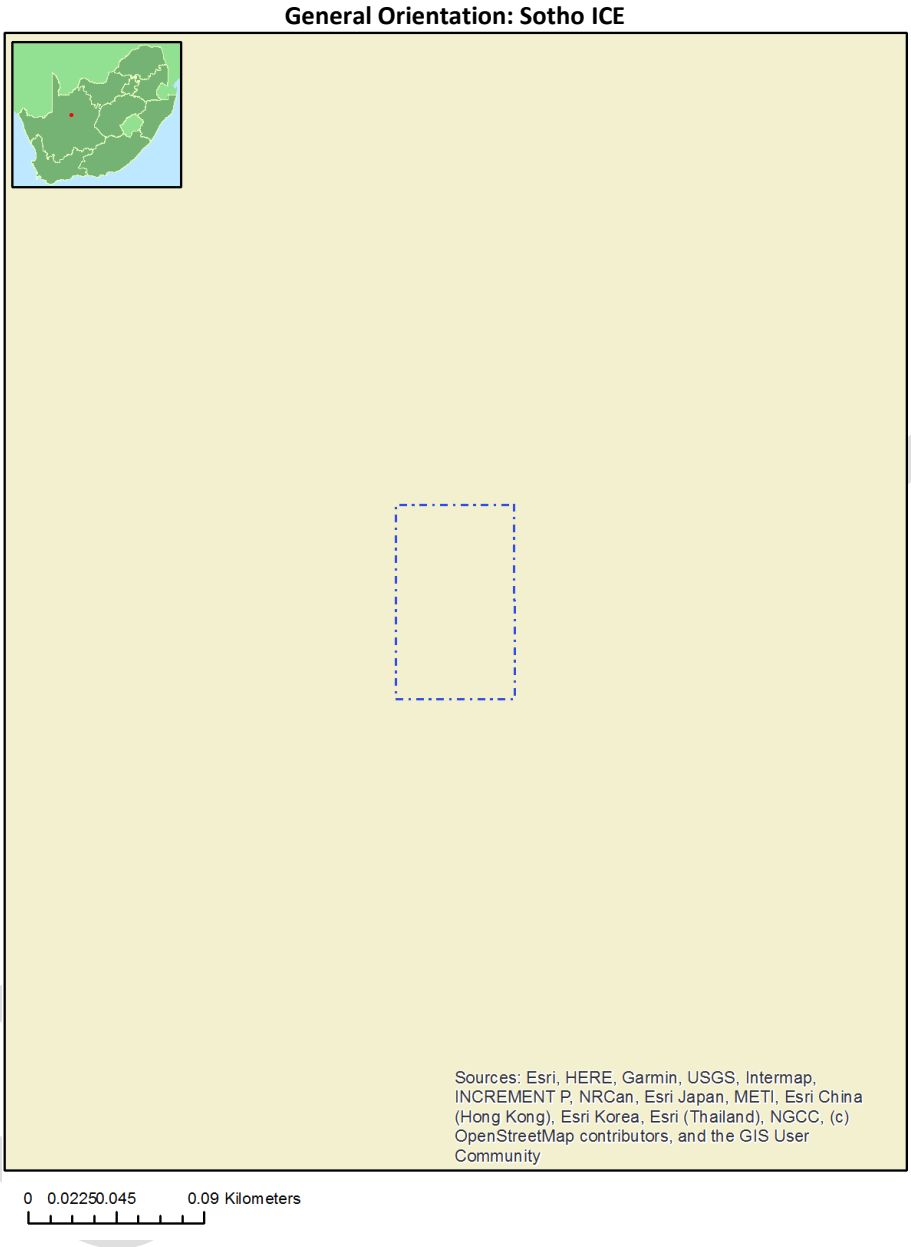
.....

Application Category: Utilities Infrastructure|Electricity|Generation|Non Renewable|Hydrocarbon|Petroleum

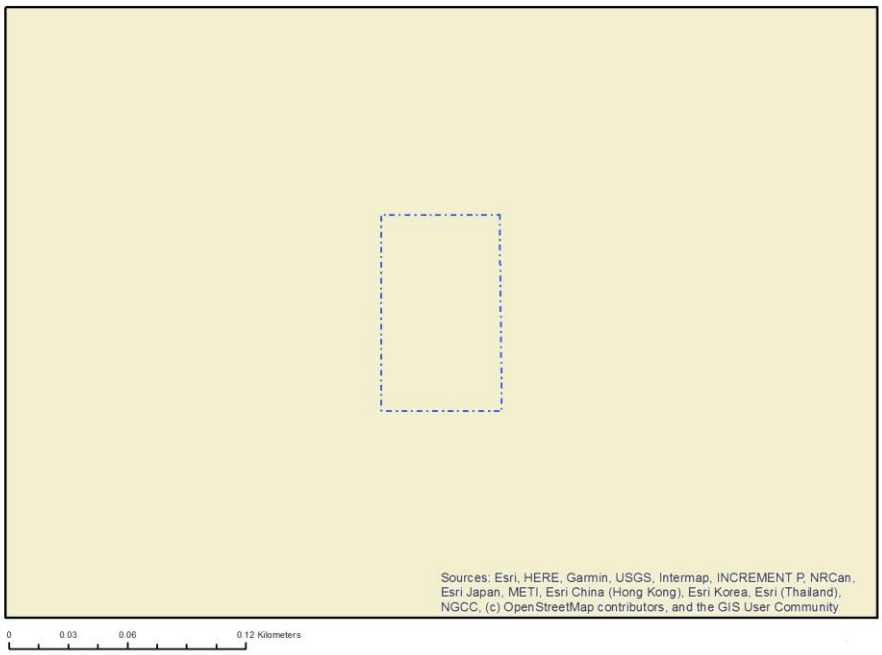
Table of Contents

Proposed Project Location

Orientation map 1: General location



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	BOKPOORT	390	0	28°45'6.43S	21°57'44.97E	Farm
2	BOKPOORT	390	0	28°42'26.6S	22°0'14.79E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/1/2145/AM1	Solar PV	Approved	0
2	14/12/16/3/3/2/802	Solar PV	Approved	0
3	14/12/16/3/3/1/2143	Solar PV	Approved	0
4	14/12/16/3/3/2/880	Solar PV	Approved	0
5	12/12/20/1920	Solar CPV	Approved	0
6	14/12/16/3/3/1/2150	Solar PV	Approved	0

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

7	14/12/16/3/3/1/2145	Solar PV	Approved	0
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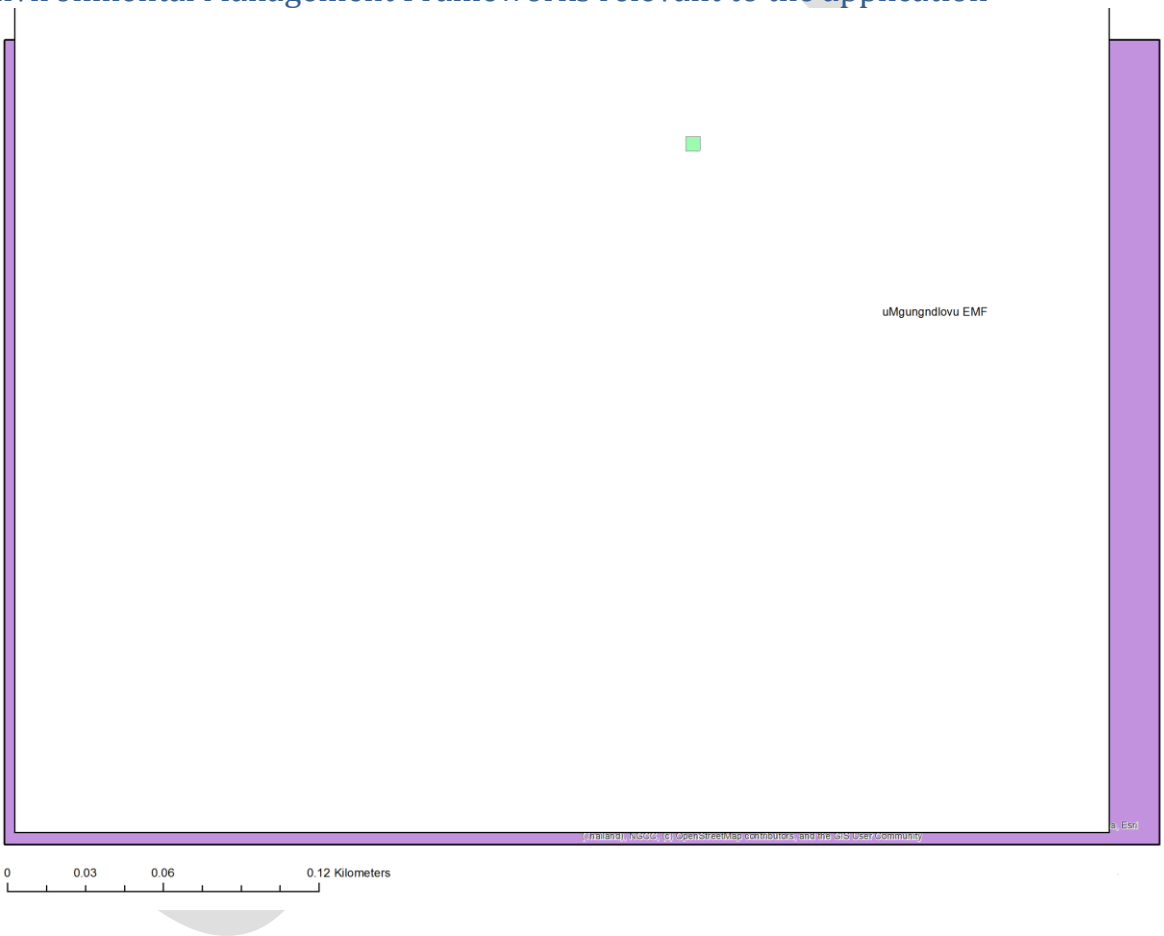
9	14/12/16/3/3/2/805	Solar PV	Approved	0
10	14/12/16/3/3/1/2151	Solar PV	Approved	0
11	14/12/16/3/3/1/2146	Solar PV	Approved	0
12	14/12/16/3/3/1/2142	Solar PV	Approved	0
13	14/12/16/3/3/2/804	Solar PV	Approved	0
14	14/12/16/3/3/2/881	Solar PV	Approved	0
15	12/12/20/2583	Solar PV	Approved	27.9
16	14/12/16/3/3/2/879	Solar CSP	Approved	0
17	14/12/16/3/3/2/801	Solar CSP	Approved	0
18	14/12/16/3/3/2/803	Solar PV	Approved	0
19	14/12/16/3/3/2/800	Solar CSP	Approved	0

Environmental Management Frameworks relevant to the application



Environmental Management Framework	LINK
Siyanda District Municipality EMF	https://screening.environment.gov.za/ScreeningDownloads/EMF/SIYANDA_EMF_REPORT_2008.doc

Environmental screening results and assessment outcomes

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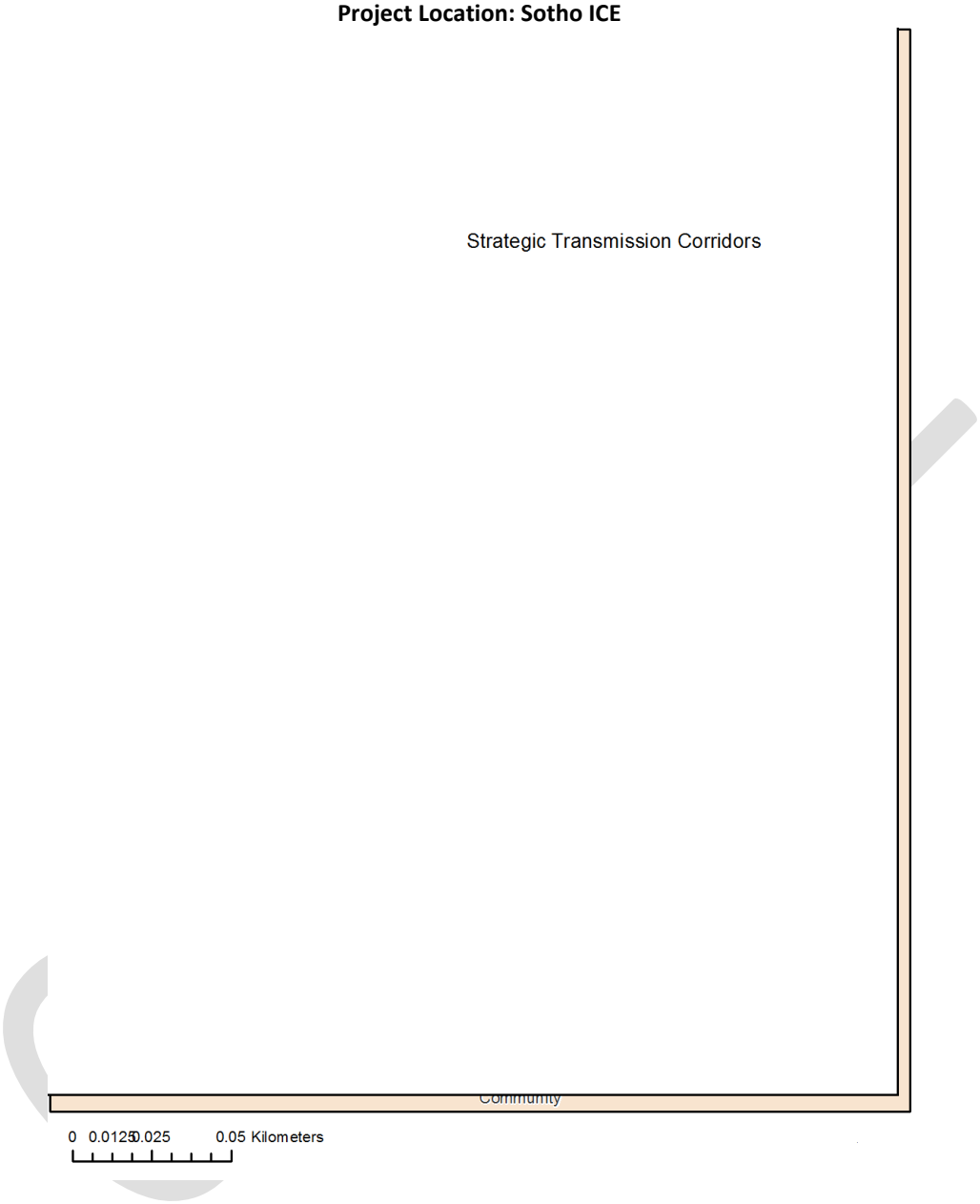
The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Strategic Transmission Corridor-Northern corridor	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_EGI.pdf
Renewable energy development zones 7-Upington	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_REDZ.pdf

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones

Project Location: Sotho ICE



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The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme				X
Animal Species Theme			X	

Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme				X
Defence Theme				X
Paleontology Theme			X	
Plant Species Theme				X
Terrestrial Biodiversity Theme				X

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

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4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
7	Hydrology	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols

	Assessment	/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf
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11	Climate Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Health Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
13	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
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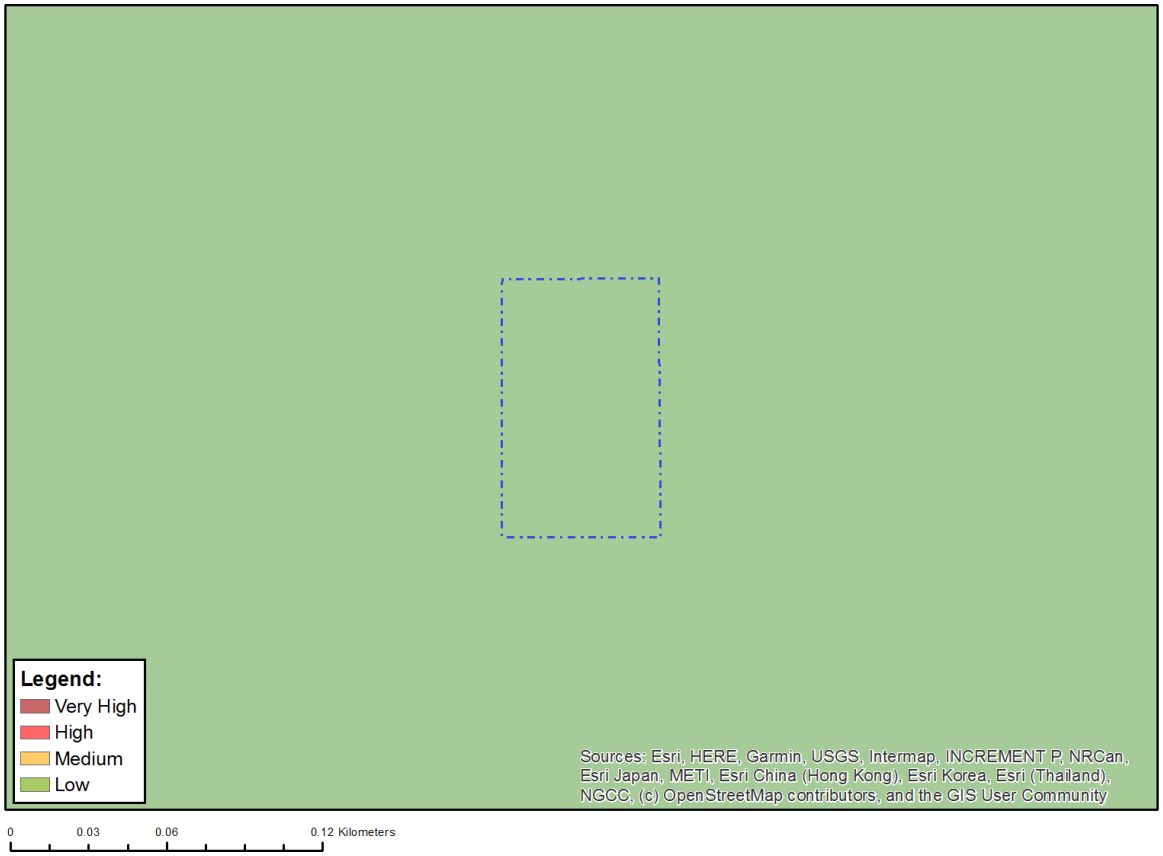
Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

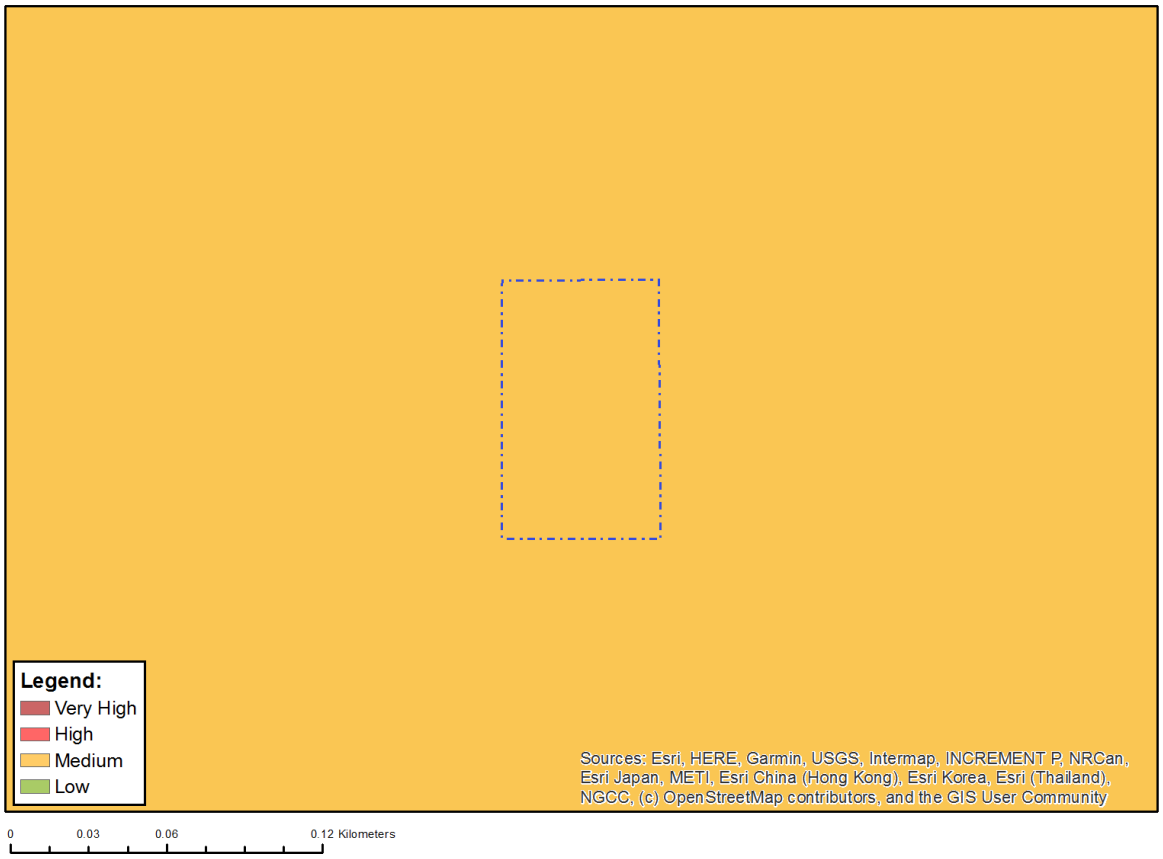


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



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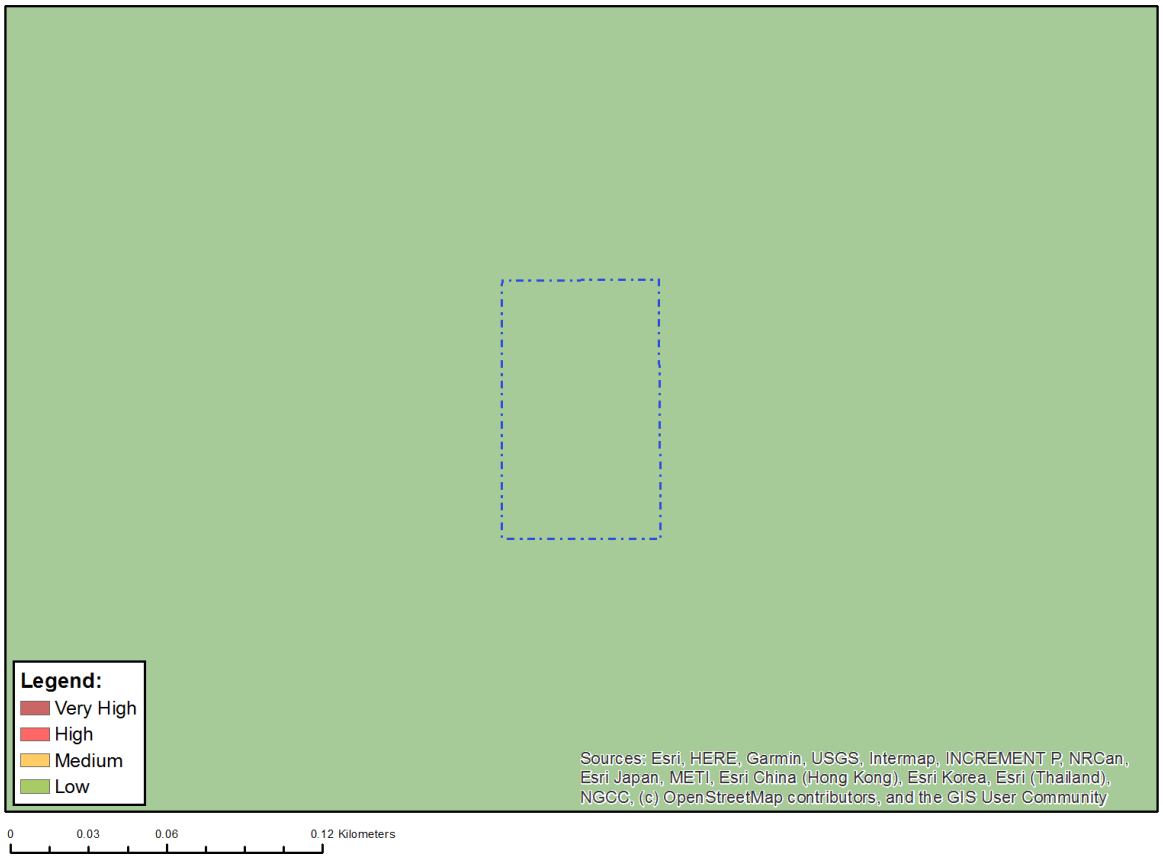
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Aves-Neotis ludwigii

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

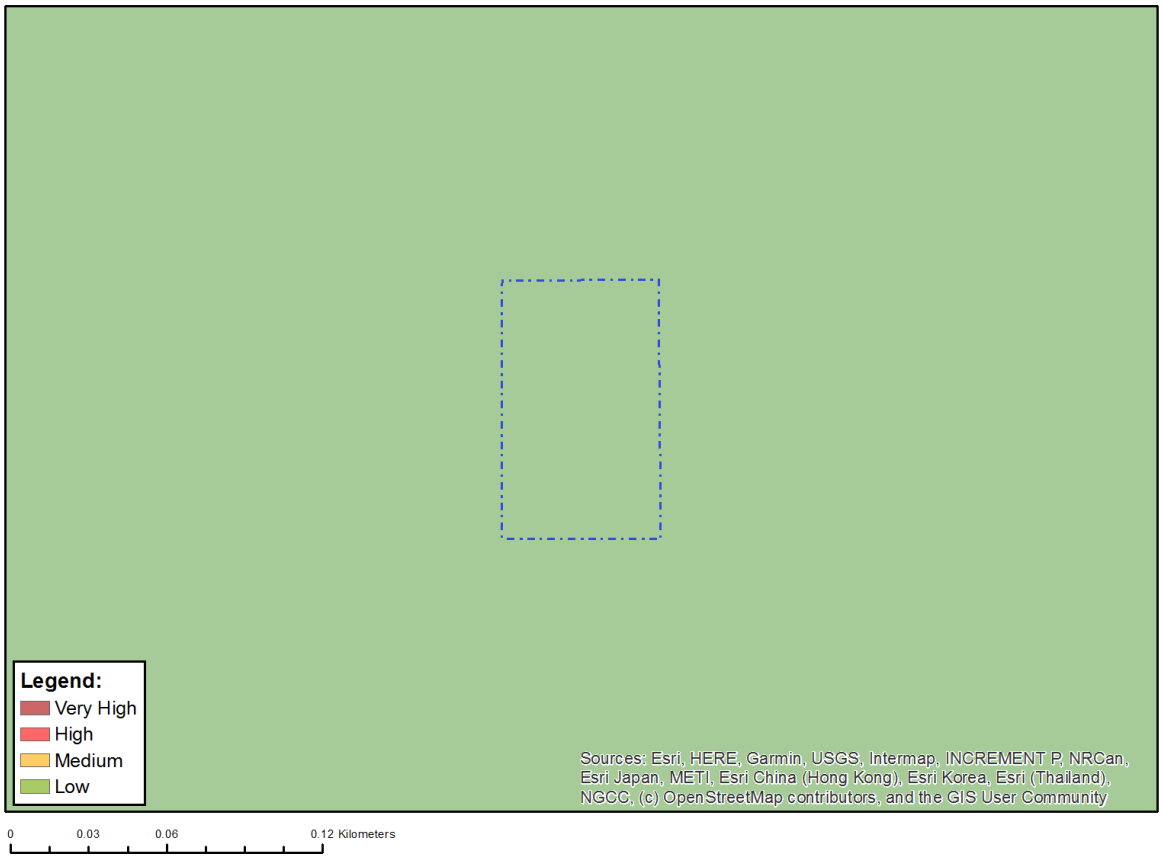
MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY

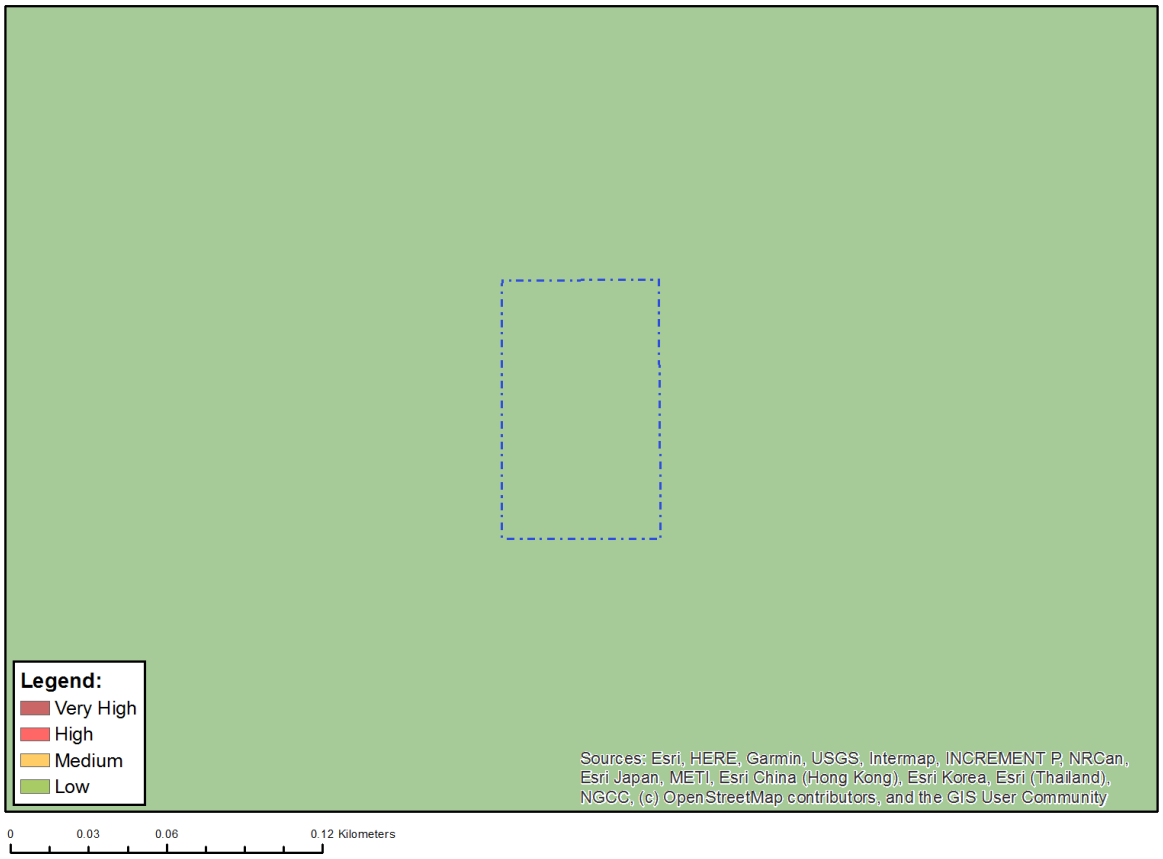


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE DEFENCE THEME SENSITIVITY

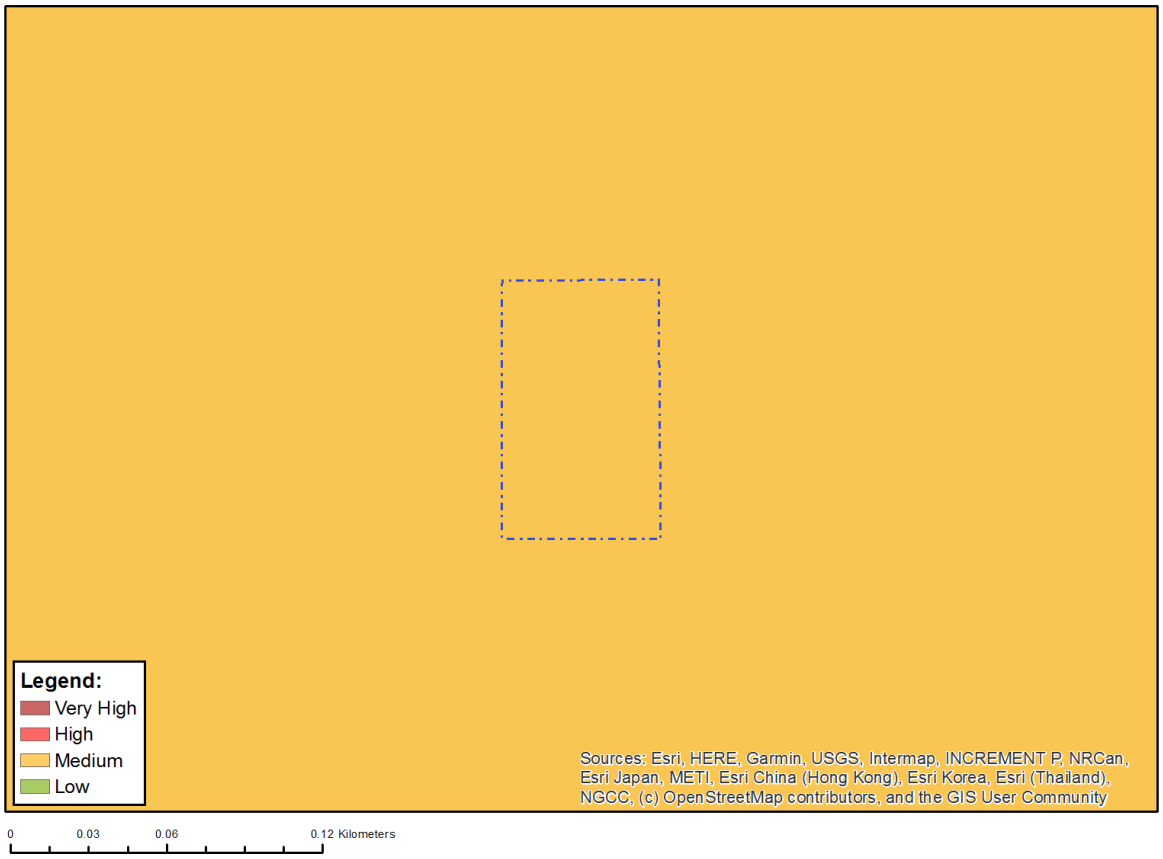


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

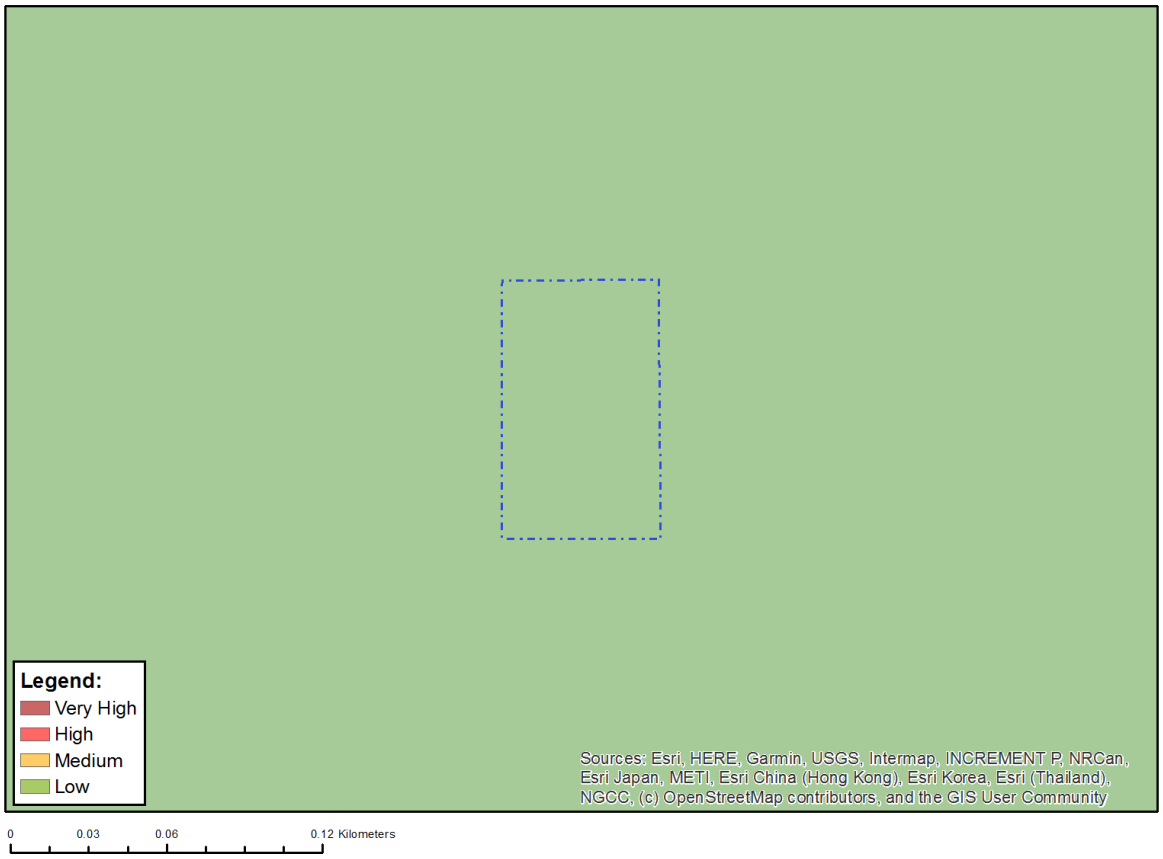


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



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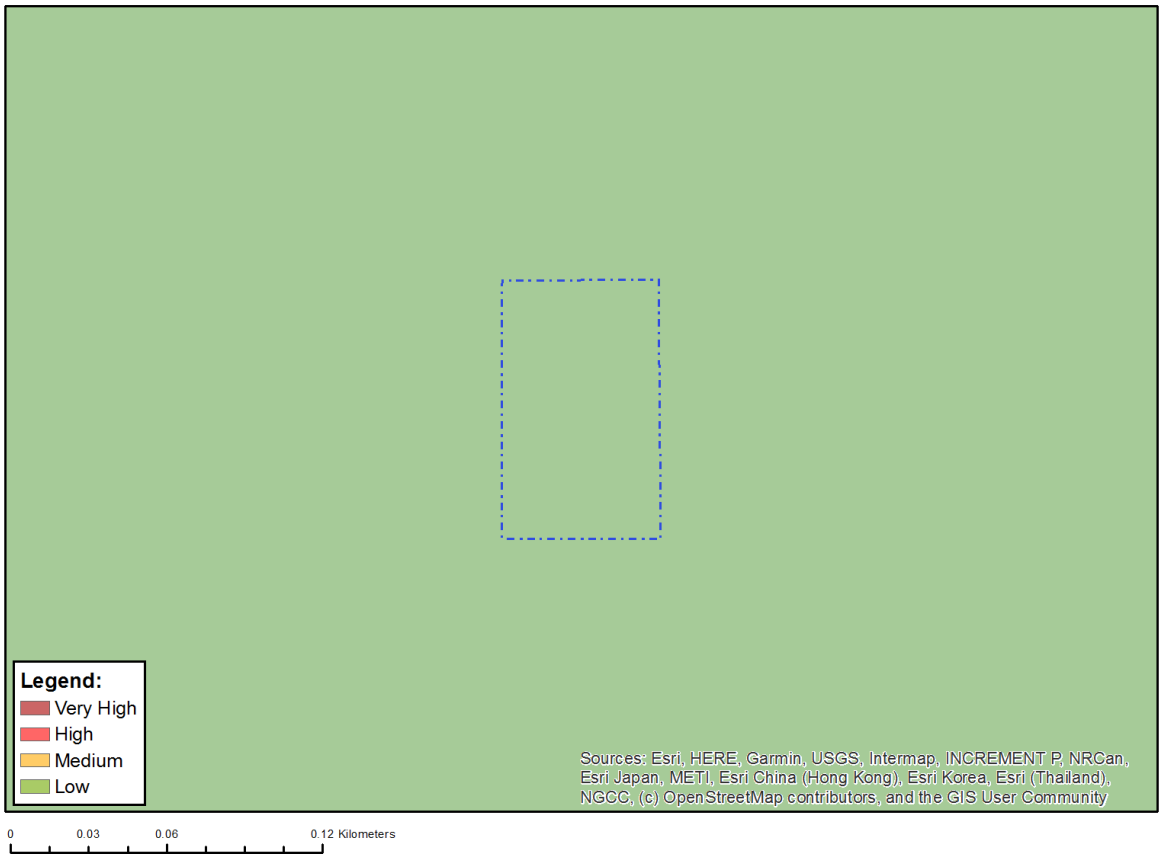
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

With its headquarters in Amersfoort, The Netherlands, Royal HaskoningDHV is an independent, international project management, engineering and consultancy service provider. Ranking globally in the top 10 of independently owned, nonlisted companies and top 40 overall, the Company's 6,000 staff provide services across the world from more than 100 offices in over 35 countries.

Our connections

Innovation is a collaborative process, which is why Royal HaskoningDHV works in association with clients, project partners, universities, government agencies, NGOs and many other organisations to develop and introduce new ways of living and working to enhance society together, now and in the future.

Memberships

Royal HaskoningDHV is a member of the recognised engineering and environmental bodies in those countries where it has a permanent office base.

All Royal HaskoningDHV consultants, architects and engineers are members of their individual branch organisations in their various countries.

Integrity

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ETHIC Intelligence
CERTIFICATE ANTI-CORRUPTION COMPLIANCE SYSTEM

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Royal HaskoningDHV
Enhancing Society Together

INDEPENDENT PEER REVIEW

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Basic Assessment for the Proposed Development of Seven 9.9MW Internal Combustion Engines (ICE) on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:
B-BBEE

Specialist name:
Specialist Qualifications:
Professional affiliation/registration:
Physical address:
Postal address:
Postal code:
Telephone:
E-mail:

2. DECLARATION BY THE SPECIALIST

I, Lourens du Plessis, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Lourens du Plessis, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

[redacted]

Sig

t/a

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20

Da

Sig

a

Date

SOUTH AFRICAN POLICE SERVICE
GARSFONTEIN
2020 -12- 08
COMMUNITY SERVICE CENTRE
SUID-AFRIKAANSE POLISIEDIENS

Lourens du Plessis t/a LOGIS
[redacted]

7 December 2020

Acwa Power
Care of Lusani Madali

[redacted]

Dear Lusani

ADDENDUM

Part 2 Amendment Process for the Development of Eight 200MW PV Plants on the Farm Bokpoort in the Northern Cape Province

1. Background

This letter serves as an addendum to the peer review (13 May 2020) of a Visual Impact Assessment (VIA) report for the *Bokpoort 2 Visual Addendum* (document short title) originally undertaken by Paul da Cruz from Royal Haskoning DHV (Pty) Ltd.

2. Purpose of the Amendment Process

Acwa Power is proposing the construction and operation of an additional seven individual 9.9MW Internal Combustion Engines (ICE) and wishes to enter it as such into the project description of the Environmental Authorisation (EA).

3. Project Description

Acwa Power proposes to develop eight Photovoltaic (PV) Solar Energy Facilities (SEFs) on the Farm Bokpoort 390 located north of the town Groblershoop in the Northern Cape Province. The proposed facility is located within the Upington Renewable Energy Development Zone (REDZ 7).

Each proposed PV Facility will have total maximum output capacity of 200MW, and will include the following:

- Inverters that convert direct current (DC) generated by the PV modules into alternating current (AC) to be exported to the electrical grid;
- A transformer that raises the system AC low voltage (LV) to medium voltage (MV). The transformer converts the voltage of the electricity generated by the PV panels to the correct voltage for delivery to Eskom;
- Transformer substation; and

- Instrumentation and control consisting of hardware and software for remote plant monitoring and operation of the facility.

  Associated infrastructure includes:

- Mounting structures for the solar panels will be either rammed steel piles (preferred solution in terms of piles with pre-manufactured concrete footings to support the PV panels;

- Cabling between the structures, to be lain underground where practical;

- A new 132kV overhead powerline which will connect the facility to the National Grid via Eskom's existing Garona Substation. The powerlines vary in length and will be located within a servitude spanning 15.5m meters on both sides. The powerline towers will be 35m high;

- Battery Energy Storage System (BESS) - battery Power at Point of Connection: 150MW, area required: 16ha; the BESS will store approximately 4500m3 of hazardous substance;

- One water pipeline connection from the river (previously authorised) and different metering points at individual PV plants;

- Internal access roads (4 – 6 m wide roads will be constructed but existing roads will be used as far as possible) and fencing (approximately 3m in height); and

- Shared infrastructure consisting of buildings, including a workshop area for maintenance, storage (i.e. fuel tanks, etc.), laydown area, parking, warehouse, and offices (previously approved).

  Proposed additional infrastructure includes:

- Seven individual Internal Combustion Engines (reciprocating engines) with the following specifications:

  - Generating capacity: 9.9MW
  - Fuel Type: LPG/LNG or diesel
  - Stack height: 50-70m
  - Number of engines: one for each plot (it is subject to the engine size, various load size available in the market)
  - Fuel storage tanks: five for each plot
  - Fuel volume: 500m^3
  - Water requirements: limited water for cooling
  - Area size: 1.5ha

- **Conclusion and Recommendations**

The addition of the ICE is not expected to significantly alter the area of potential visual exposure and is therefore **not expected to significantly alter** the influence of the Solar Energy Facility (SEF) on *areas of higher viewer incidence* (observers traveling along the national, arterial/main, or major secondary roads within the region) or *potential sensitive visual receptors* (residents of homesteads in close proximity to the SEF).

In consideration of the proposed addition of the ICE, there is no (zero) change to the significance rating compared with the original Environmental Impact Assessment (EIA) VIA report and no additional visual impacts are envisaged. In addition to this, no new mitigation measures are required.

The proposed amendment is expected to have a neutral effect from a visual impact perspective i.e. no advantages or disadvantages are expected.

It is therefore suggested that the proposed amendment allowing for the addition of the ICE be supported, subject to the conditions and recommendations as stipulated in the original Environmental Authorisation, and according to the Environmental Management Programme and suggested mitigation measures, as provided in the original VIA report.

Feel free to contact me at any time, should you have any queries.

Kind regards,

Lourens du Plessis (PrGISc)

LM du Plessis
Professional Geographical Information Science Practitioner (PrGISc)
Registered with the South African Geomatics Council (SAGC) Registration

Lourens du Plessis t/a LOGIS

PO [redacted]

15 February 2022

Acwa Power
Care of Thuledu Ntshingila

[redacted]

Dear Thuledu

GN 320 of 20 March 2020 and GN 1150 of 30 October 2020 requirements

Visual Impact Addendum Report for the Development of 8 New PV Plants and Amendment of 2 PV Developments on the Farm Bokpoort in the Northern Cape Province

I, the undersigned, having reviewed the abovementioned report, am of the opinion that the report complies with the GN 320 of 20 March 2020 and GN 1150 of 30 October 2020 requirements.

Feel free to contact me at any time, should you have any queries.

Kind regards,

[redacted]

Lourens du Plessis (PrGISc)

LM du Plessis
Professional Geographical Information Science Practitioner (PrGISc)
Registered with the South African Geomatics Council (SAGC) [redacted]

Appendix D:
EAP CV's

Royal HaskoningDHV
Enhancing Society Together

Curriculum Vitae

Seshni Govender

Roads and Rail Environmental Consultant

E: seshni.govender@rhdhv.com
T: 087 352 1592

Seshni is a Environmental Consultant working on strategic environmental planning and water related projects. Seshni has been involved in numerous Water Use Licence projects, including complex integrated licencing that requires understanding cumulative environmental impacts. She also has been involved in the development of the Environmental Authorisation Processes for the N11-13X Mokpane Ring Road and the development of Photovoltaic Plants in the Northern Cape Province and Gauteng Environment Outlook .

Seshni has drafted applications for complex integrated licences that include components of National Environmental Management Act and National Water Act on behalf of Eskom and private companies. This has exposed her to the intricate mechanisms of trying to integrate environmental impacts with mitigations measures that will be in line with the sustainable development principles.

As an Environmental Scientist Seshni contributes to projects through; report writing, data management and analysis, environmental impact analysis, policy review and public engagement/consultation.
.

Degree
BSc Environmental Science (Hons)
Nationality
South African
Years of experience
9
Years with Royal HaskoningDHV
9

Professional experience

Basic Assessment for the Proposed Developments of Ten (10) Photovoltaic (PV) plants at the Bokpoort farm near Grobblershoop, Northern Cape

> ACWA Power Energy Africa (Pty) Ltd
> Northern Cape Province, 2019

ACWA Power Energy Africa (Pty) Ltd (hereafter referred to as ACWA Power) is proposing to construct a solar energy facility (Bokpoort II) consisting of ten (10) photovoltaic (PV) plants on the north-eastern portion of the Remaining Extent (RE) of the Farm Bokpoort 390, located 20 km north-west of the town of Groblershoop within the !Kheis Local Municipality in the ZF Mgcawu District Municipality, Northern Cape Province.

On 21 October 2016, a 900 ha, 150 MW Concentrating Solar Power (CSP) plant was authorised by the Department of Environmental Affairs (DEA). Due to the changes in the Integrated Resource Plan (IRP) published in October 2019, ACWA Power intend replacing the authorised CSP site with eight (8) new PV plants. The updated layout has been revised to incorporate the 8 new PV plants of 250 MW each, covering a total of 1200 ha (i.e. 150 ha for each plant).

Two 250 ha 75 MW PV plants including ancillary infrastructure, were also authorised by the DEA on 24 October 2016. As the PV 1 and PV 2 plants are also approved on the Farm Bokpoort 390 RE, the footprints of these approved PV plants will undergo an amendment to accommodate the 8 new PV plants and ancillary infrastructure.

Basic Assessment and Water Use Authorisation for the removal, re-instatement and repositioning of two high voltage powerlines routed through the Stellenbosch Landfill off Devon Valley Road, Stellenbosch, Western Cape

> Eskom Holdings SOC Ltd and Stellenbosch Municipality
> Western Cape Province, 2020

The Stellenbosch Municipality owns and operates the Stellenbosch Landfill situated off Devon Valley Road. The landfill comprises completed cells (cell 1 and 2) as well as an operating cell (cell 3). Cell 3 is separated from cells 1 and 2 by an area on the landfill property footprint that is used for access roads, entrance area and weighbridge, green waste chipping and rubble crushing and stockpiling activities. This area is also transversed by two high voltage Eskom powerlines. The presence of these powerlines prevents the Municipality from engineering and operating the area between completed cells 1 and 2 and operating cell 3 as waste disposal cells.

Eskom Distribution (Western Cape Operating Unit) therefore proposes removing, re-instating and repositioning the two powerlines (132kV and 66kV) routed through the landfill. The 132kV powerline will be relocated to the northern and eastern boundary of the landfill, whilst the 66kV powerline will be relocated to the eastern and southern boundary. The proposed length of each of the deviated lines are approximately 1km. Two alternative pylon structures are currently being considered i.e. monopoles and lattice towers.

Basic Assessment and Environmental Management Programme for the Borrow Pit 5.5L associated with the N11 Section 13X (N11-13X), Mokopane Ring Road, Mogalakwena Local Municipality, Limpopo province

> South African National Roads Agency Ltd
> Limpopo Province, 2019

The South African National Roads Agency Ltd (SANRAL) has commissioned the Detail Design and the Construction Monitoring of the N11-13X Mokopane Ring Road to divert the heavy vehicle traffic that travels to and from the mines on the western side of Mokopane and to Botswana, from the already congested existing N11 section which passes through the existing villages and the Mahwelereng Township.

The N11-13X Mokopane Ring Road is a “greenfields” project where a new road will be constructed. The class of the new road will be Class 1. The new road to be constructed will typically have an overall width of 13.4 m where the initial carriageway will comprise a minimum 2.5 m outer shoulder, 2 x 3.7 m lanes, and 2.5 m inner shoulder. In general, the road reserve varies between 71 – 75 m but there are wider sections where there is a deep cutting or because of allowance for future interchanges.

A limited amount of gravel (G5 – G7 quality) will be available from cut widenings within the road reserve. The remainder of the gravel required for the proposed road construction (gravel layer works) will need to be sourced from borrow pits.

Application for Postponement of Compliance Timeframes to achieve New Plant Standards at ArcelorMittal South Africa, Vanderbijlpark Works, Emfuleni Local Municipality

> ArcelorMittal South Africa
> Gauteng Province, 2019

In response to Section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004) (as amended in 2018), ArcelorMittal applied for a postponement of the compliance timeframes to achieve the new plant minimum emission standards, as well as alternative emission standards for certain plants at the Vanderbijlpark Works (AMSAVW), Emfuleni Local Municipality, Gauteng.

Application for an Alternative Plant Standard and Suspension Application for activities associated with the ArcelorMittal Pretoria Works, City of Tshwane, Gauteng.

> ArcelorMittal South Africa
> Gauteng Province, 2019

In response to Section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (as amended in 2018), ArcelorMittal intends to apply for an alternative plant standard and submit a suspension application of the compliance timeframes to achieve the new plant minimum emission standards for the Pretoria Works, City of Tshwane, Gauteng.

Water Use Licence application for the Urania-Bronville Powerline Upgrade Project, Matjhabeng Local Municipality, Free State Province

> Matjhabeng Local Municipality
> Free State Province, 2019

The construction of new overhead powerlines to replace the existing underground powerlines that are no longer operational. The works will comprise the supply, delivery, off-loading, installation, erection, commissioning and handing-over (in a proper working condition) of the following infrastructure.

The construction of a new approximately 3.3 km, 132 kV overhead line between the Welkom Main Intake Substation and Urania Substation.

The construction of a new approximately 5.5 km, 11 kV overhead line between the Industries Substation and Bronville Substation.

Water Use Licence for the Proposed Deviation of the 88kV Firnham-Platrand Powerline near Standerton, Mpumalanga Province

> Eskom Holdings SOC Limited
> Mpumalanga Province, 2018

Eskom Holdings Limited, a State-Owned Company (SoC) proposed a deviation of a portion of the existing 88kV Firham-Platrand Powerline from pole 157 to pole 180 within a servitude of 31m and a length of approximately 2km. The purpose of the deviation is to avoid a wetland in which these poles are currently located which poses a network stability risk as it is located within a wetland area.

Firham Platrand is an interconnector between Standerton and Volksrust for network stability, the line supplies Transnet Traction Stations, should the line fail, the trains in the nearby tractions will not be able to move.

Water Use Licence Application for the Proposed Site Clearance for Planning and Design of a Border Barrier, Patrol Roads and Fencing between the Republic of South Africa (RSA), Swaziland and Mozambique, Phase 1 (KM 0.0 0 KM 54.0)

> The National Department of Public Works (DPW) and KwaZulu-Natal Department of Transport (KZN DoT)
> KwaZulu-Natal Province, 2018

Proposed the upgrade of existing border control infrastructure, and development of new border control infrastructure along a portion of the South Africa (KwaZulu-Natal) - Mozambique Border in the north-eastern part of the KwaZulu-Natal (KZN) Province. This application is termed the 'Phase 1' application and forms a component of a wider project being undertaken by the DPW for the upgrading of border control infrastructure along the South Africa - Swaziland border and the southern part of the South Africa - Mozambique border (the Phase 2 Project). The Phase 1 alignment is comprised of the section of the international border with Mozambique from the high-water mark of the Indian Ocean (KM0.0) to the eastern boundary of the Ndumo Game Reserve (KM54.0).

Environmental Screening Investigation: Route Determination for the K178 between the Gauteng Provincial Border and PWV1, Gauteng Province

> Gauteng Department of Roads and Transport (GDRT)
> Gauteng, 2018

The purpose of the Gauteng Strategic Road Network (GSRN) conceived by the Gauteng Department of Roads and Transport (GDRT) some 40 years ago was to plan a robust road system, with the objective of preserving transportation corridors and serving as a guideline for the rapid development and urbanisation of Gauteng.

The route for the K178 is the section between the Gauteng Provincial Border (in the east) and the future PWV1 (in the west) with an approximate length of 18.8km. The alignment generally follows the previous planned GDRT route along the alignment of the existing R54.

In the context of integrated environmental management, screening determines whether a development proposal requires environmental assessment, and if so, what level of assessment is appropriate. Screening is thus a decision-making process that is initiated during the early stages of the development of a project.

The main purpose of the ESI was to determine at this stage of the road design whether there are aspects of the development proposal that have the potential to give rise to significant or unacceptable environmental consequences i.e. fatal flaws.

Water Use Licence Application for the Proposed Site Clearance for Planning and Design of a Border Barrier, Patrol Roads and Fencing between the Republic of South Africa (RSA), Swaziland and Mozambique, Phase 2 (KM 54.0 0 KM 524.0)

> The National Department of Public Works (DPW)
> KwaZulu-Natal and Mpumalanga Provinces, 2018

The National Department of Public Works (DPW) as the applicant, (in conjunction with the KwaZulu-Natal Department of Transport (KZN DoT) as an implementing agent) is proposing the upgrade of existing border control infrastructure, and development of new border control infrastructure along a portion of the South Africa–Mozambique-Swaziland Border in KwaZulu-Natal and Mpumalanga. This application was termed the 'Phase 2' application and forms a component of a wider project being undertaken by the DPW for the upgrading of border control infrastructure along the South Africa - Swaziland border and the southern part of the South Africa - Mozambique border. The Phase 1 alignment is comprised of the section of the international border with Mozambique from the high-water mark of the Indian Ocean (KM0.0) to the eastern boundary of the Ndumo Game Reserve (KM54.0), whilst this Application (Phase 2) is from KM54.0 to KM524.0.

The project is being undertaken by the DPW in conjunction with the Department of Agriculture Forestry and Fisheries (DAFF) and the South African National Defence Force (SANDF), and Ezemvelo KZN Wildlife (EKZNW) and the iSimangaliso Wetland Park Authority (IWPA) as partner organs of state. The KZN DoT is an implementing agent for one of the infrastructure components (the border barrier structure).

The aim of the project is to stop the illegal trafficking of stolen vehicles and contraband across this section of the international border, as well as to prevent the illegal movement of people as well as livestock that could transmit disease. South Africa has approximately 4 800 km of land border and 2 800 km of coastline border which is required to be secured. South Africa is greatly affected and financial impacted by illegal imports, smuggling and other similar illegal activities which transpire over borders. In order to effectively respond to the range of security and control challenges that are being experienced by responsible organs of the State, it is important to assess the situation and to be able to incorporate a viable solution.

Basic Assessment for the Proposed Construction of a Bridge over the Rooisloot River, Various Culverts and Borrow Pits Associated With the National Route N11 Section 13x (N11-13x) (Mokopane Ring Road) in the Mokopane Area

> South African National Roads Agency Ltd

> Limpopo Province, 2018

The South African National Roads Agency Ltd (SANRAL) has commissioned the Detail Design and the Construction Monitoring of the N11-13X Mokopane Ring Road. An Environmental Impact Assessment (EIA) study was previously conducted for the proposed re-routing of the N11-13X road. The Environmental Authorisation and subsequent approval of the Environmental Management Plan (EMP) was obtained in 2009. The subject of this Basic Assessment Process was therefore to address the infilling activities within the watercourses which pertain to the Rooisloot Bridge and the associated culverts. There were 5 Borrow Pits associated with this project that were also subject to Basic Assessment Processes.

NW Environment Outlook, South Africa

> North West Department of Rural, Environment and Agricultural Development

> Mahikeng, 2018

Compilation of the water chapter as part of the publication of the North West Environment Outlook

Integrated Water Use Licence Application for the Rehabilitation of the Existing P236 and Culvert from km 6.235 to km 14.0

> KwaZulu-Natal Department of Transport

> Ubombo,, KwaZulu-Natal, 2017

The P236 is located north of Mkhuze and starts at km 0.0 at the intersection with P2-9 and ends at km 32.0, intersecting P449. The application, however, was only for the rehabilitation of km 6.235 to km 14.0 of the P236 as well as the replacement of a culvert at Km 6.240.

Integrated Open Space for the Greater Khayalami and Ruimsig/Honeydew Sub Regions

> City of Joburg, 2017

Development of two integrated open space plans for the Greater Khayalami and Ruimsig-Honeydew Sub-regions which aim to ensure that ecological goods and services are maintained and enhanced so as to contribute to spatial planning in the City of Johannesburg, and both economic and social development.

Water Use Licence Application for the Proposed Upgrade of Dango Bridge (B1372) and Bedlane Bridge (B1336) situated along P393 (R34) Road Between Nkwalini Pass (Km0,0) and Empangeni (Km24,0)

> KwaZulu-Natal Department of Transport

> Empangeni, KwaZulu-Natal, 2017

The KwaZulu-Natal Department of Transport (DoT) proposed to improve the Provincial road P393 (R34) from P47-4 at Nkwalini Pass (km 0.0) to P230 at Empangeni (km 24.0) within the King Cetshwayo District Municipality in KwaZulu-Natal Province. The project starts at the intersection of P47-4 (R66) with P393 (R34) at Nkwalini Pass (km 0.0) and ends at P230 (km 24.0) towards Empangeni. The Bedlane river bridge (B1334) is situated at km 2.6 from Nkwalini Pass and the Dango river bridge (B1372) is situated at km 3.9 from Nkwalini Pass. The existing P393 road is 8.8m wide and the proposed road geometry for the rehabilitation is 10.0m wide including shoulders.

Water Use Licence Application for the Proposed Culvert Rehabilitation along Provincial Road P230 from Km37.0 to Km47.0

> KwaZulu-Natal Department of Transport

> Umhlathuze Local Municipality, KwaZulu-Natal, 2017

This project formed part of the Empangeni Road Rehabilitation Programme and covers the rehabilitation of the provincial road P230 between km 37,0 and km 47,0 within the uMhlathuze Local Municipality which forms part of the King Cetshwayo District Municipality (DC28), KwaZulu-Natal. Provincial Road P230 from the intersection with P393 at km 37,0 to km 47,0 near Empangeni is defined as an undivided two lane road, and has been classified as a Class R1 Rural Arterial Road (in terms of the TRH26). The P230 forms part of the R34 long distance heavy haul freight route, which connects the harbour of Richards Bay and the surrounding industrial and commercial areas, with inland provinces.

Integrated Water Use Licence Application for the Canelands Extension Development, KwaZulu-Natal

> Tongaat Hulett Developments

> Kwadukuza Municipality, KwaZulu-Natal, 2017

Tongaat Hulett Development wishes to develop the site for industrial purposes. The site lies adjacent to the existing Canelands Industrial estate. Potential land uses may include general / industrial, logistics, warehousing and distribution. These land uses will complement those of the existing Canelands Industrial Estate and will ensure that this land parcel reads as an extension to the existing development. It is proposed, due to the proximity of the floodplain and numerous other constraints located on-site, that a single platform covering an area of approximately 1.67 hectares (1.67 ha) is created. Both a servicing and traffic report has been completed, which details how this development will be accommodated by the existing bulk infrastructure within the region.

Gauteng Province Environment Outlook Report

> Gauteng Department of Agriculture and Rural Development

> Gauteng, 2017

State of the Environment Report (SoER) is a report card on the condition or quality of the environment. It provides information on how we affect the environment, how the environment affects us, and how this condition has changed over time. Environmental conditions are analysed through the use of environmental indicators which are proxies of environmental status, and which can be monitored over time and space. Reporting on the State of Environment (SoE) is therefore an important tool in identifying, assessing and setting priorities for environmental issues, as well as in determining whether environmental policies and actions are effective. Furthermore, the 'environment outlook' component attempts to describe or predict how environmental challenges will evolve in the near future, and what needs to be done to achieve a more sustainable state of living for all people in the province. The ultimate value of environmental outlook reporting lies in the degree to which that assessment can be used for adaptive environmental management to address anticipated future environmental conditions and pressures.

North West Envrionmental Outlook/State of the Environment Trend Analysis

> North West Department of Rural, Environment and Agricultural Development

> Mahikeng, 2017

The *Environmental Trend Analysis Report* focused on the publications of the North West Province State of Environment and Environment Outlook Reports dated 1995, 2002, 2008 and 2013, in an effort to expand this trend reporting to fully cover the period 1995 to 2013. This exercise followed on from the 2013 Environment Outlook Report which reported on environmental trends and made related recommendations to guide the province towards a more sustainable future. As such, the following objectives were achieved:

> The indicators for each chapter were tracked through the reporting period

> Data Gaps Identified

> the value of the indicator set determined

Environmental Impact Assessment and Integrated Water Use Licence Application for the Tinley Manor Southbanks Coastal Development, KwaZulu-Natal

> Tongaat Hulett Developments

> Kwadukuza Municipality, KwaZulu-Natal, 2017

Tongaat Hulett Developments proposes to develop the Tinley Manor Southbanks Coastal Development into a mixed-use coastal development including a large residential component. Tinley Manor Southbanks Coastal Development is an approximately 485 ha site, located between the coastal towns of Tinley Manor and Sheffield Beach within the KwaDukuza Municipality, KwaZulu-Natal.

The proposed Tinley Manor Southbanks Coastal Development is set to be the first phase of the development of Tongaat Hulett Developments' land holdings in Tinley Manor, which is situated to the south and north of the Umhlali River.

Integrated Open Space Plan – Greater Khayalami and Ruimsig-Honeydew Sub-Regions, Johannesburg, South Africa

> >Client: City of Johannesburg, 2016

Development of two integrated open space plans for the Greater Khayalami and Ruimsig-Honeydew Sub-regions which aim to ensure that ecological goods and services are maintained and enhanced so as to contribute to spatial planning in the City of Johannesburg, and both economic and social development.

Royal HaskoningDHV

Update of the Dube Tradeport State of the Environment Report
> Dube Tradeport Corporation
> KwaZulu-Natal, 2016
Compilation of the Dube Tradeport State of the Environment Report 2016/2017

Integrated Open Space Plan - Linbro Park & Greater Bassonia, Johannesburg, South Africa
> City of Johannesburg,2016
Development of two integrated open space plans for the Linbro Park and Greater Bassonia which aim to ensure that ecological goods and services are maintained and enhanced so as to contribute to spatial planning in the City of Johannesburg, and both economic and social development.

Final Consultation Basic Assessment Report for the Dismantling of a portion of the existing double-circuit power line and the construction of two (2) 7 km long 88 kV power lines within a 2 km corridor between the Grootpan and Brakfontein Substations
> >Eskom Holdings SOC Ltd
> Ogies, Mpumalanga, 2015
Eskom Holdings (SoC) Pty Ltd (Eskom Distribution – Mpumalanga Operating Unit) proposes to construct two (2) 7 km 88 kV overhead power lines within a 2 km corridor between Grootpan and Brakfontein Substations near Ogies. The existing power lines are located on GlencoreXstrata mining property. The mine has requested that Eskom relocate the lines as they are within the operational footprint of the mine. The project also involves the dismantling of a portion of the existing 88 kV double-circuit mink power line approximately 5.2 km in length. The new power lines will ensure continuity of supply and access to electricity for the surrounding communities.

Conduct Pre-Feasibility (FEL-2) Waterberg Heavy Haul Line, South Africa
> Transnet SOC Ltd
> Waterberg, 2015
High-level environmental screening investigation for the proposed +- 600km rail corridor running from Lephalale to Ermelo as part of the national Strategic Infrastructure Project (SIP) suite.

Tembisa Hub Plan, South Africa
> >Intersite Property Management Services
> Ekurhuleni Metropolitan Mucipality, 2015
Preparation of a Precinct plan for the Tembisa Urban Hub in Ekurhuleni.

Review and Update of the City of Windhoek's Environmental Policy
> Consulting Services Africa (CSA)
> Windhoek, Namibia, 2014
Review the existing City of Windhoek Environmental Management Policy, 2004 and revise and improve the existing policy so that it may be approved, launched, and implemented by the Windhoek City Council.

Green existing by-laws and develop a set of new environmental by-laws or amend the existing by-laws,
> Ekurhuleni Metropolitan Municipality
> Ekurhuleni, 2014
Review the existing Ekurhuleni by-laws by introducing environmental considerations and develop a set of new environmental by-laws if required.

Route Determination and EIA for K86, K118, K181 K208, K217 and K219,
> Gauteng Department of Roads and Transport
> Gauteng Province, 2014
Route Determination and Environmental Scan of K-routes in the Gauteng Province.

Dube Tradeport State of the Environment Report
> Dube Tradeport Corporation
> KwaZulu-Natal, 2014
Compilation of the Dube Tradeport State of the Environment Report 2013/2014

State of Environment Report (SOER) for City of Johannesburg, South Africa
> >South African Cities Network
> City of Joburg, 2014
Compilation of the State of the Environment Report for the City of Johannesburg 2014

Cornubia Human Settlement - Integrated Water Use Licence Application, South Africa
> Tongaat Hulett Developments (Pty) Ltd
> Cornubia, KwaZulu-Natal, 2013
Water Use Licence Application for the Cornubia Industrial and Business Estate, Phase 1-Retail Park, Cornubia Phase and Cornubia Bridge

Seshni Govender

NW Environment Outlook, South Africa
> North West Department of Economic Development, Environment, Conservation and Tourism
> Mahikeng, 2013
Compilation and Publication of the North West Provincial

Qualifications

2010 BSc (Hons) Environmental Science, University of KwaZulu Natal, South Africa

2009 BSc Environmental Science, University of KwaZulu Natal, South Africa

Royal HaskoningDHV

Royal HaskoningDHV
Enhancing Society Together

Curriculum Vitae

Prashika Reddy

Road and Rail

Senior Environmental Scientist

Prashika started her career in the environmental field after spending 5 years' working for the Department of Agriculture: Genetic Resources Directorate. She is a Senior Environmental Scientist in the Environmental Management and Planning Unit within the Roads and Rail Advisory Group. In 2010, she obtained her professional registration as a Natural Scientist in the field of Environmental Science. She is a registered Environmental Assessment Practitioner with EAPASA.

Prashika has built up an impressive résumé, having worked on diverse projects mainly in the petro-chemical industry, as well as various large-scale power generation projects. She has established good working relationships with key clients and has undertaken several flagship projects on their behalf, such as Sasol and Eskom's Underground Coal Gasification project.

Years of experience
19
Years with Royal HaskoningDHV
14
Professional memberships
SA Council for Natural Scientific Professions, Pr Sci Nat, 400133/10
EAPASA, Registered EAP, 2019/917
Qualifications
1999: Bachelor of Science Honours: Botany, University of KwaZulu-Natal
2006: Bachelor of Science Honours: Geography (with distinction), University of Pretoria

Professional experience

Environmental Impact Assessment (EIA), Waste Management Licence and Integrated Water Use Licence for the Underground Coal Gasification (UCG) Project and associated infrastructure in support of co-firing of gas at the Majuba Power Station, Mpumalanga, South Africa, South Africa

Start Date: 2008 - 2015
Client Name: Eskom Holdings SOC Ltd
Project Value: R 5,900,000
Eskom Holdings (SOC) Ltd appointed Royal HaskoningDHV to undertake the integrated environmental authorisation process, as well as the integrated Water Use Licence, for the UCG pilot project and associated infrastructure in support of co-firing of gas at the Majuba Power Station. UCG is a process whereby coal is converted in situ into combustible gas that can be used for power generation and is one of the new clean coal technologies being developed for implementation by Eskom that intends to diversify Eskom's fuel supply.
Position: Project Manager
Assigned Tasks: Project management, client liaison, compilation of environmental reports, management of the specialist team, authority consultation and co-management of the public participation process

Integrated Environmental Authorisations for the proposed Concentrated Solar Power (CSP) Plants on the farm Sand Draai, Northern Cape Province

Start Date: 2014 - 2016
Client Name: Solafrica Energy (Pty) Ltd
Project Value: R 1,500,000
Solafrica appointed Royal HaskoningDHV to undertake the integrated environmental authorisation and waste licence processes for two CSP plants (central receiver and parabolic trough) with an electricity generation capacity of between 100 - 150MW to be constructed on the farm Sand Draai, Upington.
Position: Environmental Scientist
Assigned Tasks: Compilation of environmental reports

Environmental Impact Assessment for the Pumped Storage Power Generation Facility in the Steelpoort area, Mpumalanga and Limpopo Provinces

> Start Date: 2005 - 2007
> Client Name: Eskom Holdings SOC Ltd
> Project Value: R 1,300,000

As part of the increased electricity supply plan, Eskom will be constructing a Pumped Storage Scheme (PSS) in the Steelpoort area, Limpopo and Mpumalanga Provinces. It is planned that the scheme will have an installed capacity of approximately 1520MW. The proposed scheme consists of the following components: upper and lower reservoirs; underground power house complex and associated waterways that link the reservoirs; and ancillary works.
Position: Project Manager
Assigned Tasks: Completion of the EIA study and reports (EIA Report and EMP), project management, client liaison, management of the specialist team, authority consultation and co-management of the public participation process

Basic Assessment Study for Eight New PV Developments on the Farm Bokpoort, Groblershoop

Start Date: 2019
Client Name: ACWA Power Africa Holdings (Pty) Ltd
Project Value: R 966,123
Due to the changes in the Integrated Resource Plan published in October 2019, ACWA Power intend replacing the authorised CSP site with 8 new PV plants. The updated layout has been revised to incorporate the 8 new PV plants of 200MW each, covering a total of 1200ha (i.e. 150ha for each plant) on Remaining Extent of the Farm Bokpoort 390.
Position: Environmental Scientist and Project Manager
Assigned Tasks: Compilation of environmental reports and project management

Basic Assessment Study for Seven 9.9MW Internal Combustion Engines (ICE) at the Previously Authorised PV Developments on the Farm Bokpoort, Groblershoop

Start Date: 2020
Client Name: ACWA Power Africa Holdings (Pty) Ltd
Project Value: R 153 000
Recently, the Department of Mineral Resources and Energy issued a Request For Proposal (RFP) to which ACWA Power will be participating. A condition in the RFP requires Bidders to not tap into the national grid for power and requires that a reliability test be undertaken at specified generation rate and time. In meeting the RFP requirements, ACWA Power has decided to supplement their already authorised project infrastructure by the addition of ICE infrastructure in the projects to be bid.

Position: Environmental Scientist and Project Manager
Assigned Tasks: Compilation of environmental reports and project management

Environmental Screening Investigation for the Establishment of a Solar Based Electricity Generation System on a Build, Own, Operate and Maintain Basis – 118MW Photovoltaic Plant at the Tubatse Chrome Plant, Steelpoort, Limpopo
Start Date: 2020
Client Name: Samancor Chrome
Project Value: R 146 000
As part of the Transaction Advisory Services, Royal HaskoningDHV's Environmental Management and Planning (EM&P) Knowledge Group have been appointed to conduct a high-level desktop Environmental Screening Investigation (ESI) of twelve (12) sites to investigate the environmental sensitivities, opportunities and constraints associated with the proposed project for the proposed 118MW PV plant at the Tubatse Chrome Plant in the Steelpoort area, Limpopo Province.
Position: Environmental Scientist
Assigned Tasks: Compilation of environmental reports and project management

Environmental Impact Assessment (EIA), Waste Management Licence and Integrated Water Use Licence for the Matimba Power Station Ash Disposal Facility, South Africa
Start Date: 2012 - 2016
Client Name: Eskom Holdings SOC Ltd
Project Value: R 5,800,000
Approximately 4.8 million tons of ash is produced annually from the Matimba Power Station. This ash is currently being disposed by means of 'dry ashing' ~3km south of the power station. The proposed ash disposal facility will ensure that the power station is able to accommodate the 'ashing' requirements for the remaining life (approximately 44 years) of the Power Station.
Position: Environmental Scientist, Project Manager
Assigned Tasks: Compilation of environmental reports (EIA Report and EMPr), project management, management of the public participation process and specialist team

Charlie 1 Landfill Stormwater Management & Optimisation Project, Sasol Secunda, South Africa
Start Date: 2015 - 2016
Client Name: Sasol Chemical Industries (Pty) Ltd
Project Value: R 735,000
The Sasol Synfuels, Secunda, Charlie 1 landfill site was authorised in 1993 as a Class II Site, in terms of the Environmental Conservation Act (ECA) (Act No. 73 of 1989). Recent legislation changes such as the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and the new Waste Classification and Management Regulations, August 2013 (GN 634) have implications for the management of waste disposal sites. The latest audits conducted at Charlie 1 landfill site highlighted that the water management is not in accordance with the permit requirements. Therefore, the Pollution Control Dam (PCD) of approximately 16000m3 will be constructed to ensure compliance with the existing permit requirements. It will be constructed to ensure effective management of leachate and stormwater.
Position: Project Manager
Assigned Tasks: Project management

Scoping Study for the Full-Scale Composting of Sludge Waste Streams, South Africa
Start Date: 2014
Client Name: Sasol Chemical Industries (Pty) Ltd
Project Value: R 850,000
The proposed project involves constructing a full-scale compositing site that will be able to handle approximately 200000 - 300000t/a of sludge generated at the Sasol Secunda plant.
Position: Project Manager
Assigned Tasks: Project management, quality review of Environmental Scoping Report and public participation documentation

Waste Management Licence for the BMW Waste Facility, South Africa
Start Date: 2010
Client Name: BMW SA (Pty) Ltd
Project Value: R 168,797
Position: Project Manager
Assigned Tasks: Project management, client management, authority consultation, report compilations and internal review of work

EIA and Water Use Authorisation for the Removal, Re-Instatement and Re-Positioning of Two High-Voltage Powerlines routed through the Devon Valley Landfill, Stellenbosch
Start Date: 2019
Client Name: Stellenbosch Municipality
Project Value: R 820,000
The Stellenbosch Municipality owns and operates the Stellenbosch Landfill situated off Devon Valley Road. The landfill comprises completed cells (cell 1 and 2) as well as an operating cell (cell 3). Cell 3 is separated from cells 1 and 2 by an area on the landfill property footprint that is used for access roads, entrance area and weighbridge, green waste chipping and rubble crushing and stockpiling activities. This area is also transversed by two high voltage Eskom powerlines. The presence of these powerlines prevents the Municipality from engineering and operating the area between completed cells 1 and 2 and operating cell 3 as waste disposal cells.
Position: Project Manager and Environmental Scientist
Assigned Tasks: Project management, compilation of environmental reports, management of specialist team

Site Clearance: Planning and Design for Maintenance and/or Upgrade of the Patrol Roads and Fencing on the Borders between RSA, Swaziland and Mozambique
Start Date: 2016
Client Name: Department of Public Works
Project Value: R 2,598,000
Undertake the Basic Assessment study, mining permitting as well as Water Use Licencing application processes associated with the border patrol road and fence.
Position: Project Manager
Assigned Tasks: Project management

Basic Assessment and Water Use Licence for the rehabilitation of the existing P236 gravel road from km6.235 to km14.0 in Ubombo, KwaZulu-Natal
Start Date: 2016
Client Name: KwaZulu-Natal Department of Transport
Project Value: R 546,186
This project is a rehabilitation of a portion of the existing P236 road from km6.235 to km14.0, where the surfaced width will be increased by 2.5m and where there are climbing lanes; the surfaced width will increase by 5.6m. In areas where there will be horizontal curve widening, the width will be increased by 4.5m. Furthermore, existing culverts with be lengthened where required to accommodate the increase in the road bed width. A culvert at a stream crossing, is also planned to be replaced at km6.240 of the P236.
Position: Strategic Environmental Advisor
Assigned Tasks: Quality review of environmental reports and public participation documentation

Basic Assessment and Water Use Licence for the proposed bridge crossing over the uMfolozi River linking the Esiyembeni and Novunula areas within the Mtubatuba Local Municipality, KwaZulu-Natal
Start Date: 2016
Client Name: KwaZulu-Natal Department of Transport
Project Value: R 522,225
The KwaZulu-Natal Department of Transport (KZN DoT) is planning to construct a bridge over the uMfolozi River and associated link road that will serve to link the Esiyembeni and Novunula local communities situated on either side of the uMfolozi River which is currently impassable save for the existing N2 bridge crossing to the east near Mtubatuba.
Position: Strategic Environmental Advisor
Assigned Tasks: Quality review of environmental reports and public participation documentation

Basic Assessment for the construction of two 7km long 88kV Power Lines Grootpan / Brakfontein, South Africa
Start Date: 2015
Client Name: Eskom Holdings SOC Ltd
Project Value: R 458,021
The proposed project involves the construction of two (2) 7km 88kV power lines and dismantling of two (2) 88kV power lines from Grootpan to Brakfontein, south of Ogies in Mpumalanga.
Position: Project Principal
Assigned Tasks: Quality review and overall project management

Proposed Tinley Southbanks Beach Enhancement Project in the KwaDukuza Municipality, KwaZulu-Natal
Start Date: 2016
Client Name: Tongaat Hulett Developments (Pty) Ltd
Project Value: R 925,270

The Tinley Manor Southbanks development provides for the coastal resort, however, it does not provide for what is critical for the success of the resort and that is a safe swimming beach in close proximity to the resort. The lack of a safe swimming beach with public amenities adjacent the development was identified as a major constraint. This EIA is therefore targeted at dealing with this constraint and to enable the provision of a new beach resort that has all the requirements to be able to attract international investment, including specifically a safe, swimming beach.
Position: Strategic Environmental Advisor
Assigned Tasks: Provide strategic advice on project, review of environmental reports

Environmental Impact Assessment for the Cornubia Phase 2 Development, KwaZulu-Natal, South Africa
Start Date: 2012
Client Name: Tongaat Hulett Developments (Pty) Ltd
Project Value: R 989,660
Conduct a full Environmental Impact Assessment (EIA) for the proposed Cornubia Mixed Use Phased development - Phase 2 in Mount Edgecombe, KwaZulu-Natal.
Position: Strategic Environmental Advisor
Assigned Tasks: Provide strategic advice on project, review of environmental reports

Cornubia Retail Park - EIA, South Africa
Start Date: 2012
Client Name: Tongaat Hulett Developments (Pty) Ltd
Project Value: R 370,120
Undertaking the EIA, Public Participation Process (PPP), attending client progress meetings and providing environmental input into the planning of the proposed Phase 2 Retail Development.
Position: Strategic Environmental Advisor
Assigned Tasks: Environmental Scientist. Strategic project advice, quality review and approval of reports

Centurion Metropolitan Core Masterplan: Stormwater and Flooding, South Africa
Start Date: 2012
Client Name: City of Tshwane Metropolitan Municipality
Project Value: R 4,300,000
The City of Tshwane requires a multi-disciplinary project team to assist the Client with the Preparation of a Master Plan of the Centurion Metropolitan Core Study Area.
Position: Environmental Scientist
Assigned Tasks: Environmental Screening Investigation

Environmental Screening for the Commercial 125MW CSP, South Africa
Start Date: 2012
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 185,000
Environmental Screening Investigation for the proposed 125MW commercial concentrated Solar Power Plant located in Upington.
Position: Project Principal
Assigned Tasks: Project Management, financial management, review of Environmental Screening Report

Route Determination and Environmental Screening Investigation of 14 K-routes, South Africa
Start Date: 2016-2019
Client Name: Gauteng Department of Roads and Transport
Project Value: R 5.6 Million
Route determination and ESI for routes K
Position: Environmental Scientist
Assigned Tasks: Environmental Screening Investigation and compilation of the ESI Report

City of Tshwane: Waste Transfer Facilities, South Africa
Start Date: 2014
Client Name: City of Tshwane Metropolitan Municipality
Project Value: R 150,000
Report on environmental and sustainability considerations in Waste to Energy (WtE) Plants when they are co-fired with Municipal Solid Waste. Concept designs and environmental screening of various waste transfer stations. Situational assessment of other closed landfill facilities.
Position: Environmental Scientist
Assigned Tasks: Advise the client on Environmental authorisation requirements

Basic Assessment for the Sasol C3 Expansion Project, Sasol Industrial Complex, South Africa
Start Date: 2013
Client Name: Sasol Polymers
Project Value: R 267,614
The C3 expansion project was initiated to address an estimated 105ktpa additional propylene that will be

available in 2014 as a result of various optimisation projects on the upstream Sasol Synfuels facilities. An opportunity was identified for the additional propylene to be utilised as feed for the polypropylene (PP) plants, namely PP1 and PP2. The C3 expansion project involves upgrading and implementing changes to the existing PP1 and PP2 process equipment to accommodate the increase in throughput.
Position: Project Principal
Assigned Tasks: Strategic project advice, quality review and approval of reports

BA for the Sasol Iso-Octanol Long Term Phase II Project, Sasol Industrial Complex, South Africa
Start Date: 2012
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 261,184
The Iso-octanol long-term phase 2 project involves a process whereby aldehydes are converted in the existing Iso-alcohol stream (in Octene Train III) by hydrogenation to its corresponding alcohols to achieve the desired product specification for the Iso-octanol product. A new reactor and a new distillation column with its associated equipment will be installed for this purpose. The expected Iso-octanol production will range between 7 and 9kt/annum. In addition, a storage tank with a capacity of approximately 400m3 and a loading pump will be installed to enable storage and loading of the final Iso-octanol product.
Position: Project Principal
Assigned Tasks: Strategic project advice, quality review and approval of reports

Environmental Impact Assessment for the C3 Stabilisation Project situated on the Sasol Secunda Site, South Africa
Start Date: 2010
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 447,172.00
Environmental Impact Assessment for the C3 Stabilisation Project situated on the Sasol Secunda Site
Position: Project Manager
Assigned Tasks: Project Management, review and compilation of EIA documentation, management of public process, liaise with client and authorities

Environmental Impact Assessment for the proposed Biogas to Power Plant Project at Sasol Synfuels, South Africa
Start Date: 2009
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 167,865
Basic assessment study for the Biogas to power plant project.
Position: Project Manager
Assigned Tasks: Project management, compilation of environmental reports

Environmental Impact Assessment for the proposed Sasol Bioworks upgrade, South Africa
Start Date: 2008
Client Name: Sasol Technology (Pty) Ltd
Project Value: R306,101 Sasol One Bioworks Expansion
Position: Project Manager
Assigned Tasks: Overall Project Management and quality control

EIA or the Amendment of Mining Right for the UCG Pilot Plant, South Africa
Start Date: 2008
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 404,000
Environmental Impact Assessment and Mining Authorisation for the Underground Coal Gasification Pilot Project located in Secunda Mpumalanga Province.
Position: Project Manager
Assigned Tasks: Overall Project Management and quality control

Department of Public Works: ECO Work in Pretoria, South Africa
Start Date: 2010 - 2017
Client Name: Department of Public Works
Project Value: R 2,100,000
Environmental Control Officer and Occupational Health and Safety for the demolition activities associated with the HG de Witt Building in Pretoria.
Position: Project Manager
AssignedTasks: Project Managementand Environmental Control Officer (ECO) work

AEL OEMPr Compilation
Start Date: 2019
Client Name: AEL Africa
Project Value: R 100,000
Position: Senior Environmental Scientist
Assigned Tasks: Compilation of OEMPr for the ISAP and Nitrate Plant

Environmental Status Quo for the Scottsville Local Area Plan
Start Date: 2018
Client Name: Msunduzi Municipality
Project Value: R 2.5 million
Position: Environmental Scientist
Assigned Compilation of Environmental Status Quo chapter

White Mfolozi Bridge & Link Road, South Africa
Start Date: 2016
Client Name: Kwa-Zulu Natal Department of Transport
Project Value: R 0.8 million
Position: EAP
Assigned Tasks: Compilation of the Basic Assessment Report and EMPr in support of the necessary Environmental Authorisations and permits

Sundumbili Wastewater Treatment Works, South Africa
Start Date: 2015
Client Name: Ilembe Municipality
Project Value: R2 000 000
Position: EAP
Assigned Tasks: Environmental Screening and Environmental Impact Assessment

Rustenburg Integrated Rapid Public Transport Network (IRPTN), South Africa
Start Date: 2009
Client Name: Rustenburg Local Municipality
Project Value: R 3,000,000,000
Planning, design and implementation of the Rustenburg Rapid Transport project in Rustenburg.
The final system, which will consist of several phases, will compromise of approximately 900 busses, 600 kilometres (km), 50 bus routes, 35 km segregated bus lanes, 30 stations, 3 depots, 1 transport management centre, and zero compromise in public transport service quality. Royal HaskoningDHV are the project managers in charge of the Design and Construction, as well as the designers for the Intelligent Transportation Systems and Urban Traffic Control.
Position: Environmental Scientist
Assigned Tasks: Environmental Screening Investigation and Ad Hoc environmental advice

Previous Experience

2010 - 2012
SSI Engineers and Environmental Consultants (Pty) Ltd
Associate

2008 – 2010
SSI Engineers and Environmental Consultants (Pty) Ltd formerly known as Bohlweki Environmental (Pty) Ltd
Senior Environmental Consultant

2006 – 2008
Bohlweki Environmental (Pty) Ltd
Junior Environmental Consultant

2001 – 2006
Department of Agriculture
Senior Plant and Quality Control Officer

Royal HaskoningDHV

Appendix E:
Environmental Management Programme

REPORT

Environmental Management Programme for the Proposed Development of a 9.9MW Internal Combustion Engine (ICE) associated with the Afrikaans PV Plant on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape

REVISED ENVIRONMENTAL MANAGEMENT PROGRAMME
DFFE REF: 14/12/16/3/3/1/2469

Client:	ACWA Power Project DAO (RF) Pty Ltd
Reference:	MD4195-RHD-ZZ-XX-RP-YE-0001
Status:	01/S0
Date:	25 April 2022

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Document title:	Environmental Management Programme for the Proposed Development of a 9.9MW Internal Combustion Engine (ICE) associated with the Afrikaans PV Plant on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape
Document short title:	EMPR 9.9MW ICE
Reference:	MD4195-RHD-ZZ-XX-RP-YE-0001
Status:	01/S0
Date:	25 April 2022
Project name:	2 Additional ICE
Project number:	MD4195
Author(s):	Seshni Govender

Drafted by:	Prashika Reddy
Checked by:	Malcolm Roods
Date:	25.04.2022
Approved by:	Malcolm Roods
Date:	25.04.2022

Classification
Project related

Royal HaskoningDHV

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Appendices

Acronyms

AEL	Atmospheric Emissions Licence
AQMS	Air Quality Monitoring Station
AQSR	Air Quality Sensitive Receptor
BA	Basic Assessment
BAR	Basic Assessment Report
BESS	Battery Energy Storage System
CA	Competent Authority
CBA	Critical Biodiversity Area
CBAR	Consultation Basic Assessment Report
CSP	Concentrating Solar Power
CV	Curriculum Vitae
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioner Association of South Africa
ECO	Environmental Control Officer
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
EWT	Endangered Wildlife Trust
GA	General Authorisation
GHG	Greenhouse Gas
GIS	Geographic Information System
GNR	Government Notice Regulation
I&AP	Interested and Affected Party
ICE	Internal Combustion Engine
IFC	International Finance Corporation
IDP	Integrated Development Plan
IPP	Independent Power Producer
IRP	Integrated Resources Plan
IEM	Integrated Environmental Management
LNG	Liquified Natural Gas
LPG	Liquified Petroleum Gas
LOS	Level of Service
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NCDENC	Northern Cape Department of Environment and Nature Conservation
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEM:AQA	National Environmental Management Air Quality Act (Act No. 39 of 2004)
NEM:BA	National Environmental Management Biodiversity Act (Act No. 10 of 2004)
NEM:PAA	National Environmental Management Protected Areas Act (Act No. 57 of 2003)
NEM:WA	National Environmental Management – Waste Act (Act No. 59 of 2008)

NFA	National Forests Act (Act No. 84 of 1998)
NGO	Non-Governmental Organisation
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
OHSA	Occupational Health and Safety Act (Act No. 85 of 1993)
PES	Present Ecological State
PP	Public Participation
PPA	Power Purchase Agreement
PS	Performance Standards
PV	Photovoltaic
REC	Recommended Ecological Category
REDZ	Renewable Energy Development Zone
RFP	Request For Proposal
SAAQIS	South African Air Quality Information System
SACNASP	South African Council of Natural Science Professionals
SDG	Sustainable Development Goals
SEF	Solar Energy Facility
SIP	Strategic Infrastructure Project
SWMP	Stormwater Management Plan
UNFCC	United Nations Framework Convention on Climate Change
WRF	Weather Research and Forecasting
WUA	Water Use Authorisation

Glossary

Accident	A road vehicle accident.
Activity (Development)	An action either planned or existing that may result in environmental impacts through pollution or resource use. For the purpose of this report, the terms 'activity' and 'development' are freely interchanged.
Alien Species	(a) A species that is not an indigenous species; or (b) an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention as set out in the National Environmental Management: Biodiversity Act (Act No. 10 of 2004).
Applicant	The project proponent or Developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.
Buffer	A buffer is seen as an area that protects adjacent communities from unfavourable conditions. A buffer zone is usually an artificially imposed zone included in a management plan.
Building and Demolition Waste	Building and demolition waste means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.
Client's Project Manager	The person appointed by the client who is responsible for the construction site as a whole.
Contractor	Companies appointed on behalf of the Developer to undertake activities, as well as their sub-contractors and suppliers.
Construction Project Management Team	The team consists of a Project Manager as well as a Designated Environmental Officer.
Culvert	A pipe or box intended to convey water under a highway, railroad, canal, or similar facility.
Degradation	The lowering of the quality of the environment through human activities e.g. river degradation, soil degradation.
Domestic Waste	Domestic waste means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreation purposes.
Emergency	An undesired event that results in a significant environmental impact and requires the notification of the relevant statutory body such as a local or provincial authority.
Environment	In terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998)(as amended), "Environment" means the surroundings within which humans exist and that are made up of: (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plants and animal life;

	(iii) any part or combination of (i) of (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
Environmental Aspect	An environmental aspect is any component of a Contractor's construction activity that is likely to interact with the environment.
Environmental Control Officer	An individual nominated through the Developer to be present on-site to act on behalf of the Developer in matters concerning the implementation and day to day monitoring of the EMPr and conditions stipulated by the authorities.
Environmental Impact	A change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.
Environmental Management Programme	A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts, and, limiting or preventing negative environmental impacts are implemented during the life-cycle of a project. It is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction and operation, long-term maintenance, and, decommissioning of a project are prevented and that positive benefits of the projects are enhanced.
General Waste	General waste means waste that does not pose an immediate hazard or threat to health or to the environment, and includes - (i) domestic waste; (ii) building and demolition waste; (iii) business waste; and (iv) inert waste.
General Waste Landfill Site	A waste disposal site that is designed, managed and permitted to allow for the disposal of general waste.
Hazardous Waste Landfill Site	A waste disposal site that is designed, managed and permitted to allow for the disposal of hazardous waste.
Impact	A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.
Mitigation	Measures designed to avoid, reduce or remedy adverse impacts.
Principal Agent	The principal agent is appointed by the Developer to oversee the overall project management and the management of the professional project team.
Re-use	To utilise articles from the waste stream again for a similar or a different purpose without changing the form of properties of the articles.
Recycle	A process where waste is reclaimed for further use, this involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.
Rehabilitation	Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement re-vegetation of a disturbed area and the insurance of a stable

	land surface. Re-vegetation must aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.
Road Reserve	A corridor of land, defined by co-ordinates and proclamation, within which the road, including access intersections or interchanges, is situated. A road reserve may, or may not, be bounded by a fence.
Road Width	For the purposes of this document, the road width is defined as the area within the road reserve i.e. fence line to fence line, but also includes all areas beyond the road reserve that are affected by the continuous presence of the road, e.g. a reach of a watercourse.
Safety, Health and Environmental (SHE) Officer	The SHE Officer is a Contractor representative, responsible for the safety, health and environmental aspects during construction. The SHE Officer will be responsible for the day-to-day monitoring of the EMPr and Health and Safety Plan (if identified as the DEO).
Waste	Waste means any substance, whether or not that substance can be reduced, re-used, recycled and recovered - (i) that is surplus, unwanted, rejected, discarded, abandoned or disposed of; (ii) which the generator has no further use of for the purposes of production; (iii) that must be treated or disposed of; or (iv) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but— ○ a by-product is not considered waste; and ○ any portion of waste, once re-used, recycled and recovered, ceases to be waste.
Waste Disposal Facility	Waste disposal facility means any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises.
Workforce	The entire project team including people employed by the Principal Agent or the Contractor, persons involved in activities related to the project, or person present at or visiting the construction area, including permanent contactors and casual labour.

1 INTRODUCTION

In September 2020, the Department of Mineral Resources and Energy (DMRE) released a request for proposal as part of the Risk Mitigation Independent Power Producer Procurement Programme to reduce the current load shedding periods being experienced by the country. In responding to the request, ACWA Power Project DAO (RF) Pty Ltd (hereafter referred to as ACWA Power) submitted a bid for a 150MW (export capacity) PV plant that was bid as "Project DAO" and were successful. Project DAO has been classified as a Strategic Integrated Project (SIP) on the 01 April 2021 under Project Number: RM-TA-0025-001 in terms of Schedule 2 (Section 17(2)) of the Infrastructure Development Act (Act No. 23 of 2014).

A condition in the RFP requires Bidders to not tap into the national grid for power and requires that a reliability test for only 15 days be undertaken at a specified generation rate and time once the Power Purchase Agreement (PPA) has been finalised. PV can only generate electricity when the weather is favourable. In order to address this need, ACWA Power proposed additional infrastructure ICE within their authorised plants to create flexibility and efficiency within the plants for the reliability test period.

In meeting the RFP requirements, ACWA Power decided to supplement their already authorised project infrastructure by adding ICE infrastructure in the projects to be bid and were issued with Environmental Authorisations (EAs) in May 2021 for the following:

- Zulu ICE (Ref 14/12/16/3/3/1/2295);
- Venda ICE ((Ref 14/12/16/3/3/1/2296);
- Swati ICE ((Ref 14/12/16/3/3/1/2297);
- Sotho ICE (Ref 14/12/16/3/3/1/2298);
- Pedi ICE (Ref 14/12/16/3/3/1/2299);
- Ndebele ICE (Ref 14/12/16/3/3/1/2300); and
- Afrikaans ICE (Ref 14/12/16/3/3/1/2301).

The DMRE amended the reliability run requirements, and ACWA Power decided to lapse four (Zulu, Afrikaans, Sotho and Swati PV plant ICE) of the seven ICE EAs. As a result, the ICE layout and EMPr were amended in October 2021 (Ref 14/12/16/3/3/1/2296-MP1; Ref 14/12/16/3/3/1/2299-MP1 and Ref 14/12/16/3/3/1/2300-MP1) to reflect the reduction in the infrastructure.

The DMRE has now confirmed that they are not amending the reliability run requirements, and as such, ACWA Power needs two additional ICE to meet these requirements. Individual applications for Environmental Authorisation will be lodged for the 9.9MW ICE within the Afrikaans and Sotho previously approved PV plants on the Bokpoort Farm, however, this Basic Assessment (BA) study is applicable to the entire development of the two individual ICE. The proposed positions of the ICE were planned taking into account the layout of other approved infrastructure e.g. PV plants and access routes, which will have to undergo an amendment process.

The draft consultation Basic Assessment Report (cBAR) and Environmental Management Programme (EMPr) was released for review and comment for a period of 30-days from 14 December 2021 to 04 February 2022, with Liquified Petroleum Gas (LPG) or Liquified Natural Gas (LNG) being one of the preferred fuel sources. Subsequent to the detailed engineering design, LPG/ LNG is no longer preferred to diesel, which has resulted in the update of the Atmospheric Impact Report (AIR). Therefore, this EMPr is being revised to reflect the preference for diesel.

ACWA Power has indicated that the development will be funded from local and international sources and hence the environmental studies for the proposed development would need to comply with the International Finance Corporation Performance Standards (IFC) 2012 and the Equator Principles.

The locality map of the two additional ICE is provided in **Figure 1**. The layout is provided in ***Annexure A***.

This EMPr has been prepared as part of the BA study to provide specific environmental guidance to the relevant parties for the planning, construction, rehabilitation of the proposed infrastructure with regards to their responsibilities in terms of the environmental specification.

The Competent Authority, being the Department of Forestry, Fisheries and the Environment (DFFE) requires that an EMPr be submitted in accordance with Section 19 of the EIA Regulations 2014 (as amended). Section 19 should be read in conjunction with Section 24N of the NEMA (Act No. 107 of 1998) (as amended).

In the context of this project and in most cases, the EMPr is primarily based on the principles of NEMA, which therefore bestows a 'Duty of Care' on those who cause, have caused or may in future cause pollution or degradation of the environment, as per Section 28(1) of the NEMA.

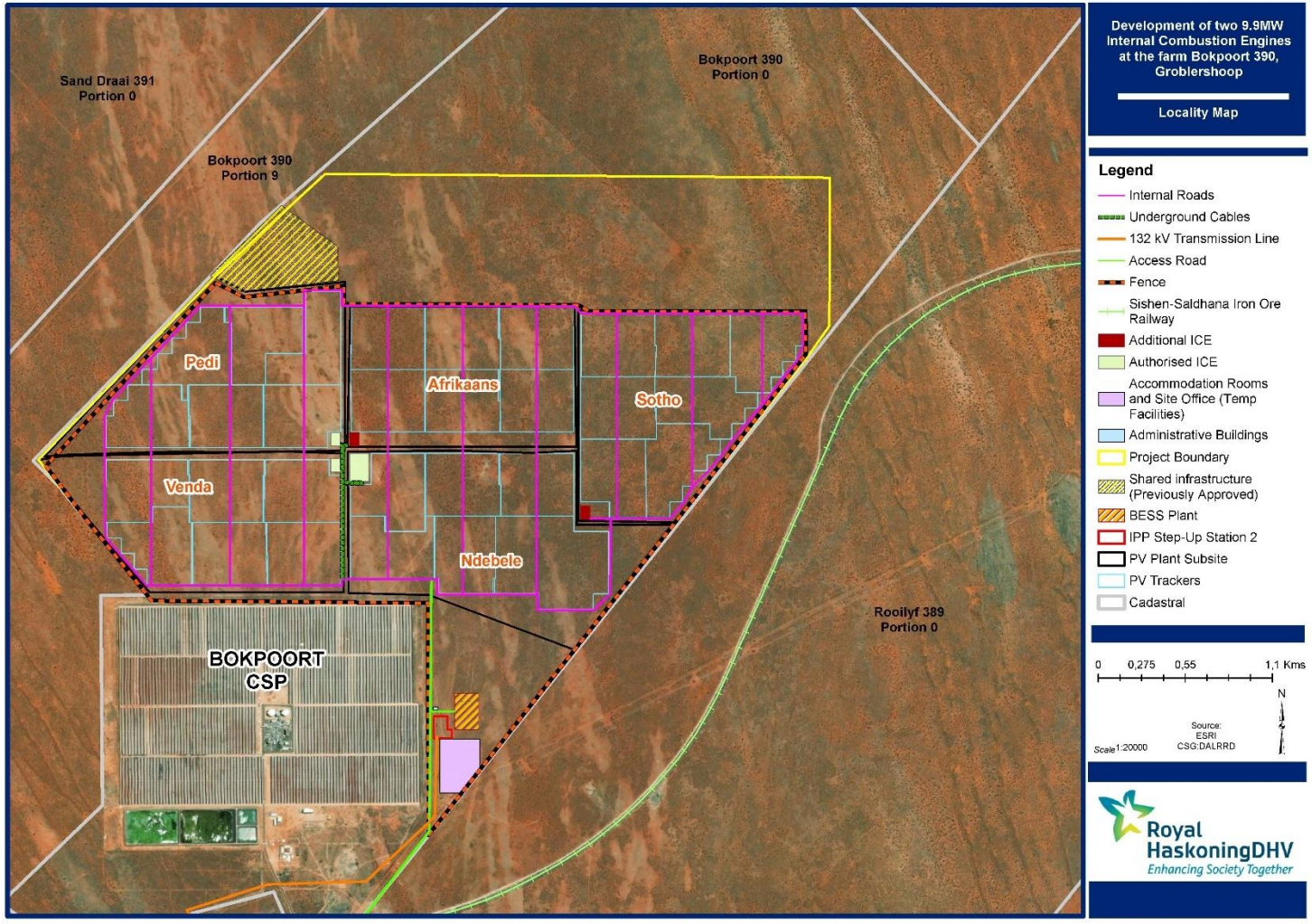

Figure 1: Locality map

1.1 Purpose of the Environmental Management Programme (EMPr)

The purpose of the EMPr is to prescribe mitigation and management measures to ensure social and environmental impacts, risks and liabilities identified during the BA study are effectively managed during the construction phase and to further ensure the enhancement of the positive environmental benefits of the development are achieved.

Therefore, the EMPr specifies the mitigation and management measures to which ACWA Power is committed, should the EA be granted, and details how ACWA Power and/ or other responsible parties will mobilise organisational capacity and resources to implement these measures.

The EMPr is developed in terms of the Specific Environmental Management Acts (SEMAs) and enforces that construction activities meet the requirements of existing environmental legislation and good environmental practice in terms of national and international norms and standards.

Core to the purpose of the EMPr is to implement the 'mitigation hierarchy' (DEA et al., 2013), which is illustrated in **Figure 2**.

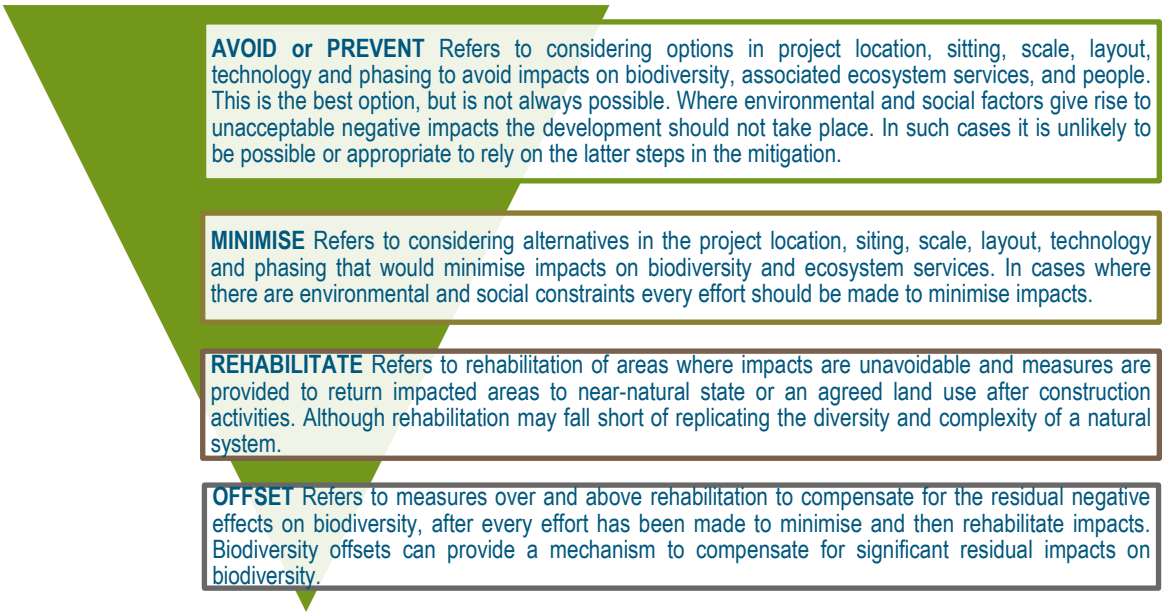

Figure 2: Mitigation hierarchy

1.2 Objectives of the EMPr

The EMPr has the following objectives:

- To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the proposed project.
- To identify measures that could optimise beneficial impacts.
- To establish a method of monitoring and auditing environmental management practices during all phases of development.
- Specify time periods within which the measures contemplated in the EMPr must be implemented.
- To provide an environmental awareness plan.

It must be noted that the EMPr is a dynamic document that will be periodically reviewed and updated. The approach adopted for this EMPr is derived from the Deming Cycle (**Figure 3**), a cycle of continuous improvement that entails the reiterative actions of plan, do, check, act, and critically to then return to the planning phase. When applicable, changes to the EMPr are to be approved in accordance with legislative requirements.

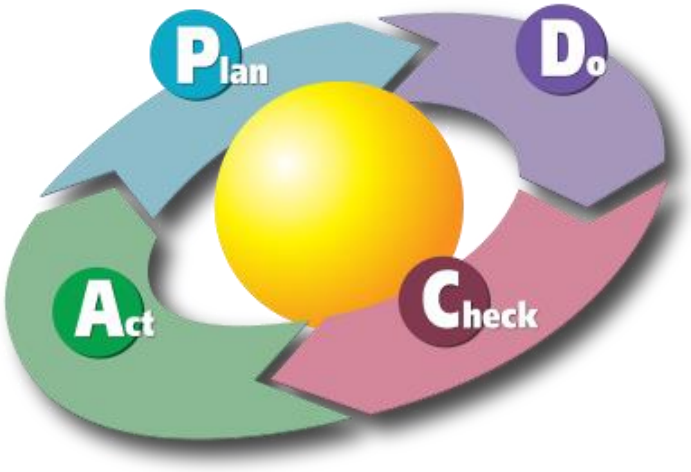

Figure 3: Deming cycle of continuous improvement

1.3 Scope of the EMPr

In accordance with the requirements of the NEMA, this EMPr is to be implemented by the Developer as well as any employee, contractor, agent, or sub-contractor appointed to act on behalf of the Developer in the execution of the project, in order to ensure environmental compliance on site.

The specifications outlined in this EMPr are thus applicable to all activities undertaken by the Developer as well as their appointed contractors and all persons involved in the execution of the works, including sub-contractors, the workforce, suppliers, and volunteers, for the duration of construction, operation and future maintenance.

1.4 Structure of the EMPr

The EMPr provides proposed mitigation and management measures for the following phases of the project (**Table 1**).

Table 1: Different Phases of the project construction

Phase	Description
Pre-Construction (Planning & Design)	This section will provide guidelines on pre-construction activities including site establishment and clearance; environmental induction and training and awareness; site access and health and safety.
Construction	This section will provide guidelines on construction methods and considerations.
Operations	This section will provide guidelines on the operational phase.

Post-Construction / Rehabilitation	This section of the EMPr provides management principles for the rehabilitation, maintenance and operational phases of the project. This will include best practice, procedures and responsibilities as required for various associated activities.

The content of this EMPr is consistent with the requirements as set out in Section 19 (Appendix 4) of the EIA Regulations 2014 (as amended) and is cross-referenced as follows (**Table 2**).

Table 2: Compliance with Appendix 4 of the EIA Regulations 2014 (as amended)

EMPr Requirements according to Appendix 4 of GN R. 982 (326)	Section in the EMPr & Appendix
(1) An EMPr must comply with section 24N of the Act and include -	
a) Details of – (i) the EAP who prepared the report; and (ii) the expertise of that EAP to prepare an EMPr, including a CV.	**Section 1.6.2**
b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	**Section 2**
c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	**Figure 8**
d) A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including - (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities.	**Section 8; 9; 10**
e) A description and identification of impact management outcomes required for the aspects contemplated in paragraph (d).	**Section 8; 9; 10**
f) A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	**Section 8; 9; 10**
g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	**Section 8; 9; 10**

EMPr Requirements according to Appendix 4 of GN R. 982 (326)	Section in the EMPr & Appendix
h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	**Section 8; 9; 10**
i) An indication of the persons who will be responsible for the implementation of the impact management actions.	**Section 8; 9; 10**
j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.	**Section 8; 9; 10**
k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).	**Section 8; 9; 10**
l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	**Section 5**
m) An environmental awareness plan describing the manner in which - (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.	**Section 6**
n) Any specific information that may be required by the competent authority.	**NA**
(2) Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	**NA**

1.5 Applicable Documentation

The following environmental documentation is applicable for the project, and must be read in conjunction with this EMPr:

- Environmental Authorisation/ s – once issued;
- Final Consultation Basic Assessment for the Proposed Development for the Proposed Development of Two 9.9MW Internal Combustion Engines (ICE) on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape including all annexures and specialist studies; and
- Any other permit and/ or licence issued in respect to this project.

1.6 Project Team Details

1.6.1 Project Developer

The Developer is the ACWA Power and the details of the responsible person are listed in **Table 3**.

Table 3: Details of the developer

Applicant	ACWA Power Project DAO (RF) Pty Ltd	
Representative	Ashley Singh	
Physical Address	[redacted]	
Telephone		

Applicant	ACWA Power Project DAO (RF) Pty Ltd
E-mail	[redacted]

1.6.2 Details of the Environmental Assessment Practitioner

The team responsible for the preparation of the EMPr is presented in **Table 4** below.

Table 4: Details of the Environmental Team

Consultant	Royal HaskoningDHV	Royal HaskoningDHV
Contact Persons	Prashika Reddy	Seshni Govender
Postal Address	PO Box 867, Gallo Manor, 2191	
Telephone	[redacted]	087 352 1592
E-mail	[redacted]	Seshni.govender@rhdhv.com
Qualification	BSc (Hons) Geography BSc (Hons) Botany	BSc (Hons) Environmental Science
Expertise	Prashika Reddy is a Senior Environmental Scientist with 20 years' experience in various environmental fields including: EIAs, EMPrs, PPP and environmental monitoring and audits. She is/ has been part of numerous multi-faceted large-scale projects, including the establishment of linear developments (roads and powerlines), industrial plants, electricity generation plants, mixed-use developments and mining projects. She is a Professional Natural Scientist (400133/10) with the South African Council for Natural Scientific Professions as well as a Registered EAP with EAPASA (2019/917).	Seshni Govender is an Environmental Consultant with 8 years' Environmental Consultant with eight (8) years working on compliance and strategic planning projects across South Africa. I have been involved in numerous Screening Studies, Basic Assessment, Water Use License projects, including complex integrated licensing that requires understanding cumulative environmental impacts. She is a Professional Natural Scientist (132741) with the South African Council for Natural Scientific Professions.

CVs of the Environmental Team are provided in ***Annexure A***.

2 PROJECT DESCRIPTION

2.1 Property Description

The project area is located on the north eastern portion of the Farm Bokpoort 390 RE which is 20km north-west of the town of Groblershoop within Ward 3 of the !Kheis Local Municipality in the ZF Mgcawu District Municipality, Northern Cape Province. The total project area designated for the development is approximately 1500ha with the ICE occupying 1.5ha (0.5ha actual development footprint). The project site is situated approximately 77km south-east of Upington. The Orange River is located approximately 12km south-west of the site.

The landowner details as well as 21-digit surveyor general codes are provided in **Table 5**. Consent has been received from ACWA Power SolAfrica Bokpoort CSP.

Table 5: Property details

Property	Owner	21 Digit Surveyor-General Code
Farm Bokpoort 390 RE	ACWA Power SolAfrica Bokpoort CSP Power Plant (Pty) Ltd (RF)	C02800000000038900000

2.2 Project Location and Co-ordinates

The corner point co-ordinates of each ICE are provided in **Table 6**.

Table 6: Project co-ordinates

PV Plant Identifier	Co-ordinates – ICE
Afrikaans ICE	A: 28°42'37.82"S; 22° 0'0.63"E, B: 28°42'37.66"S; 22° 0'2.53"E C: 28°42'40.40"S; 22° 0'2.62"E, D: 28°42'40.39"S; 22° 0'0.61"E

2.3 Technical Description

Combustion engines are a well-known technology used in automobiles, trucks, construction equipment, marine propulsion, and backup power applications. Combustion engines employ the expansion of hot gases to push a piston within a cylinder, converting the linear movement of the piston into the rotating movement of a crankshaft to generate power. While the steam engines that powered the industrial revolution were driven by externally produced steam, modern combustion engines used for electric power generation are internal combustion engines in which an air-fuel mixture is compressed by a piston and ignited within a cylinder. Reciprocating ICE are characterized by the type of combustion: spark-ignited (SG) or compression-ignited, also known as diesel or gas.

In diesel engines, air is compressed until the temperature rises to the auto-ignition temperature of the fuel. As the fuel is injected into the cylinder, it immediately combusts with the hot compressed air and expanding combustion gases push the piston to the bottom of the cylinder. A built-in heat exchanger for turbo cooling that improves shock load response and facilitates remote cooling, providing flexibility in indoor installations (Figure 4).

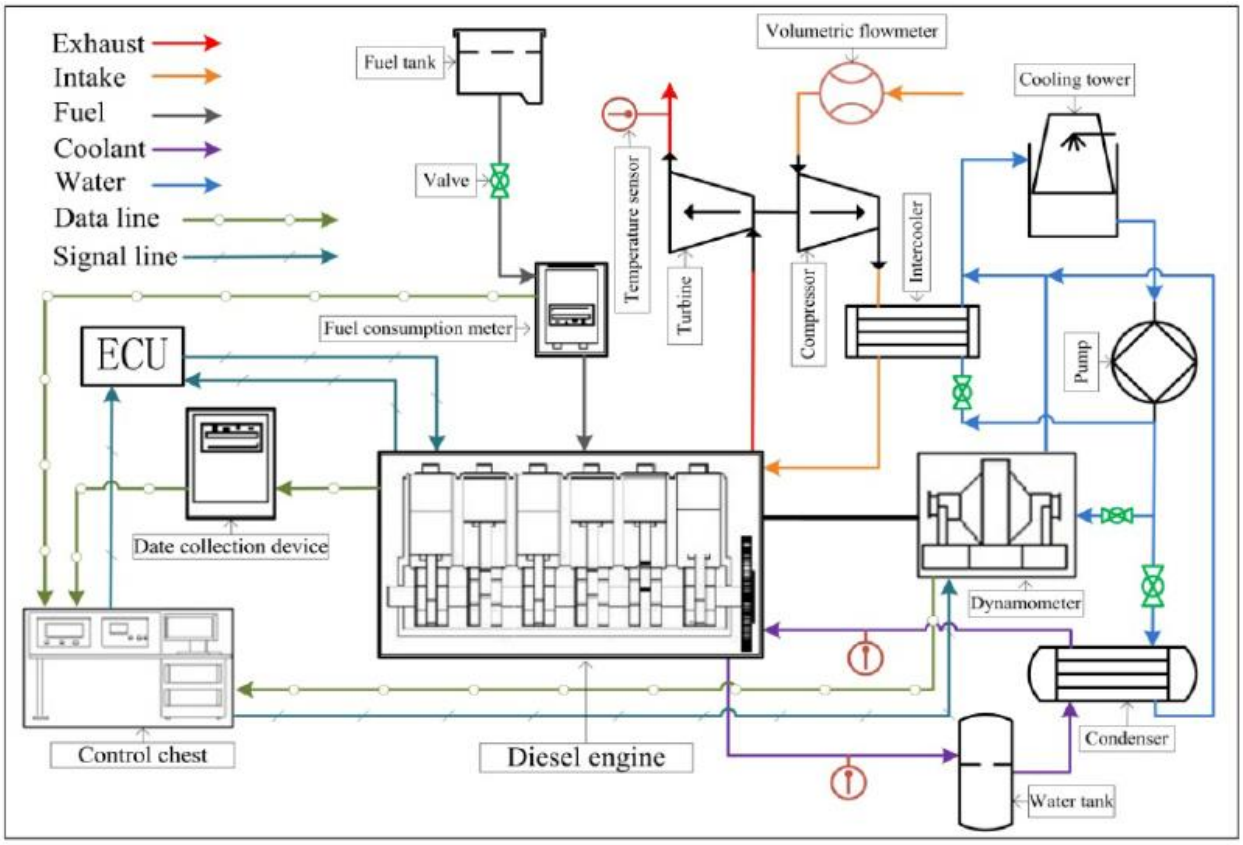

Figure 4: Example of a diesel engine flow chart

For Project DAO, high speed engine four stroke generating set will be applied (Figure 5**Error! Reference source not found.**). The primary fuel will be diesel. The diesel will be transferred to the plant via oil road tankers and, the interface point will be at the uploading station inside the power plant boundary. The engine and alternator are a containerised infrastructure (Figure 6), that will be placed on an appropriately bunded civil plant areas. The developer will be responsible for the diesel via a fuel supplier.

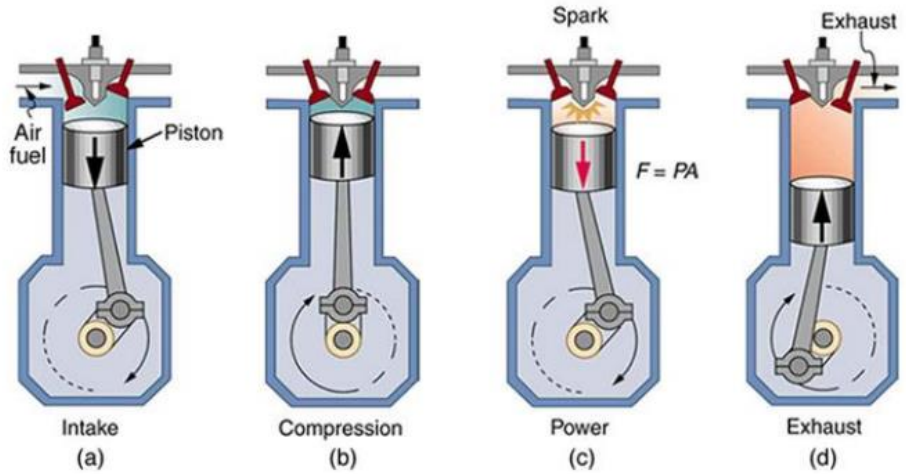

Figure 5: The four stages of combustion in a four-reciprocating engine

Figure 6: Example of a containerised ICE

The components of an ICE are presented in Figure 7.

Figure 7: Layout of a *Himoinisa* ICE

(Key – 1: Remote cooling system, 2: Heat insulated engine parts, 3: Battery disconnector, 4: Air filter, 5: Refuelling connectors)

The ACWA Power Project DAO is a multi-technology hybrid power plant that is designed to meet the requirements of the Risk Mitigation IPP Procurement (RMIPPPP). The plant has a contracted capacity on the output side onto the transmission system of 150MW. The hybrid power plant consists of 326MW of Photovoltaic (PV), Battery Energy Storage System (BESS) of 540-560MWhrs and ICE of 49.5MW.

The project is dispatched according to needs of the off-taker that is limited to daily availability declarations. The plant is designed to meet its obligations of dispatch as per its available energy from the renewable components of the plant, so it can in essence be considered a PV and BESS power plant.

The RMIPPPP has a dispatchable period requirement of 16.5 hours per day. The RMIPPPP has a reliability test run requirement, that must be executed prior to the start of the operating period of the Power Purchase Agreement (PPA). The requirement of the reliability run is that the power plant must operate at full contracted capacity, 150MW, for the duration of 15 days with some additional starts and stops within that period. Failure to achieve the reliability run, results in the plant being rejected and not achieving the commercial operating date with the risk that the PPA can be terminated.

As the plant is primarily designed for renewable energy from the sun, ensuring a guaranteed 15-day window at 100% capacity of 150MW has a low probability. Hence the design incorporated the ICE component to primarily assist the reliability testing regime. The reliability run places reliance from an energy input from the ICE over a 24-hour period to compensate for low availability of sunlight during the testing regime. Depending on the specific period of the year (weather conditions of the day, seasonality of the year) of the reliability run, the ICE may run for a full 24-hour period, charging the batteries in those periods that are not dispatchable. The design has catered for certain quantity of diesel to be stored at site for the reliability run requirements with a logistic supply solution to meet additional diesel requirements, should it be required.

During the operational phase of the project, it is envisaged that the ICE plant will not be required to provide any energy output to the grid. However, from a prudent operating perspective and to ensure that the ICE plant is appropriately maintained, a start-and-stop regime is envisaged to sustain plant integrity. To meet these requirements, the ICE plant will be operated for 2 hours per week during the operational phase of the plant for 20 years. The plant will use diesel delivered to site by tanker truck for thermal generation of electricity in reciprocating engines. The diesel will be stored in containerised storage tanks on-site. The ICE plants will include reciprocating engines, diesel storage, and ancillary infrastructure. The three authorised ICE plants situated at the Venda, Pedi and Afrikaans PV plants as well as the two additional ICE at the Afrikaans and Sotho PV plants will allow for individual fuel uploading, fuel storage and regasification system. Each ICE plant will have their own safety mechanisms in place such as fire extinguishers and exhaust systems.

2.3.1 Benefits of ICE in Renewable Projects

- A combustion engine power plant can start and ramp to full load very quickly due to rapid ignition of fuel within the cylinders and the coordinated starting of multiple generating sets.
- Reciprocating ICE often have a standardized, modular design that minimises construction time. The modular design of these units that can be operated in parallel and deployed as needed to match the changing power requirements and can serve an important function for the stability of electricity transmission grids.

Table 7 summarises the main technical details for an ICE and associated infrastructure.

Table 7: Technical details of the proposed ICE

Facility Component	Description/ Dimensions
Generating Capacity	9.9MW
Fuel Type	Diesel
Stack height	5.8m
Number of engines	Afrikaans: 11 engines
Fuel storage tanks	Afrikaans: 2 x 71.6m^3 and 1 x 35.3m^3 (Total volume = 178.5m^3)
Fuel volume	Combined capacity of 500m^3
Water requirements	Water for cooling which falls within the already assessed threshold i.e. 22 000m^3
Footprint	Site extent 1.5ha (0.5ha actual development footprint)

2.4 Sensitivity Map

The overall sensitivity map is included in **Figure 8** and ***Annexure B.***

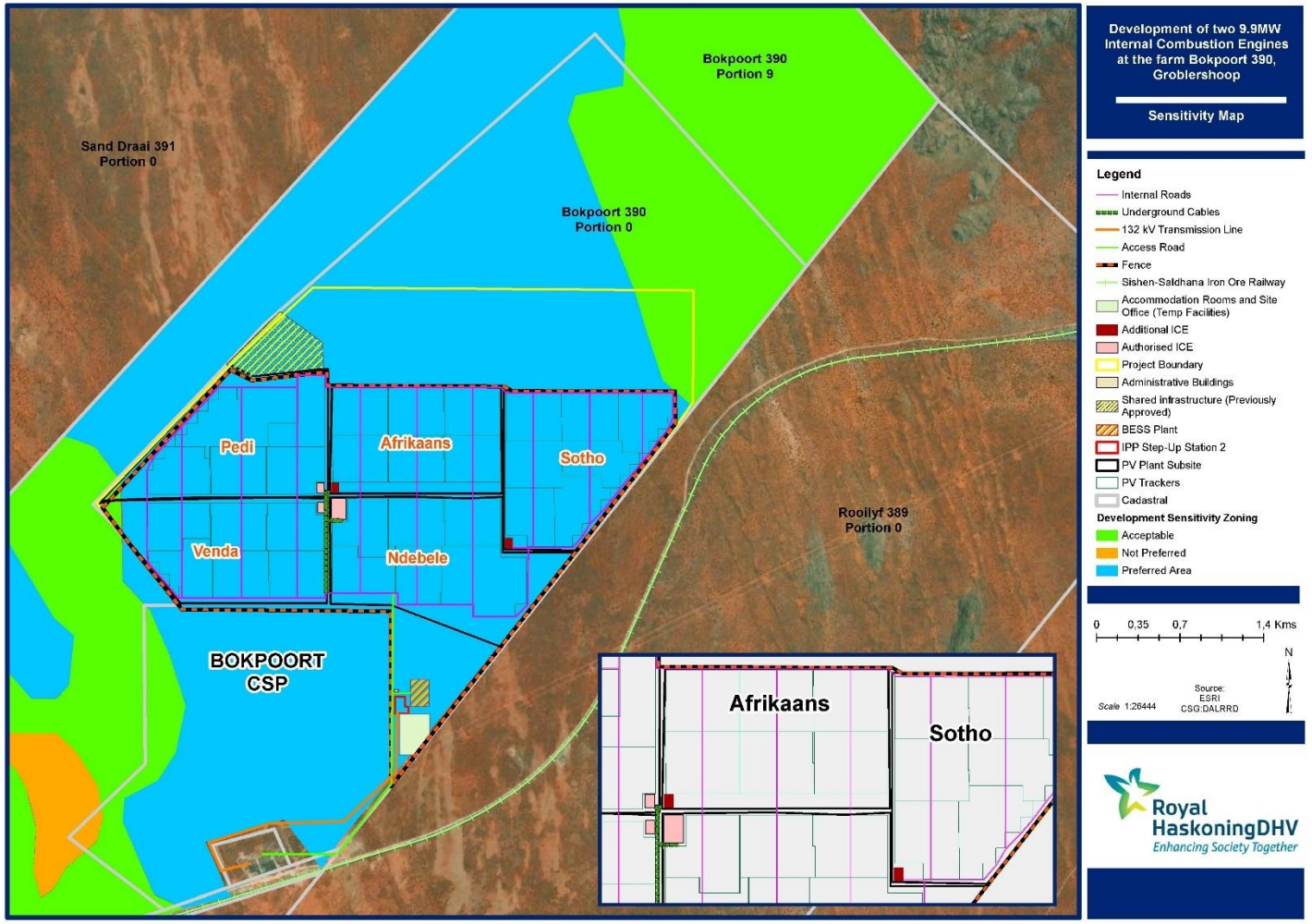

Figure 8: Sensitivity map

3 LEGAL FRAMEWORK

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant environmental legislation (**Table 8**) that need to be considered during this study.

This section outlines the legislation that is applicable to the proposed project and has been considered in the preparation of this report.

Table 8: Key legislation considered

Acts	Objectives, important aspects, associated notices and regulations
National Environmental Management Act, 1998 (Act No. 107 of 1998)(as amended)	***Objectives:*** 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 co-ordinating environmental functions exercised by organs of state. ***Relevant Notices and Regulations:*** ▪ Environmental Impact Assessment Regulations, 2014 (GNR 326 in GG 40772 as amended) ▪ Listing Notice 1 (GNR 327) as amended ▪ Listing Notice 2 (GNR 325) as amended ▪ Listing Notice 3 (GNR 324) as amended ***Relevance to the proposed project:*** ▪ Development must be socially, environmentally and economically sustainable. ▪ Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated; the social, economic and environmental impacts of activities including disadvantages and benefits, must be considered, assessed and evaluated and decisions must be appropriate in the light of such consideration. ▪ 'Polluter Pays' principle. ▪ Any activity that is proposed and which is listed in the NEMA EIA Regulations, requires environmental authorisation.
National Water Act (Act No. 36 of 1998) (as amended)	***Objectives:*** The National Water Act (NWA) is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations. ***Relevance to the proposed project:*** ▪ Sustainable protection, use, development and conservation of water resources – including aquatic ecosystems. ▪ Defines 11 water uses and provides licencing procedures.

Acts	Objectives, important aspects, associated notices and regulations
	Notices and Regulations: ▪ General Authorisation in terms of Section 39 of the National Water Act (Act No. 36 of 1998, Water Uses Section 21 (a) and (b) (GN in GG 40243 of 02 September 2016). ▪ General Authorisation in terms of Section 39 of the National Water Act (Act No. 36 of 1998, Water Uses Section 21 (c) and (i) (GN in GG 40229 of 26 August 2016).
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Section 32 - Control of dust. Section 34 - Control of noise. Section 35 - Control of offensive odours. ▪ Listed Activities and Minimum National Emission Standards published in 2013 (GN 893, in Government Gazette No. 37054) as amended by GN 551, 12 June 2015; GN 1207, 81 October 2018 and GN 687, 22 May 2019). ▪ Air Dispersion Modelling promulgated in GN 533, in Government Gazette No. 37804; 11 July 2014. ▪ National Ambient Air Quality Standards promulgated in GN 1210 on 24 December 2009, in Government Gazette No. 32816. ▪ National Dust Control Regulations published on the 1st of November 2013 (Government Gazette No. 36974 R.827). ▪ Declaration of Greenhouse Gases as Priority Air Pollutants (21 July 2017). ▪ National Greenhouse Gas Emission Reporting Regulations (03 April 2017).

3.1 Other Relevant Acts, Guidelines, Department Policies and Environmental Management Instruments

Table 9: Other relevant Acts, Guidelines, Department Policies and Instruments

Acts/Guideline/Policies/Environmental Management Instruments	Considerations
The Constitution (No. 108 of 1996)	Chapter 2 – Bill of Right Section 24 – Environmental Rights
National Environmental Management Biodiversity Act (Act No. 10 of 2004) and Regulations: ▪ **Threatened or protected species (GN 388)** ▪ **Lists of species that are threatened or protected (GN 389)** ▪ **Alien and invasive species regulations (GNR 506)** ▪ **Publication of exempted alien species (GNR 509)** ▪ **Publication of National list of invasive species (GNR 507)** ▪ **Publication of prohibited alien species (GNR 508)**	Provide for the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.
National Environmental Management: Waste Act (Act No. 59 of 2008) as amended	Section 17 - Every attempt must be made to reduce, recycle or re-use all waste before it is disposed.

Acts/Guideline/Policies/Environmental Management Instruments	Considerations
	Section 25 - All waste (general and hazardous) generated during construction may only be disposed of at appropriately licenced waste disposal sites. All waste management activities (e.g. recycling, treatment) meeting the relevant thresholds should be authorised under the National Environmental Management: Waste Act (Act No. 59 of 2008) [NEM:WA] (as amended) and Government Notice (GN) 921 of 29 November 2013 (as amended in 2015 and 2017). No person may commence, undertake or conduct a waste management activity listed GN 921 (as amended) unless a licence is issued in respect of that activity.
National Heritage Resources Act (Act No. 25 of 1999)	Section 34 - 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. Section 35 - No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site. Section 36 - No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. “Grave” is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place. Section 38 (a) - the construction of a road, wall, powerline, 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.
Electricity Regulation Act No. 4 of 2006 as amended by the Electricity Regulation Amendment Act No. 28 of 2007	These regulations regulate the use and generation of electricity.
Occupational Health and Safety Act (Act No. 85 of 1993)	Section 8 - General duties of employers to their employees. Section 9 - General duties of employers and self-employed persons to persons other than their employees.
Construction Regulations (2014)	Contractors must comply with the Construction Regulations which lay out the framework for construction related activities.
Other: Hazardous Substance Act (Act No. 15 of 1973) and Regulations	

Acts/Guideline/Policies/Environmental Management Instruments	Considerations
Conservation of Agricultural Resources Act (Act No. 43 of 1983) Civil Aviation Act (Act No. 13 of 2009) and Civil Aviation Regulations (CAR) of 1997 Electricity Act (Act No. 41 of 1987) Civil Aviation Authority Act (Act No. 40 of 1998) White Paper on Renewable Energy (2003) Integrated Resource Plan for South Africa (2019) Environmental Impact Assessment Guidelines for Renewable Energy Projects, GNR 989 of 2015 in terms of NEMA (Act No. 107 of 1998) Land Use Planning Ordinance (Ordinance 15 of 1985) National Road Traffic Act (Act No. 93 of 1996) Procedure to be followed in Applying for Environmental Authorisation for Large Scale Wind and Solar Photovoltaic Energy Development Activities in terms of Section 24(2)a of NEMA, 1998 when occurring in Geographical Areas of Strategic Importance (GG No. 114, 16 February 2018) National Climate Change Adaptation Strategy (2019) Version UE10 South African National Climate Change Response Policy (2011) Carbon Tax Act (Act No. 15 of 2019) National GN R154 National Noise Control Regulations SANS 10103:2008, the *Measurement and Rating of Environmental Noise with Respect to Annoyance, and to Speech Communication* SANS 10328:2008, *Methods for environmental noise impact assessments* ZF Mgcawu District Municipality Integrated Development Plan 2017-2022 Northern Cape PSDF (2012) Energy Policy !Kheis Local Municipality By-laws	

3.2 International Conventions and Agreements

Relevant environmental and social international conventions and agreements to which South Africa is a party that is applicable to this project are presented in **Table 10**.

Table 10: Relevant international conventions to which South Africa is a party[1] [2]

Convention/ Agreements
Convention on Biological Diversity (29 December 1993)
United Nations Framework Convention on Climate Change - Kyoto Protocol (23 February 2005)
Montreal Protocol on Substances That Deplete the Ozone Layer (1 January 1989)
United Nations Convention to Combat Desertification (26 December 1996)
United Nations Framework Convention on Climate Change (21 March 1994)
Stockholm Convention on Persistent Organic Pollutants (POPs) (17 May 2004)
The Fourth ACP-EEC Convention 15 December 1989 (Lome)
Convention concerning the Protection of the World Cultural and Natural Heritage 1972 (Paris)
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (24 February 2004)

[1] *Sources: United States Central Intelligence Agency World Fact book (www.cia.gov/library/publications/the-world-factbook/index.html)*
[2] *Schlechter, M., & Baxter, B. 2016. Final EIA Report: Proposed 75MW Photovoltaic (PV2) Solar Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape. Golder Associates. Ref 14/12/16/3/3/2/880.*

Convention/ Agreements
Paris Agreement adopted on 12 December 2015 at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC CoP21)

3.3 International Standards

3.3.1 International Finance Corporation Performance Standards

ACWA Power is committed to complying with the IFC Performance Standards (PS) on social and environmental sustainability. These were developed by the IFC and were last updated on 1st January 2012.

The PS comprise of eight performance standards as described in **Table 11**.

Table 11: IFC Performance Standards

Objective	Applicability
PS 1: Assessment and Management of Environmental and Social Risks and Impacts Guidance note on the categorisation of projects during project screening, requirements for institutional capacity and requirements for public consultation and disclosure.	This Basic Assessment Study supported by comprehensive specialist assessments that was assessed as part of the initial investigations for the seven authorised ICE, the respective specialists (***Appendix C1 – C8 of the BAR***) have provided assessments on the addition of the ICE components which has identified environmental and social risks and impact of the project and provided mitigation measures to enhance positive impacts and minimise negative impacts, where applicable when considering the addition of the ICE component. The impact assessment is consistent with Good International Industry Practices (GIIP) and takes into account the nature, extent, duration, intensity, probability and significance of the identified impacts both before and after mitigation measures (***Chapter 7 of the BAR***). Cumulative impacts that result from the incremental impacts on areas or resources directly impacted by the project have also been identified and noted in the study (***Chapter 7 of the BAR***). The EMPr (***this document***) provides the actions for the management of identified environmental impacts and a detailed outline of the implementation programme. The EMPr provides strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring. Extensive engagement has taken place with project affected people for the previously authorised ten PV plants and seven ICE and will also continue for the addition of the two additional ICE components (***Chapter 6 of the BAR***).
PS 2: Labour and Working Conditions Recognises that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of	The overall project development (Project DAO) will provide employment opportunities for 100 – 250 people during the construction phase and 20 – 40 people during the operations phase.

Objective	Applicability
the fundamental rights of workers, including health and safety. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention and can jeopardise a project.	Prior to development, human resource policies and procedures, working conditions and terms of employment, equal opportunity, retrenchment policy and a formal grievance mechanism must be established to promote the fair treatment, non-discrimination and equal opportunity of workers in line with national employment and labour laws. Further to this, the Developer also has an obligation to provide a safe and healthy work environment for its employees in terms of the Occupational Health and Safety Act (Act No. 85 of 1993).
PS 3: Resource Efficiency and Pollution Prevention Recognises that increased economic activity and urbanisation often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. More efficient and effective resource use and pollution prevention and greenhouse gas emission avoidance and mitigation technologies enhance the efficiency and sustainability of the project.	South Africa's reliance on fossil fuels as a primary energy source is well known and coal combustion is the main contributor to carbon dioxide emissions, a greenhouse gas that has been linked to climate change. The recent RFP by DMRE, specified that the PV plants may not use auxiliary power from the grid and has to be operational for a specific time period at the start up, in anticipation of the operational start up period possibly occurring during unfavourable weather conditions. The ICE does utilise non-renewable sources of fuel, this is expected to be utilised for a limited time period to boost the viability of the project. An Air Quality and Climate Change Assessment (***Appendix C4 of the BAR***) has been commissioned and the subsequent impacts associated have been assessed with the recommendations and mitigation measure being incorporated in the BAR and the EMPr (**this document**) to mitigate all impacts as effectively as possible. Pollution prevention measures contained in this report and EMPr (**this document**) are in line with GIIP and contain comprehensive management outcomes and impact management actions for waste generation during the different project phases as well as the storage and use of hazardous substances as well as the generations of emissions associated with the ICE that may have a potential to have a detrimental impact on the environment.
PS 4: Community Health, Safety and Security Recognises that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. This Performance Standard addresses the Promotor' responsibility to avoid or minimise the risks and impacts to community health, safety, and security.	The proposed project will be designed, constructed, operated and decommissioned in accordance with GIIP. Mitigation measures and controls are provided in the EMPr (***Appendix E***) for spills, incidents and pollution control as well as for containment losses of hazardous substances and generation of emissions associated with the ICE. An Emergency Preparedness and Response Plan must be compiled by the Developer for the project prior to implementation. Traffic and dust impacts have been assessed as being moderate prior to the implementation of mitigation measures and have to be carefully managed as these impacts have been documented during the stakeholder engagement process as being major safety and nuisance factors. An adequate resolution needs to be obtained regarding the upgrading (re-gravelling, surfacing etc.) of existing roads and

Objective	Applicability
	intersections in the study area. A separate environmental process has been initiated and under review for the road.
PS 5: Land Acquisition and Involuntary Resettlement Recognises that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use, while temporary or permanent.	No physical or economic displacement and resettlement of people will take place. In terms of land acquisition, the study area is owned by ACWA Power SolAfrica Bokpoort CSP Power Plant (Pty) Ltd (RF).
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources Recognises that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development.	The project will not impact any proclaimed protected biodiversity area. The initial assessment[3] of the critical habitats have shown that apart from the rocky outcrop to the north of the study area associated with the Koranna-Langeberg Mountain Bushveld Vegetation type which is classified as a Natural Habitat, the calcareous low shrub plains, open shrub plains, open shrub duneveld and transformed areas are classified as Modified Habitats. This rocky outcrop is not affected by the proposed project. The Biodiversity Assessment (***Appendix C2***) was compiled with impacts managed in line with the mitigation hierarchy. No impacts were identified that could not be mitigated to an acceptable level. Mitigation measures associated with the protection of fauna and flora and management of alien invasive species have been included in the EMPr (**this document**). The Ecological Walkthrough (***Annexure C***) recommended that it is not feasible to remove or relocate tree species found in the study area e.g. *Boscia albitrunca, Vachellia erioloba* and *V. haematoxylon*, thus all trees within the development footprint will be removed and destroyed. Permits will need to be obtained from NCDENC. With respect to the other species of conservation concern (SCC) that occur on site, which are mostly restricted to the calcareous low shrubland, these species could be rescued and relocated to surrounding areas. They could also be used as part of the project's rehabilitation plan, particularly if they can be temporarily housed during the construction phase, thereby reducing the total number of plants that would be lost from site. With respect to relocation, it is very important that the relocation sites are thoroughly investigated, to prevent the relocation sites being disturbed through the artificial addition of plant species. It

[3] *Bathusi Environmental Consulting cc.2019. Ecological Basic Impact Assessment of the proposed 200 MW Solar Power Development that will be situated on the Remaining Extent of Farm Bokpoort 390 within the !Kheis Local Municipality (ZF*

Objective	Applicability
	is not practical to assume that all the species can be rescued and relocated particularly where large amounts of plants are present, such as the in the case of the *Acanthopsis hoffmannseggiana* and the *Aloe claviflora*, under these circumstances its best to try and rescue what is practical. These species are well represented in the surrounding area thus indicating that the loss from site would not result in a loss of the species from the immediate area. The *Euphobia davyi* and *Hoodia gordonii* should be removed and relocated. A Biodiversity Offset Feasibility Investigation has been considered for the entire project inclusive of the PV plants, ICE and other infrastructure on the Bokpoort farm – ***Appendix G** of the main BAR*.
PS 7: Indigenous Peoples Recognises that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalised and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development.	The Socio-economic study[4] [5] [6] confirmed that there is no evidence of the presence of any indigenous people residing or utilising the project area and immediate surrounds.
PS 8: Cultural Heritage Recognises the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that protect cultural heritage in the course of their project activities.	This Basic Assessment Study supported by comprehensive specialist assessments that was assessed as part of the initial investigations for the seven authorised ICE, the respective specialists (***Appendix C1 – C8 of the BAR***) have provided assessments on the addition of the ICE components which has identified environmental and social risks and impact of the project and provided mitigation measures to enhance positive impacts and minimise negative impacts, where applicable when considering the addition of the ICE component. The impact assessment is consistent with Good International Industry Practices (GIIP) and takes into account the nature, extent, duration, intensity, probability and significance of the identified impacts both before and after mitigation measures (***Chapter 7 of the BAR***). Cumulative impacts that result from the incremental impacts on areas or resources directly impacted by the project have also been identified and noted in the study (***Chapter 7 of the BAR***). The EMPr (**this document**) provides the actions for the management of identified environmental impacts and a detailed outline of the implementation programme. The EMPr provides

[4] *Smith, T; de Waal, D. 2016. Socio-economic Impact Assessment for the proposed 75 MW Photovoltaic (PV1) Solar Facility (Bokpoort II Solar Development). Report No 1400951-302448-18.*
[5] *Smith, T; de Waal, D. 2016. Socio-economic Impact Assessment for the proposed 75 MW Photovoltaic (PV2) Solar Facility (Bokpoort II Solar Development). Report No 1400951-303533-1.*
[6] *Smith, T; de Waal, D. 2016. Socio-economic Impact Assessment for the proposed 150 MW CSP Tower Facility (Bokpoort II Solar Development) on the Remaining Extent of the Farm Bokpoort 390, Northern Cape. Report No 1400951-299899-7.*

Objective	Applicability
	strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring. Extensive engagement has taken place with project affected people for the previously authorised ten PV plants and seven ICE and will also continue for the addition of the two additional ICE components (***Chapter 6 of the BAR***).

4 ENVIRONMENTAL CODE OF CONDUCT

One of the objectives of the EMPr is to ensure that all the workforce, Contractors, sub-contractors and construction staff, service providers and suppliers have an understanding of environmental issues and potential impacts on site activities. This environmental code of conduct provides the basic rules that must be strictly adhered to. It is the responsibility of the Contractor to enforce that each contractor, sub-contractor service providers and suppliers understand and adhere to the Code of Conduct.

ENVIRONMENTAL CODE OF CONDUCT

ALL PERSONS ARE OBLIGED TO KEEP TO THE RULES OF THIS CODE OF CONDUCT

Ignorance, negligence, recklessness or a general lack of commitment resulting in environmental degradation or pollution must not be tolerated!

ENVIRONMENTAL RULES

- Only use authorised accesses;
- Dispose waste to the correct waste containers provided – do not litter;
- Use the toilet facilities provided;
- Do not dispose contaminated wastewater to the stormwater or the environment;
- Immediately report any spillage from containers, plant or vehicles;
- Do not burn or bury any waste;
- Do not trespass onto private properties;
- Do not trespass into ‘No-Go’ Areas;
- Never tease, catch or set devices to trap or kill any animal;
- Never damage or remove any trees, shrubs or branches unless it forms part of working instructions and authorisation has been received;
- Do not deface, draw or cut lettering or any other markings on trees, rocks or buildings in the area; and
- Know the environmental incident procedures.

5 MANAGEMENT AND MONITORING PROCEDURES

5.1 Organisational Structure and Responsibilities

ACWA Power is the Primary Developer for the project. Each of the team roles are elaborated on in terms of their specific duties in **Table 12**.

Table 12: Roles and responsibilities

Role	Responsibility
Developer (ACWA Power or End User)	***Role:*** The Developer is ultimately responsible for ensuring compliance with the environmental specification and all relevant legislation and is accountable for any non-compliances with this EMPr and any other conditions of approval or non-compliances with legislation. ***Responsibilities:*** ▪ Appoint a Project Manager (PM) to assume ultimate project responsibility; ▪ Appoint an experienced Environmental Control Officer (ECO) to monitor environmental compliance according to the EA, Final Approved EMPr and all other relevant licences and permits; ▪ Be fully conversant with the conditions of the EA, EMPr and all other licences and permits; ▪ Ensure the EA, Final Approved EMPr and all other relevant licences and permits are in the tender documentation issued to prospective Contractors; ▪ Request for, review and approve the method statements prepared by the Contractor; ▪ Review and comment on environmental assessments and/ or reports produced by the Contractor and ECO; ▪ Discuss with the ECO the application of penalties for the infringement of the Environmental Specifications, another possible enforcement measures necessary; ▪ Issue penalties as and when necessary based on the recommendation of the ECO; ▪ Arrange information meetings for or consult with the public about the impending construction activities; ▪ May on the recommendation of the PM and/ or ECO order the Contractor to suspend any or all works on-site if the Contractor or his sub-contractor/ supplier fails to comply with the said environmental specifications for the project; and ▪ Ensure the EMPr is implemented as well as revised and updated as and when required.
Project Manager (Developer's Engineering Representative on Site)	***Role:*** The PM reports directly to the Developer, oversees site works and liaises with the Contractor(s) and the ECO. ***Responsibilities:*** ▪ Implement the environmental specification on site;

Role	Responsibility
	▪ Be fully conversant with the conditions of the EA, EMPr and all other licences and permits; ▪ Ensure the EA, Final Approved EMPr and all other relevant licences and permits are in the tender documentation issued to prospective Contractors; ▪ Request for, review and approve the method statements prepared by the Contractor; ▪ Review and comment on environmental assessments and/ or reports produced by the Contractor and ECO; ▪ Undertake regular site visits and ensure environmental specifications are implemented; ▪ Monitor compliance with the requirements of the specification; ▪ Assess the Contractor's environmental performance in consultation with the ECO from which a brief monthly statement of environmental performance is drawn up for record purposes and to be reported on within project meetings; and ▪ A Pre-construction survey of the site must be undertaken of the entire works area and all support infrastructure (such as site construction camps) etc. This must include a complete photographic record and may also include video recordings.
Principal Contractor including Sub-Contractors, Service Providers, Suppliers and Maintenance Contractor	The Contractor must: ▪ Be fully conversant and comply with the EA, Final Approved EMPr and all other relevant licences and permits; ▪ Implement the EMPr for the duration of the contract; ▪ Manage and maintain the Site Environmental File for the duration of the contract; ▪ Appoint a suitably qualified Site Environmental Officer whose responsibility includes on-going monitoring and control of all construction activities concerning minimisation of environmental impact and adherence to all relevant environmental documentation for the duration of the project; ▪ Supply method statements timeously for all activities requiring special attention as specified and/ or requested by the Developer, ECO and/ or PM during the duration of the Contract; ▪ Ensure any sub-contractors/ suppliers who are utilised within the context of the contract comply with the environmental requirements of the project, in terms of the specifications. The Contractor will be held responsible for non-compliance on their behalf; ▪ Provide trained and qualified resources - budgets, equipment, personnel and training - for the effective control and management of the environmental risks associated with the construction of the development; ▪ Bear the cost of any delays, with no extension of time granted, should his or her sub-contractors/ suppliers contravene the said specifications such that the Engineer orders a suspension of work. The suspension will be enforced until such time as the offending party(ies), procedure, or equipment is corrected; ▪ Bear the costs of any damages/ compensation resulting from non-adherence to the said specifications or written site instructions; ▪ Read and act on ECO reports and take cognisance of the information/ recommendations contained therein; ▪ Comply with all applicable legislation; ▪ Ensure that he/ she informs the PM timeously of any foreseeable activities which will require input from the ECO; ▪ Notify the ECO and PM, verbally and in writing at least ten (10) working days in advance of any activity he/ she has reason to believe may have significant

Role	Responsibility
	adverse environmental impacts, so that mitigatory measures may be implemented timeously; ▪ Ensure environmental awareness among his/ her employees, sub-contractors and workforce so that they are fully aware of, and understand the Environmental Specifications and the need for them; ▪ Maintain a register of environmental training for site staff and sub-contractor's staff for the duration of the contract; ▪ Communicate and liaise frequently and promptly with the ECO and the PM to ensure effective, proactive environmental management with the overall objective of preventing or reducing negative environmental impacts while enhancing positive environmental impacts; ▪ The Contractor will conduct all activities in a manner that minimises disturbance to the natural environment as well as directly affected residents and the public in general; and ▪ The Principal Contractor assumes responsibility and accountability of all appointed sub-contractors and must ensure their compliance with this EMPr.
Designated Environmental Officer (DEO) (Contractor's Representative)	***Role:*** Each Contractor must have a dedicated Environmental Officer (DEO) to ensure the day to day implementation of the environmental specification on site and to report to the PM and ECO. ***Responsibilities:*** The EO must: ▪ Be fully conversant and assist the Contractor in complying with the EA, Final Approved EMPr and all other relevant licences and permits; ▪ Be fully conversant with all relevant environmental legislation applicable to the project, and ensure compliance with them; ▪ Compile environmental method statements on behalf of the Contractor that will specify how potential environmental impacts will be managed in line with the requirements of the EA, Final Approved EMPr and other relevant licences and permits and where relevant environmental best practice, and how they will practically ensure that the objectives of the EMPr are achieved; ▪ Convey the contents of the EA, Final Approved EMPr and other relevant licences and permits to the Principal Contractor, sub-contractors and suppliers. Ensure all relevant information is relayed to construction site-staff in a manner that is easily understandable; ▪ Undertake daily and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EA, Final Approved EMPr and other relevant licences and permits; ▪ Take appropriate action if the specifications contained in the EA, Final Approved EMPr and other relevant licences and permits are not followed. This must include reporting transgressions to the Project Manager, Engineer and Principal Contractor, and may include the recommendation for penalties to be imposed on the Principal Contractor; ▪ Monitor and verify that environmental impacts are kept to a minimum, as far as possible;

Role	Responsibility
	▪ Order the removal from the construction site of any person(s) and/ or equipment in contravention of the specifications of the EMPr; ▪ Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting; ▪ Ensuring that the Written Warning Notification and Incidents Register is available on request; and ▪ Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. ***Required Qualifications:*** ▪ Environmental Management Diploma or Degree. ▪ Any traceable and verifiable experience working as an environmental resource on a previous project.
Environmental Control Officer (ECO)	***Role:*** The ECO must be employed by the Developer for the duration of the contract. The ECO must report to the relevant authorities as required by the conditions of approval. The ECO must monitor compliance against the environmental specification and report on such. ***Responsibilities:*** The ECO must: ▪ Be appointed for the construction phase of the development who will have the responsibility to ensure that the mitigation/ rehabilitation measures and

Role	Responsibility
	recommendations referred to in the EA are implemented and to ensure compliance with the provisions of the approved EMPr; ▪ Be appointed before commencement of any authorised activities; ▪ Once appointed, the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring of the Department of Forestry, Fisheries and the Environment (DFFE) at Directorcompliance@environment.gov.za; ▪ Be fully conversant with the conditions attached to the EA, EMPr and all other relevant licences and permits; ▪ Be familiar with the recommendations and mitigation measures of the associated EMPr for the project; ▪ Monitor the implementation of the EA, EMPr and all other relevant licences and permits during the pre-construction, maintenance and rehabilitation phases; ▪ Monitor that the Developer and Principal Contractor are in compliance with the EA, EMPr and all other relevant licences and permits at all times during the pre-construction, maintenance and rehabilitation phases of the project; ▪ Monitor all site activities monthly for compliance; ▪ Conduct bi-monthly audits of the site (one contract at a time) according to the EA, EMPr and all other relevant licences and permits, and report findings to the project team; ▪ Attend monthly site meetings and provide feedback on compliance, updates on outstanding reviews or approvals and highlight areas of potential environmental risk based on current and upcoming construction activities; ▪ Recommend corrective action for any environmental non-compliance at the site; ▪ Compile a monthly ECO report in line with the requirements of Appendix 7 of the EIA Regulations 2014 (as amended); ▪ Conduct once-off training (induction) with the Contractor on the requirements of the EA, EMPr, and other relevant licences and permits; and may include general environmental awareness based on best practice; and ▪ Must remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation. ***Required Qualifications*** ▪ Environmental Management Diploma or Degree. ▪ 5 years+ experience in environmental field. ▪ Traceable and verifiable ECO experience specifically in renewable energy developments. ***It must be noted that the responsibility of the ECO is to monitor compliance and give advice on the implementation of the EMPr and not to enforce compliance. Ensuring compliance is the responsibility of the Developer, Project Manager, Contractor and the Site Environmental Officer.***
Environmental Manager (EM)	▪ Be fully conversant and assist the Operations Manager in complying with the EAs, Operational EMPr and all other relevant licences and permits applicable to the plant. ▪ Be fully conversant with all relevant environmental legislation applicable to the plant and ensure compliance with them. ▪ Assist in the compilation of environmental specifications, operating instructions and company standards that will specify how potential environmental impacts will be managed in line with the requirements of the EAs, Operational EMPr and other relevant licences and permits and where relevant environmental best practice,

Role	Responsibility
	and how they will practically ensure that the objectives of the Operational EMPr are achieved; ▪ Convey the contents of the EAs, Operational EMPr and other relevant licences and permits to new contractors and service providers, if required; ▪ Conduct annual internal audits and internal reporting of the plant and surrounding areas in compliance with the Operational EMPr and other relevant licences and permits. ▪ Take appropriate action if the specifications contained in the EAs, Operational EMPr and other relevant licences and permits are not followed. ▪ Monitor and verify that environmental impacts are kept to a minimum, as far as possible. ▪ Order the removal from the plant, any person(s) and/ or equipment in contravention of the specifications of the Operational EMPr. ▪ Appoint an independent Environmental Auditor to annually monitor environmental compliance according to the EAs, Operational EMPr and all other relevant licences and permits.

5.2 Monitoring

A monitoring programme will be in place not only to ensure compliance with the EMPr through the contract/ work instruction specifications, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are or could result in significant environmental impacts for which corrective action is required.

A monitoring programme will be implemented for the duration of the construction phase of the project. This programme will include:

- Monthly audits will be conducted by the ECO for the duration of the construction activities including rehabilitation – the ECO shall undertake this environmental monitoring with the audits considering compliance with the EMPr.
- On-going monitoring is to be undertaken by the Contractor's DEO – this will include notification to the ECO in the event an incident takes place.
- External auditing may take place at unspecified times by the authorities and/ or other relevant authorities.
- The Contractor's DEO must undertake daily site inspections to ensure all legislative requirements are adhered to.

5.3 Reporting Procedures

5.3.1 Documentation

The following documentation must be kept on site in order to record compliance with the EMPr:

- An Environmental File which includes:
  - Copy of the EMPr and all appendices;
  - Copy of the EA;
  - Copy of all other licences/ permits;
  - Copy of relevant legislation;
  - Environmental Policy of the Main Contractor;
  - Environmental Method Statements compiled by the Contractor;
  - Written Warning Notifications;
  - Environmental Register, which must include:

- Complaints Register - including records of Complaints, and, minutes and attendance registers of all environmental meetings;
- Incident Register - including copies of notification of Emergencies and Incidents, this must be accompanied by a photographic record;
- Waste Documentation such as, but not necessarily limited to:
  - Waste Manifest Documents;
  - Weighbridge Receipts (for general waste);
  - Safe Disposal Certificates (SDCs) (for hazardous waste);
  - Waste Management Contractors Permits (to operate); and
  - Waste Management Licences (for recycling and disposal facilities) - if applicable.

- Material Safety Data Sheets (MSDSs) for all hazardous substances;
- Dust suppression register;
- Notification of Emergencies and Incidents in terms of Section 30 of NEMA (Act No. 107 of 1998) and Section 20 of the National Water Act (Act No. 36 of 1998).

A copy of the EA, the audit and compliance monitoring reports, and the approved EMPr, must be made available for inspection and copying –

- At the site of the authorised activity;
- To anyone on request; and
- Where the holder of the environmental authorisation has a website, on such publicly accessible website.

5.3.2 Environmental Register

The Contractor must establish an Environmental Register that includes:

- ECO Audit Reports and findings.
- Complaints Register.
- Incidents Register.

The Contractor must enforce that the following information is recorded for all complaints / incidents:

- Nature of complaint/ incident.
- Causes of complaint/ incident.
- Party(ies) responsible for causing complaint/ incident.
- Immediate actions undertaken to stop/ reduce/ contain the causes of the complaint/ incident.
- Additional corrective or remedial action taken and/ or to be taken to address and to prevent reoccurrence of the complaint/ incident.
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.
- Procedures to be undertaken and/ or penalties to be applied if corrective or remedial actions are not implemented.
- Copies of all correspondence received regarding complaints/ incidents.

The above records will form an integral part of the Contractors' records. These records must be kept in the Site Environmental File on site, and must be made available for scrutiny; if so, requested by the Developer, ECO or relevant authorities.

5.3.3 Method Statements

To allow the mitigation measures in this document to be implemented, task-specific method statements must be developed for each set of tasks. A Method Statement details how and when a process must be carried out, detailing possible dangers/ risks, and the methods of control required. Method statements can include:

- Type of construction activity;
- Timing and location of the activity;
- Construction procedures;
- Materials and equipment to be used;
- Transportation of the equipment to/ from site;
- How equipment/ material must be moved while on site;
- Location and extent of construction site office and storage areas;
- Identification of impacts that might result from the construction activity;
- Methodology and/ or specifications for impact prevention/ containment;
- Methodology for environmental monitoring;
- Emergency/ disaster incident and reaction procedures (required to be demonstrated); and
- Rehabilitation procedures and continued maintenance of the impacted environment.

The Contractor must be accountable for all actions taken in non-compliance of the approved Method Statements. The Contractor must keep all the Method Statements and subsequent revisions on file, copies of which must be distributed to all relevant personnel for implementation.

As a minimum, the following Method Statements must be generated:

- Site establishment;
- Formalisation of any access or emergency vehicular routes;
- Cement mixing/ concrete batching;
- Contaminated water;
- Dust;
- Environmental awareness course(s);
- Environmental monitoring;
- Erosion control;
- Fire, hazardous and/ or poisonous substances;
- Fuels and fuel spills (must form part of the item above);
- Storage, handling and decanting of diesel (must form part of the item above);
- Personnel, public and animal safety;
- Rehabilitation of modified environment(s);
- Solid and liquid waste management;
- Sources of materials (including MSDSs);
- Soil management (including topsoil and stockpiles);
- Stormwater Management; and
- Wash areas.

Method Statement topics may be grouped together in certain instances reducing the need to produce stand-along statements covering each topic.

5.3.4 Environmental Emergency Response

According to NEMA (Act No. 107 of 1998) - “incident” means an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

According to Section 20 of the National Water Act (Act No. 36 of 1998), “incident” includes any incident or accident in which a substance - (a) pollutes or has the potential to pollute a water resource; or (b) has, or is likely to have, a detrimental effect on a water resource.

The Contractor's environmental emergency procedures must enforce responses to unexpected/ accidental actions/ incidents that could cause environmental impacts. Such incidents must include:

- Accidental discharges to water (i.e. into the watercourse) and land;
- Accidental spillage of hazardous substances (typically: oil, petrol, and diesel);
- Accidental damage to existing utilities e.g. sewer and water pipelines;
- Accidental toxic emissions into the air; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

An *Environmental Emergency Response Action Plan* is separate to the Health and Safety Plan as it is aimed at responding specifically to environmental incidents and must enforce and include the following:

- Construction employees shall be trained in terms of incidents and emergency situations;
- Details of the organisation (i.e. manpower) and responsibilities, accountability and liability of personnel;
- A list of key personnel and contact numbers;
- Details of emergency services (e.g. the fire department/ on-site fire detail, spill clean-up services) shall be listed;
- Internal and external communication plans, including prescribed reporting procedures;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures to be implemented; and
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

The Contractor and their sub-contractor(s), service providers and suppliers must comply with the environmental emergency preparedness and incident and accident-reporting requirements as per the relevant legal requirements.

5.3.5 Written Warning Notification(s)

A Written Warning Notification must be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This must be issued by the ECO to the Contractor in writing. Preceding the issuing of a Written Warning Notification, the Contractor must be given an opportunity to rectify the issue within an agreed timeframe. Failure to rectify the non-compliance within one (1) working week of the issue of the warning or a repeat non-compliance will result in a penalty.

The ECO must verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO and Contractor must close out the non-compliance.

5.3.6 Public Communication and Liaison with I&APs

The Developer must ensure that the adjacent landowners are informed and updated throughout the construction phase.

Sufficient signage must be erected around the site (including at the entrance), informing the public of the construction activities taking place. The signboards must include the following information:

- The name of the Contractor; and
- The name and contact details of the site representative to be contacted in the event of emergencies or complaint registration.

6 TRAINING AND ENVIRONMENTAL AWARENESS

The Developer is committed to promoting and implementing sustainability throughout their operations. As It is important to ensure that the Contractor has the level of environmental awareness and competence to enforce continued environmental due diligence and on-going minimisation of environmental harm. Training needs must be identified based on the available and existing capacity of site personnel (including the Contractors, sub-contractors, service providers and suppliers) to undertake the required EMPr management actions and monitoring activities. It is vital that all personnel are trained to perform their designated tasks to an acceptable standard.

The environmental training is aimed at:

- Promoting environmental awareness;
- Informing the Contractor of all environmental procedures, policies and programmes applicable;
- Providing generic training on the implementation of environmental management specifications;
- Providing job-specific environmental training in order to understand the key environmental features of the construction site and the surrounding environment. Job-specific training include: Spill response training; Snake handling, Training by an avifaunal specialist to identify potential Red Data species as well as the signs that indicate possible breeding by these species.
- The effectiveness of the environmental training will be reflected by the degree of conformance to EMPr requirements, the result of internal audits and the general environmental performance achieved by the project;
- Incidents and non-compliances will be assessed through the Internal Incident Investigation and Reporting System, to determine the root cause, including the possible lack of awareness/ training;
- Should it be evident that re-training is required, the SHE Manager will inform the Developer of the need and take the appropriate actions;
- General awareness training of all personnel shall be repeated annually; and
- The re-induction shall take into consideration changes made in the EMPr, changes in legislation, current levels of environmental performance and areas of improvement.

Environmental awareness to the employees of the project must be provided by the Principal Contractor in the following forms:

- Toolbox Talks (Weekly) – These are mandatory. The topics discussed during training sessions must be recorded, with all employees present signing an attendance register. These records must be maintained in the Site Environmental File.
- EMPr Awareness (as and when required).

As potential environmental impacts differ in each execution/ implementation, the environmental topics selected for discussion can either be:

- General topics that are applicable to the entire activity;
- Area specific topics as identified in the impacts on the receiving environment or based on findings from the most recent ECO report;
- Topics that can be “taken home” and implemented off-site.

The above-mentioned awareness activities must be used to share information and to ensure that all personnel are aware of the environment in which they operate and what environmental aspects require attention during their daily operations/ activities/ tasks. Additionally, personnel awareness training will be undertaken if and when required to strengthen the personnel’s understanding of environmental issues.

6.1 Activity Specific Topics

Some activities may have environmental impacts that are unique to each area as determined by the outcomes of the risk assessment and findings of the ECO reports. These must be addressed in the Weekly Tool Box Talks.

Area-specific topics include (and some of these topics may be a repeat of those covered under general topics):

- Stormwater and erosion management;
- Potential for water pollution and related impacts;
- Identification and management of erosion;
- Vehicle emissions and related impacts;
- Practical training regarding the clean-up of major and minor hydrocarbon spills;
- The importance of the waste management system and implementing good housekeeping;
- Dust generation and why and how to reduce dust; and
- Biodiversity interaction awareness.

6.2 Take-home Topics

Environmental awareness must not stop at the workplace. Many of the concepts learned at work can be applied to employees' lifestyle at home. Topics that can be covered under "take home topics" include, but are not limited to:

- Water consumption and conservation; and
- Domestic waste minimisation and recycling - "Reduce, Reuse and Recycle".

7 ENVIRONMENTAL MANAGEMENT PROGRAMME – PRE-CONSTRUCTION

7.1 Authorisation, Licences and Permits

Management Objective: The development must have the relevant authorisation, licences and permits in place prior to construction according to applicable legislation					
Management Outcome: All construction work must comply with the conditions of the relevant authorisations, licences and permits.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. All required authorisations, permits and licences must be obtained by the Developer prior to the commencement of construction. 2. All applications for licences in respect of protected trees must be obtained from the relevant Provincial DFFE/ NCDENC office. 3. Permits for the removal of protected plant species must be obtained from NCDENC. 4. Material for construction must be sourced from licenced borrow pits or commercial sources.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Developer	Obtaining authorisations, permit and licences prior to construction	ECO	Once-off	All authorisations, licences and permits must be filed in the Site Environmental File

7.2 Appointment of Contractor

Management Objective: Appointment of Contractor who will undertake construction works in compliance with approved environmental authorisation, licences and permits					
Management Outcome: The appointed Contractor (including all sub-contractors and suppliers) complies with the relevant provisions of the environmental authorisation, approved EMPr and all other relevant licences and permits, as well as applicable environmental legislation and associated regulations					
Impact Management Actions	**Implementation**		**Monitoring**		
1. The Developer must ensure that this EMPr forms part of any contractual agreements with a Contractor(s) and sub-contractors for the execution of the proposed project. 2. The Contractor must make adequate financial provision in their budgets for the implementation of the environmental authorisation, approved EMPr and all other relevant licences and permits. 3. The Contractor (including all sub-contractors and suppliers) must comply with the relevant provisions of	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Developer Contractor	Environmental Authorisation, EMPr, licences and permits must be included in the tender	ECO	Once-off	Contractor Agreements and Appointment

Management Objective: Appointment of Contractor who will undertake construction works in compliance with approved environmental authorisation, licences and permits					
Management Outcome: The appointed Contractor (including all sub-contractors and suppliers) complies with the relevant provisions of the environmental authorisation, approved EMPr and all other relevant licences and permits, as well as applicable environmental legislation and associated regulations					
the environmental authorisation, EMPr, applicable environmental legislation and associated regulations promulgated in terms of these laws.		documents and the Contractor needs to price appropriately			

7.3 Environmental Awareness Training

Management Objective: Environmental impacts during construction are minimised due to general awareness of environmental requirements					
Management Outcome: Environmental impacts are minimised through effective awareness and training for all construction staff including sub-contractors, service providers and suppliers					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. The ECO must undertake the initial environmental induction with the project management team prior to the commencement of construction. 2. The Contractor's Environmental Induction presentation must be provided to the ECO for review (comment and approval) prior to the commencement of construction. 3. All Contractors, sub-contractors, service providers and suppliers must acknowledge their understanding of the EMPr and environmental responsibilities by signing an induction attendance record.	ECO	On-site environmental induction	-	Once-off	Record of attendance to the induction must be filed in the Site Environmental File
1. All construction staff including sub-contractors, service providers and suppliers must receive environmental awareness training. 2. Training must be done via Toolbox Talks and records of the training (attendance registers and content notes) must be kept within the Site Environmental File. 3. Information posters must be erected and maintained at key location site. 4. The Contractor's environmental awareness training must be site specific and address all findings raised by the ECO.	Contractor	Weekly toolbox talks and awareness training	ECO	Monthly	Record of attendance to the toolbox talks must be filed in the Site Environmental File

7.4 Preparation of Area for Construction

Management Objective: Impacts on fauna and vegetation in and adjacent to the construction area are avoided					
Management Outcome: Construction activities are restricted to the demarcated construction area					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. A pre-construction photographic record of the entire construction servitude must be undertaken prior to commencement. 2. Under no circumstances must any natural area on neighbouring properties (outside the approved development footprint) be impacted, degraded, cleared, or affected in any manner. The construction of a semi-permanent fence (which will prevent vehicle and personnel access to adjacent areas) must be constructed. 3. The demarcation and fencing must be signed off by the ECO before any work commences. 4. Prior to the stripping and clearing of the terrestrial habitat within the development footprint/ corridor, a search and rescue of indigenous vegetation must be undertaken and relocated to suitable habitat out of the development footprint/ corridor. 5. Prior to site clearance, a detailed 'walkthrough' must be conducted to ascertain the number, abundance and physical conditions of all protected tree species (*Acacia erioloba (Camel Thorn), Acacia haematoxylon (Grey Camel Thorn) and Boscia albitrunca (Shepherd's Tree)* were observed in the project area) to assist with permit application (DFFE). 6. Prior to site clearance, conduct a detailed 'walkthrough' of the proposed site to ascertain the number, abundance and physical conditions of all protected plant species to assist with permit application (NCDENC). 7. Prior to site clearance, conduct targeted searches for less mobile animal species of conservation concern with high probability of occurring within the Project footprint (i.e. small mammals, medium mammals that may have dens/resting places/ roosts, burrows, etc. within the footprint) to allow relocation to take place where necessary, and avoid mortalities of these species. 8. Prior to construction, an avifaunal specialist must conduct a site walkthrough, covering the final road, pipeline and powerline routes as well as the shared infrastructure area, to identify any nests/ breeding/ roosting activity of sensitive species, as well as any additional sensitive habitats. The results of which may inform the final construction schedule in close proximity to that specific area,	Contractor Ecologist Avifauna Specialist Acoustics Engineer	Demarcation of construction servitude prior to site clearing Walkthrough by Ecologist and Avifauna Specialists DFFE & NCDENC permits	ECO	Once-off	All DFFE and NCDENC permits must be filed in the Site Environmental File Walkthrough reports by Ecologist & Avifaunal Specialists Pre-construction photographic records Final plant acoustic design Clearly marked construction servitude

Management Objective: Impacts on fauna and vegetation in and adjacent to the construction area are avoided					
Management Outcome: Construction activities are restricted to the demarcated construction area					
including abbreviating construction time, scheduling activities around avian breeding and/ or movement schedules, and lowering levels of associated noise. 9. A professional engineer who is qualified in acoustics with more than 15 years of experience, must be employed to review, model the predicted noise of the final generator plant design and provide additional detailed acoustic design (where necessary) to ensure the five generator plants do not negatively affect the noise sensitive receptor as well as the current and proposed infrastructure on the site.					

8 ENVIRONMENTAL MANAGEMENT PROGRAMME – CONSTRUCTION

8.1 Site Establishment

Management Objective: Incorporation of environmental issues and constraints in the planning and establishment of the site					
Management Outcome: Impacts relating to site establishment are minimised					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Stockpile areas, hazardous materials storage areas (including fuels), equipment cleaning areas, cooking and ablution facilities, workshops, parking must be restricted to the Shared Infrastructure area as indicated in the final layout plan. 2. The location of any additional temporary lay-down, stockpile, waste or spoil areas must be approved by the Environmental Control Officer (ECO) prior to implementation. 3. Signage must be placed in the area where construction will take place informing the public of the activities taking place. 4. The construction areas must be kept in an orderly state at all times.	Contractor and DEO	Layout Plan	ECO	Once-off	Approved Layout Plan

8.2 No-Go Areas

Management Objective: Construction-related activities in No-Go areas is prevented					
Management Outcome: Impact on No-Go areas are avoided through effective demarcation and management of these areas					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. The extent of disturbance must be limited to the extent of the construction footprint. No areas outside the construction footprint must be cleared unless authorised. 2. Any contractors found working inside the No-Go areas (areas outside the working servitude) must be issued a penalty as per the penalty system setup for the project. 3. Unauthorised stockpiling, dumping or storage of equipment, material or waste must be strictly prohibited in identified No-Go areas. 4. Areas outside of the construction footprint that are disturbed during the construction phase must be rehabilitated immediately to the satisfaction of the ECO as per the relevant re-vegetation/ re-planting plan. 5. Existing roads or authorised access roads must be used to gain access to site. 6. No construction activities or staff are permitted within 1.5 km of the identified Martial Eagle nest buffer.	Contractor and DEO	Demarcation of sensitive areas and staying within approved areas for construction	DEO ECO	Daily Monthly	Site inspection of sensitive No-Go areas

8.3 Soil Management

Management Objective: Additional construction-related activities impact on soils are prevented					
Management Outcome: Impact on soils are minimised or avoided through implementation of mitigation measures					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. A *Soil Management Method Statement* must be compiled by the Contractor and approved by the ECO. 2. Erosion/ sediment control measures such as use of silt curtains, erosion berms, sand bags etc. must be placed around the stockpiles to limit sediment runoff from stockpiles. 3. Subsoil and topsoil must be stockpiled separately. Stockpiled soil must be replaced in the reverse order to which it was removed (subsoil first followed by topsoil). 4. Stockpiles of construction materials must be clearly separated from soil stockpiles in order to limit any contamination of soils.	Contractor and DEO	Method Statement to be compiled for soil stockpile management	DEO ECO	Daily Monthly	Site inspection and compliance with Method Statement

Management Objective: Additional construction-related activities impact on soils are prevented					
Management Outcome: Impact on soils are minimised or avoided through implementation of mitigation measures					
5. The maximum depth of topsoil stripping should be 30 cm or as agreed with the ECO. 6. If additional unconsolidated material exists below 30 cm and needs to be removed for construction purposes, it must be stripped and stockpiled separately from the upper 30 cm topsoil. 7. The stockpiles must only be placed within demarcated stockpile areas. 8. Stockpiled soils must be kept free of weeds and must not be compacted. 9. Limiting the stockpile height to 3 metres and the slope to 1 in 5 and rounding the top edges.					
1. A *Soil Erosion and Sedimentation Control Method Statement* must be compiled by the Contractor and approved by the ECO prior to construction. 2. Vegetation/ soil clearing, and stripping activities must only be undertaken during agreed working times and permitted weather conditions. 3. Construction activities must be scheduled to minimise the duration of exposure to bare soils on site. 4. All erosion control measures must be maintained and monitored weekly and sediment accumulating behind the structures must be removed and redistributed to ensure that structures do not fail. 5. Conduct inspections after each rainfall event to identify areas of erosion. 6. Implement an effective system of stormwater runoff control at all points of disturbance where water accumulation might occur. The system must effectively collect and safely disseminate any runoff water from all hardened surfaces, and it must prevent any potential down slope erosion. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.	Contractor and DEO	Method Statement to be compiled for erosion control and sedimentation	DEO ECO	Daily Monthly	Site inspection and compliance with Method Statement

8.4 Vegetation Clearing

Management Objective: Construction-related activities are undertaken in a manner which prevents additional impacts to vegetation					
Management Outcome: Vegetation clearance and associated impacts are minimised though adherence of EMPr vegetation clearance requirements					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Areas proposed for vegetation clearance must be clearly marked and no heavy vehicles should travel beyond the marked area. 2. The retention of a vegetated buffer zone between the edge of the proposed infrastructure footprint and the outer boundary of the facility, within which the existing vegetation is retained. 3. Cleared vegetation and debris that has not been utilised must be collected and disposed of at a suitable licenced waste disposal facility. Under no circumstances may it be burned on site. 4. All bare surfaces across construction site must be checked for Invasive Alien Plants (IAPs) monthly and IAPs removed by hand pulling/ uprooting and adequately disposed. 5. Herbicides must be utilised where hand pulling/ uprooting is not possible. 6. No painting or marking of rocks or vegetation to identify locality or other information must be allowed, as it will disfigure the natural setting. Marking must be done by steel stakes with tags, if required. All temporary markings must be removed upon completion of the construction. 7. Collection of branches, wood (dead or alive), shrubs or any vegetation for fire making purposes is strictly prohibited. 8. An Alien and Invasive Management Programme must be developed and implemented. This programme must include (*inter alia*) the identification, control and eradication of invasive and exotic animals and plants from the site and immediate surrounds. The programme must be developed by a qualified ecologist and implemented by the DEO. Ongoing monitoring must be conducted by the ECO and periodic monitoring (annual) by a qualified ecologist to ascertain the efficacy of the programme. 9. The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.	Contractor & DEO Ecologist	Working within demarcated areas Alien and Invasive Management Programme	DEO ECO	Weekly (DEO) Monthly (ECO) Annually (Ecologist)	Site inspections

8.5 Protection of Fauna

Management Objective: Construction-related activities are undertaken in a manner which prevents additional impacts to fauna and wildlife					
Management Outcome: Impacts on fauna are minimised through adherence of EMPr requirements					
Impact Management Actions	**Implementation**		**Monitoring**		
General	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Workers/ employees on-site must be educated to not harm wildlife. This must include as a minimum, basic environmental training based on the requirements of the EMPr, including training on avoiding and conserving local wildlife. As well as potentially occurring dangerous animals of the area and the correct actions to take when encountering dangerous species, notably snakes and scorpions. 2. Establish operational procedures for eventualities in dealing with snakebites. 3. No wild animal may under any circumstance be hunted, snared, captured, injured, killed, harmed in any way or removed from the site. This includes animals perceived to be vermin (such as snakes, rats, mice, etc.). Nests must be protected and no eggs to be collected. 4. Due to the type of development, the type and nature of fencing/ demarcation must not attempt to facilitate free movement of smaller/ medium-sized animals as this could lead to unwanted presence (and accidental killing) of animals within the development site. 5. Perimeter fencing must be designed to prevent entrapment of large bodied species such as korhaans between fence rows, giving them sufficient space for take-off, i.e. if a double-layer of parallel fencing is used, the gap between the fences should be large enough to allow for large birds to take-off and leave the area. Where this would result in unacceptable compromises to the security of the site, large-bodied birds should be prevented from entering the gaps between parallel fence rows. Perimeter fence design to be done in consultation with an avifaunal specialist. 6. No domestic pets of any kind, with specific reference to feral cats, must be allowed on the development site. 7. Any fauna that are found within the construction zone must be moved to the closest point of natural or semi-natural habitat outside the construction corridor. The handling and relocation of any animal perceived to be dangerous/ venomous/ poisonous must be	Contractor	Walk-through prior to vegetation clearing Awareness Training Injuring, capturing, killing of animals identified on site must be reported as an environmental incident and investigated	ECO	Monthly	Training material relating to wildlife management

Management Objective: Construction-related activities are undertaken in a manner which prevents additional impacts to fauna and wildlife					
Management Outcome: Impacts on fauna are minimised through adherence of EMPr requirements					
undertaken by a suitably trained individual. A permit from the relevant conservation authority may be required. 8. All vehicles accessing the site should adhere to a low speed limit (40km/hr is recommended) to avoid collisions with susceptible species such as reptiles (snakes and lizards).					
Avifauna: 1. The appointed DEO must be trained by an avifaunal specialist to identify the potential Red Data species as well as the signs that indicate possible breeding by these species. 2. The DEO and ECO must then, during audits/ site visits, make a concerted effort to look out for such breeding activities of Red Data species, and such efforts may include the training of construction staff (e.g. in Toolbox talks) to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. 3. If any of the Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist must be contacted immediately for further assessment of the situation and instruction on how to proceed. 4. A construction phase bird monitoring programme must be implemented by a bird specialist, to document potential impacts on key species such as korhaans, bustards and eagles, and must include the ongoing monitoring of the active Verreaux's Eagle and Martial Eagle nest sites.	DEO	Training on Red Data avifauna species Implement a Bird Monitoring Programme	ECO	Monthly	Site inspection Bird Monitoring Reports

8.6 Protection of Ground- and Surface Water Resources

Management Objective: Construction-related activities is undertaken in a manner which prevent additional impacts to ground- and surface water resources					
Management Outcome: Impacts on ground- and surface water resources are minimised					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Fuel storage tanks must meet international standards for structural design integrity and operational performance. 2. Mitigation for spillage or leakages include the implementation of secondary containment structures e.g. bunded areas to prevent the accidental release of fuel (diesel).	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Prevention of any spillage into	ECO	Monthly	Site inspection

Management Objective: Construction-related activities is undertaken in a manner which prevent additional impacts to ground- and surface water resources					
Management Outcome: Impacts on ground- and surface water resources are minimised					
3. Spillages must be cleaned up immediately and contaminated soil must either be remediated in situ or disposed of at an appropriately licenced landfill site. 4. Potentially contaminating wastes e.g. cement must be stored in bunded areas until removed by a reputable contractor for disposal at an appropriately licenced site. 5. Place drip trays under vehicles when parked. 6. Service vehicles in a dedicated workshop area. 7. Providing environmental awareness training for workers on site.		ground- and surface water resources			

8.7 Spills, Incident and Pollution Control

Management Objective: To avoid, manage and mitigate potential impact on the environment due to spillages					
Management Outcome: Impacts to the environment soils, surface and groundwater is avoided (where possible) or managed					
Impact Management Actions	**Implementation**		**Monitoring**		
1. A *Spill Contingency Plan* must be compiled by the Contractor. 2. In the event that a pollution incident occurs on site, the Contractor must: ▪ Implement reasonable measures immediately to contain and minimise the impacts of the incident; ▪ Investigate and determine the root cause. This must be addressed in an Action Plan to prevent a recurrence; ▪ Notify all persons whose health is affected by the incident; ▪ Undertake clean up procedures immediately; ▪ Notify the DEO and ECO of the incident immediately who will advise the employee as to the measures that must be implemented; ▪ Record the incident in the *Environmental Incident Register*; and ▪ Implement measures to prevent similar incidents from occurring in the future. 3. In the event of a significant spillage that cannot be contained and which poses a serious threat to the environment, the following Departments must be informed within forty-eight (48) hours of the incident and in accordance with Section 30 of the NEMA: ▪ The relevant municipality; ▪ Department of Water and Sanitation;	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	DEO & Contractor	Construction staff to be trained in spill management Spill Contingency Plan Updated Environmental Incident Register	DEO ECO	Daily Monthly	Site inspection Inspection of Environmental Incident Register Compliance with Spill Contingency Plan Provision of spill kits

Management Objective: To avoid, manage and mitigate potential impact on the environment due to spillages					
Management Outcome: Impacts to the environment soils, surface and groundwater is avoided (where possible) or managed					
▪ The Local Fire Department; and ▪ Any other affected Department. 4. Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly disposed of using appropriate spill kits. Any contaminated soil from the construction site must be removed and rehabilitated or disposed appropriately at the nearest landfill site. The ECO must be notified immediately when a spill occurs.					

8.8 Hazardous Substances

Management Objective: To minimise the risk of impact to the environment through the safe storage, handling, use and disposal of hazardous substances					
Management Outcome: The management of hazardous substances is undertaken in accordance with the Hazardous Substances Act (Act No. 15 of 1973)					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Hazardous storage and refuelling areas must be bunded prior to their use on site during the construction period following the appropriate SANS codes. 2. Material Safety Data Sheets (MSDSs) for all hazardous substances must be filed in the Site Environmental File. 3. Fire-fighting equipment must be present at all hazardous storage facilities. 4. Fuel storage containers must be regularly inspected to prevent leaks. 5. 220l drums must be kept on site to collect contaminated soil. These drums must be labelled and sealed to prevent the ingress of water. Contaminated soil must be disposed of at a licenced hazardous waste site. 6. If a water pump is required, the water pump must operate within to prevent any spillage and limit the risk of soil/ water contamination. The drip tray will need to be lined with absorbent pads and checked daily while in use. Water leaks into the drip tray must be prevented and attend to immediately.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Bunding of hazardous storage sites	DEO ECO	Daily Monthly	Site inspection of hazardous storage areas and inspection of drip trays and impervious surfaces

8.9 Water Supply

Management Objective: Undertake responsible water usage during construction					
Management Outcome: Water for construction is compliant with the requirements of the National Water Act (Act No. 36 of 1998)					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Only approved/ licenced sources of water must be used for construction on the construction site and in the construction camps. 2. Water for human consumption must be available at the site offices and at other convenient locations on site where work occurs.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Water abstraction from licenced sources	ECO	Monthly	Site inspection Proof of water use authorisation for the abstraction of water

8.10 Stormwater Management

Management Objective: Stormwater is managed across the construction area					
Management Outcome: Avoid, prevent and manage impacts related to stormwater					
Impact Management Actions	**Implementation**		**Monitoring**		
1. A *Stormwater Management Plan (SWMP)* must address stormwater management during construction and the final developed infrastructure and approved by the ECO. 2. Runoff generated from cleared and disturbed areas/ slopes that drains into watercourses must be controlled using erosion control and sediment trapping measures like silt fences, sandbags, earthen berms and synthetic logs, particularly where slopes are exposed. These control measures must be established at regular intervals perpendicular to the slope to break surface flow energy and reduce erosion as well as trap sediment. 3. Berms, sandbags and/ or silt fences employed must be maintained and monitored for the duration of the construction phase and repaired immediately when damaged. The berms, sandbags and silt fences must only be removed once vegetation cover has successfully re-colonised the disturbed areas post-rehabilitation.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Project Manager	SWMP	ECO	Monthly	Approval of SWMP

8.11 Ablution/ Sanitation

Management Objective: Adequate number of clean ablution/ sanitation facilities are available to all staff to minimise impacts on the environment					
Management Outcome: No pollution or disease arises in terms of poorly maintained ablution / sanitation facilities or lack thereof					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. A minimum ratio of one chemical toilet must be provided per 15 persons. Chemical toilets must be serviced a minimum of once every week. A SDC and/ or waste manifest must be obtained and kept on site. The construction of "long drop" toilets, including French drains or soakaway systems is prohibited. Under no circumstances must open areas or the surrounding bush be used as toilet facilities. 2. The chemical toilets must be strategically placed (easily accessible to workers, preferably no more than a 300m from the work-face). 3. All ablution activities must take place in these facilities, and the waste material must be removed from site on a regular (weekly) basis by a permitted Waste Contractor for safe disposal at a licenced waste disposal facility or a municipal wastewater treatment works. 4. All temporary/ portable toilets must be secured to the ground to prevent them from toppling due to wind or any other cause. 5. If toilet facilities are to be constructed, these must be linked to conservancy tanks. All wastewater within conservancy tanks must be removed on a frequent basis (weekly). 6. Conservancy tanks must not be buried underground. If these are below ground level, they must be placed within a bunded facility where leak detection can be undertaken through visual inspection. 7. Unauthorised dumping/ spilling of waste from toilets into the environment and/ or burying of waste are strictly prohibited.	Contractor	Provision of ablution facilities during construction Approval for the treatment and release of wastewater (if applicable)	DEO ECO	Daily Monthly	Proof of servicing and safe disposal Water use authorisation for the release of wastewater into the environment

8.12 Access Routes

Management Objective: Minimise impacts to the environment through the use of existing and established access routes					
Management Outcome: Construction vehicle movement are restricted to approved routes					
Impact Management Actions	**Implementation**		**Monitoring**		
1. No new construction access routes must be created, and the clearing of vegetation to widen an access road (outside of the approved construction right-of-way (8m road reserve width) must be	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

Management Objective: Minimise impacts to the environment through the use of existing and established access routes					
Management Outcome: Construction vehicle movement are restricted to approved routes					
undertaken under strict conditions and under a method statement, approved by the ECO and under supervision by the DEO. As such construction access routes must be included in the environmental compliance auditing scope of the DEO and ECO. 2. In the event that new access roads are required, the appropriate licencing process in terms of the EIA Regulations 2014 (as amended) must be undertaken. 3. Access of all construction and material delivery vehicles must be strictly controlled and vehicles (type e.g. private, heavy, number plates, owner etc.) recorded. 4. Security gates must be provided at the entrance of site. 5. Strategic positioning of entry and exit points to ensure as little impact/ effect as possible on the traffic flow. 6. The main routes to the site must be clearly defined and signposted.	Contractor	Access routes must be mapped prior to construction	DEO ECO	Monthly	Site inspection

8.13 Fires

Management Objective: Minimise the risk of fire during construction					
Management Outcome: Fire prevention measures are carried out in accordance with the National Veld and Forest Fire Act (Act No. 101 of 1998)					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Prevent all open fires on site. 2. The workers must be educated on the dangers of open/ unattended fires. 3. Fire-fighting measures such as fire extinguishers must be located on site. 4. The workforce must be trained in fire prevention and fire-fighting measures. 5. The burning of general waste material is prohibited. 6. Provide demarcated fire-safe zones, facilities and suitable fire control measures 7. Contact numbers for the local Fire Fighting Unit must be communicated in the environmental awareness training and displayed at the camps.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Awareness training	ECO	Monthly	Site inspection

8.14 Vehicle and Equipment Maintenance

Management Objective: Vehicle and equipment maintenance are carried out in designated areas preventing pollution to soil, surface water and groundwater resources					
Management Outcome: Impacts to soil, surface water and groundwater resources are avoided or minimised through the implementation of management actions					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Heavy machinery and construction vehicles must be parked in a vehicle maintenance yard which must be illustrated on the shared infrastructure layout map submitted to the ECO for approval. 2. A dedicated maintenance area must be demarcated with an impermeable surface leading to an oil-water separator. 3. All machinery and equipment to be used within the sensitive working areas must be checked daily for oil and diesel leaks before gaining access to these working areas. 4. No vehicle must be repaired in any place other than in the dedicated maintenance yard – if such repairs are required the vehicle must be made safe (i.e. no leakage while being removed to the repair facility) and removed at the earliest opportunity to the repair facility. 5. Prior to returning on site the DEO must declare the vehicle safe to return to site. 6. Washing of vehicles on site or at the construction camp is prohibited. The only exception is if a designated bund facility with an oil-water separator is constructed at the shared infrastructure area. 7. The positioning of such a facility must be approved prior to construction by the ECO in consultation with the Engineer.	Contractor DEO	Dedicated maintenance area/ yard	ECO	Monthly	Site inspection

8.15 Waste Management

Management Objective: To avoid, manage and mitigate potential waste impacts during the construction phase					
Management Outcome: Potential impacts to the environment caused by waste (general and hazardous) are avoided or managed					
Impact Management Actions	**Implementation**		**Monitoring**		
Solid Waste	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Adequate rubbish bins and waste disposal facilities (general and hazardous waste) must be provided on-site and at the shared infrastructure area. 2. The construction site must be kept clean and tidy and free from rubbish.	Contractor	General camp house-keeping	DEO ECO	Daily Monthly	Approved Waste Register

Management Objective: To avoid, manage and mitigate potential waste impacts during the construction phase					
Management Outcome: Potential impacts to the environment caused by waste (general and hazardous) are avoided or managed					
3. Recycling/ re-use of waste must be encouraged. 4. No solid waste must be burned on site. 5. Bins and/ or skips must be supplied at convenient intervals on site for disposal of waste within the construction camp(s). The bins must have liner bags for easy control and safe disposal of waste. 6. Bins must be provided to all areas that generate waste e.g. worker eating and resting areas and the camp site. General refuse and construction material refuse as well as hazardous waste must not be mixed. 7. Hazardous waste bins must be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the top of the container must be covered with a lid). 8. Hazardous waste must be disposed of at a licenced hazardous waste landfill site. 9. Waste bins must be cleaned out weekly or when capacity has been reached to prevent any windblown waste and/ or visual disturbance. 10. Skips must be covered by tarpaulin or sail and bins must have lids. 11. Once loaded onto a truck, the rubble (inert waste i.e. concrete, sand, rock etc.) must be taken to a recognised local municipal landfill site as approved by the ECO. Waybills or a signed waste manifest (with all relevant signatures) or as a last resort photographic record of the waste disposal at the local municipal landfill site must be provided as proof of safe disposal. The truck must be covered with tarpaulin or a sail. 12. Should rubble be required as a raw material for the construction, it must be taken to a designated stockpile area - which must be approved by the ECO. 13. Spoil material must be hauled to a designated spoil site approved by the ECO. No spoil material must be discarded on site. 14. A Waste Register must be compiled. The DEO must control and record each load that leaves the site. 15. A full paper trail for waste disposal must be kept that includes: permits to operate (handle, transport waste); Waste Management Licences (for both storage and waste disposal facilities - where applicable) for Waste Handling Contractor/ s; Waste Registrations (for storage of waste, and recycling facilities - where applicable]) for Waste Handling Contractor/ s; Waste Manifests; Weighbridge		Provision of bins Waste Register Waste documents Awareness training on waste minimisation and re-use			Provision of waste disposal facilities (bins & skips) Proof of waste documents (SDCs, weighbridge receipts, recycling certificates)

Management Objective: To avoid, manage and mitigate potential waste impacts during the construction phase					
Management Outcome: Potential impacts to the environment caused by waste (general and hazardous) are avoided or managed					
Certificates; Safe Disposal Certificates and Certificates of Recycling. 16. The provisions of the NEM: Waste Act and Norms and Standards for the Storage of Hazardous Waste and Recycling or Recovery of Waste must be complied with.					
Wastewater 1. In the event that wastewater needs to be treated and released into the environment, an Environmental Risk Assessment must be conducted and an approval process (in terms of applicable environmental legislation) must be undertaken prior to implementation.	Contractor	Collection, storage, treatment and/ or disposal of wastewater	ECO	Monthly	Site inspection Proof of SDCs

8.16 Batching Plants

Management Objective: To avoid, manage and mitigate potential impact on the environment due to spillages and contamination					
Management Outcome: Minimise spillages and contamination of soil, surface water and groundwater					
Impact Management Actions	**Implementation**		**Monitoring**		
1. A Method Statement must be compiled for Batching Plants. 2. Batching plants areas must be fitted with a containment facility for the collection of cement-laden water. 3. Mixing of concrete must take place on trays, shutter boards or on impermeable surfaces. 4. Runoff from cement/ concrete batching areas must be directed to an excavation lined with DPM plastic and allowed to dry out before being broken up and re-used elsewhere or safely disposed of at a licenced disposal facility. 5. No tracking of wet concrete is allowed. 6. Wet concrete must be cleared from site daily. 7. Only dry concrete may be stockpiled directly on the ground. 8. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Method Statement for Batching Plants	DEO ECO	Monthly	Approved Method Statement for Batching Plants Site inspection

8.17 Noise Management

Management Objective: To avoid or prevent unnecessary noise to the environment by ensuring noisy construction activities are mitigated					
Management Outcome: Noise management is undertaken in accordance with SANS 10103 and the Occupational Health and Safety Act (Act No. 85 of 1993)					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Surrounding communities and adjacent landowners are to be notified upfront (within 48 hours) of noisy construction activities (blasting, excavations and piling activities). 2. All construction vehicles and equipment must be kept in good repair. 3. Construction activities must be limited to the period 06h00 to 18h00. 4. Machines in intermittent use must be shut down or throttled down to a minimum whenever practicable. 5. Construction staff working in an area where the 8-hour ambient noise levels exceed 85 dBA must have the appropriate Personal Protective Equipment (PPE) (earmuffs). 6. A *Complaints Register* must be kept at the Site Office at all times.	Contractor	Compliance with SANS 10103 and OHS Act Use of appropriate PPE	DEO ECO	Daily Monthly	Inspection of Complaints Register Site inspection

8.18 Air Quality

Management Objective: To reduce air quality (dust, emission and odour) during construction activities					
Management Outcome: Minimal dust, emissions and odour due to adherence of management actions					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Dust must be suppressed on the construction site as well as access roads and active working areas during dry periods by the regular application of water. 2. Water used for this purpose must be used in quantities that will not result in the generation of runoff. 3. If water is abstracted from a water resource for dust suppression, a Water Use Authorisation must be obtained from the DWS prior to first abstraction. 4. Additional dust control measures (sweeping; screens; berms and/ or water suppression - using non-potable water if possible, or chemical suppressants) along access during construction of access road sections and during thermal power generation facility construction. 5. A speed limit of 40 km/hr must be set for all vehicles travelling over exposed areas or near stockpiles.	Contractor	Regular dust suppression Maintaining a dust suppression register Dust fallout monitoring	DEO ECO	Daily Monthly	Site inspection Dust suppression register Records from dust fallout monitoring Inspection of Complaints

Management Objective: To reduce air quality (dust, emission and odour) during construction activities					
Management Outcome: Minimal dust, emissions and odour due to adherence of management actions					
6. Dust suppression measures must be implemented, especially on road stretches located within 500 m of households/ farmsteads located close to the access route. 7. A *Dust Suppression Register* as well as a *Complaints Register* must be kept on site. All complaints received must be investigated with remedial action taken communicated to the affected party within 7 days. 8. Dust fallout from the construction and batching areas must be monitored by dust collection buckets located downwind of construction area. Monitoring in accordance with SANS 2004. 9. Fence-line monitoring of dustfall in accordance with the National Dust Control Regulations (NDCR).		Plant and equipment must be in good working order			Register relating to dust complaints Servicing Receipts

8.19 Protection of Heritage and Palaeontological Resources

Management Objective: Prevent damage and destruction to fossils, archaeological site and material of heritage significance					
Management Outcome: Impact to heritage and palaeontological resources are managed in terms of the National Heritage Act					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, must cease immediately and the ECO must be notified as soon as possible. 2. If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA. 3. Under no circumstances must any artefacts be removed, destroyed or interfered with by anyone on the site. Contractors and workers must be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51 (1). 4. Monitoring of all substantial bedrock excavations for fossil remains by ECO on an ongoing basis during construction phase, with	Palaeontologist Contractor	Construction works to be halted until the relevant provincial heritage agency is contacted	DEO ECO	Once-off	Construction works to be halted until the relevant provincial heritage agency is contacted

Management Objective: Prevent damage and destruction to fossils, archaeological site and material of heritage significance					
Management Outcome: Impact to heritage and palaeontological resources are managed in terms of the National Heritage Act					
reporting of any substantial new palaeontological finds (notably fossil vertebrate bones and teeth) to SAHRA for possible specialist mitigation. 5. In the case of any significant chance fossil finds during construction (e.g. vertebrate teeth, bones, burrows, petrified wood, shells), these must be safeguarded - preferably in situ - and reported by the ECO as soon as possible to the South African Heritage Resources Agency, SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). This is so that appropriate mitigation by a professional palaeontologist can be considered. Such mitigation usually involves the judicious sampling, collection and recording of fossils as well as of relevant contextual data concerning the surrounding sedimentary matrix. The palaeontologist concerned would need to apply beforehand for a collection permit from SAHRA. A tabulated Chance Fossil Finds Procedure is provided in ***Annexure D***). 6. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/ Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule. 7. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/ Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule.					

8.20 Visual

Management Objective: Reasonable measures are taken to ensure intrusive visual impacts are minimised					
Management Outcome: No complaints about visual impact					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Clearing of vegetation must be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in a large visual contrast compared to the surrounding vegetation.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	EMPr	ECO	Monthly	Site Inspection

8.21 Traffic Management

Management Objective: Reasonable measures are taken to ensure the safety of public, pedestrians and construction workers at all times during construction					
Management Outcome: All precautions are taken where possible to minimise the risk of injury, harm, death or complaints. Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993) and Regulations					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Adequate road warning signs and road markings must be introduced. 2. The road signage must be carried out in accordance with the latest edition of the South African Road Traffic Signs Manual (SARTSM) and comply with the latest editions of the Southern African Development Community (SADC) Road Traffic Signs Manual. 3. The Transnet Service Road must be re-gravelled (150 mm thick over width) before construction commences of the PV plants and associated infrastructure. 4. Once re-gravelled, the road must be regraded on a monthly basis to prevent the deterioration of the road condition. 5. The intersection of the Gariep Road and Transnet Service Road can be upgraded in order to reduce the traffic congestion that is expected as well as minimize the dust generation at the intersection. 6. The delivery of materials by trucks must be phased through the day to the reduce the impact that trucks may have on traffic congestion and dust generation. 7. On-site speed restrictions to be imposed for 15 km/hr once through the security gate and 40 km/hr on the access road to the site (turn-off from the Transnet Service Road).	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Traffic Management Method Statement	DEO ECO	Monthly Daily	Approval of Traffic Management Method Statement

Management Objective: Reasonable measures are taken to ensure the safety of public, pedestrians and construction workers at all times during construction					
Management Outcome: All precautions are taken where possible to minimise the risk of injury, harm, death or complaints. Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993) and Regulations					
8. Clear and early warning of construction vehicles at intersection Gariep/ Transnet Service Roads must be provided. 9. Throughout the period of construction, the Province, District and Local Municipalities to be made aware of the name and contact details of the Engineer (PM) that they can communicate with should any matters arise in connection with any aspects of the construction that are affecting the road.					

8.22 Social Considerations

Management Objective: Negative social impacts are avoided or minimised and benefits are maximised					
Management Outcome: Social benefits and impacts associated with construction activities are enhanced (in the form of employment opportunities) or avoided/ minimised (social ills associated with construction activities)					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Tender documents must include statements which include the use of local communities or local community organisation(s) in supplying services and labour for the construction activities. 2. A Community Liaison Officer (CLO) must be appointed for the project to deal with the employment of local labour and to interface between the Contractor and the local community. 3. The principles of equality, BEE, gender equality and non-discrimination must be implemented. 4. Due to the concentration of a workforce in the area over the construction period, the Contractor must implement an HIV/ AIDS Awareness Programme, annually on-site. Activities for HIV/ AIDS awareness and prevention will be broad based, targeting both individuals and groups. They may consist of: ▪ Information posters in public places both on and off site (eating places, bars, guest houses, etc.); ▪ Peer educators (reference people) drawn from the local labour force and trained in HIV/ AIDS issues for discussions with colleagues (estimate 1 per 30 employees); ▪ Small focus group discussions and information covering key issues must be held;	Contractor Community Liaison Officer	Labour recruitment policy Awareness training material relating to HIV/ AIDS	Developer ECO	Once-off	Recruitment of local labour to be included in contract documentation HR and Labour Policy

Management Objective: Negative social impacts are avoided or minimised and benefits are maximised					
Management Outcome: Social benefits and impacts associated with construction activities are enhanced (in the form of employment opportunities) or avoided/ minimised (social ills associated with construction activities)					
▪ Inclusion of HIV/ AIDS activities at site meetings and other discussions; and ▪ Voluntary Counselling and Testing. 5. No informal settlements must be allowed. 6. Project information must be communicated to I&APs to avoid misunderstandings and the creation of unrealistic expectations. 7. A formal grievance/ complaint mechanism must be set up. 8. All complaints must be recorded, followed up and resolved expeditiously. 9. Local contractors and providers of goods and services must be used where practicable. 10. ACWA Power must work with local authorities to prevent development of ad-hoc roadside dwellings, shops and so forth on or adjacent to the project site. 11. The Contractor, in line with the relevant socio-economic focus of the !Kheis LM and ACWA Power's personnel policies, must develop an appropriate exit strategy for temporary employees. 12. A database of local job seekers, with skills levels and employment history, must be developed before commencing with personnel recruitment for the operational phase.					

9 ENVIRONMENTAL MANAGEMENT PROGRAMME – OPERATIONS

9.1 Alien Invasive Plant Management

Management Objective: Operational activities are undertaken in a manner which prevents additional impacts to vegetation					
Management Outcome: Alien and invasive vegetation infestation is managed as per the requirements of NEM: BA and Regulations					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Continue with the Alien and Invasive Management Programme established during the construction phase. The EM must compile relevant action plans to deal with the presence of alien and invasive species. 2. Alien species monitoring be conducted on an annual basis during the wet/ growing season. 3. Monitoring must focus on identified priority sites, as well as other disturbed sites throughout the site to identify potential new sites of colonisation.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Operational Manager	IAP eradication and control	EM	Monthly	Site inspection

9.2 Protection of Fauna

Management Objective: Operations-related activities are undertaken in a manner which prevents additional impacts to fauna and wildlife					
Management Outcome: Impacts on fauna are minimised through adherence of EMPr requirements					
Impact Management Actions	**Implementation**		**Monitoring**		
General 1. Site induction for contractors and personnel must include a familiarization with all aspects relating to environmental components of the project, as well as potentially occurring dangerous animals of the area and the correct actions to take when encountering dangerous species, notably snakes and scorpions. 2. A competent person must be appointed to safely handle and remove any dangerous animal from the operational site. 3. Establish operational procedures for eventualities in dealing with snakebites. 4. Information signs regarding animals that may cross-roads, notably during nocturnal periods, should be erected at selected localities.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Operational Manager Avifaunal Specialist	Awareness Training Injuring, capturing, killing of animals identified on site must be reported as an environmental	EM	Monthly	Training material relating to wildlife management Operational phase bird monitoring data report

Management Objective: Operations-related activities are undertaken in a manner which prevents additional impacts to fauna and wildlife					
Management Outcome: Impacts on fauna are minimised through adherence of EMPr requirements					
5. Monitoring of road conditions will inform sites where burrows are observed. ***Avifauna:*** 1. The on-site operational facilities manager (or a suitably appointed Environmental Manager) must be trained by an avifaunal specialist to identify the potential Red Data species as well as the signs that indicate possibly breeding by these species. 2. If a priority species or Red Data species is found to be breeding (e.g. a nest site is located) on or within 2 km of the operational facility (or the grid connection servitude), the nest/ breeding site must not be disturbed and the avifaunal specialist must be contacted for further instruction. 3. The on-site operational facilities manager (or a suitably appointed Environmental Manager) must conduct inspections every two months of the grid connection line, and all existing transmission line pylons within 2 km of the project site boundary to locate possible nesting raptors. Any such nests must not be disturbed and must be reported to the avifaunal specialist for further instruction. 4. No operational activities or staff are permitted within 1.5 km of the identified Martial Eagle nest. 5. All artificial water points (e.g. livestock water points and wind pumps) on the project site and within 500 m from the boundary of the project site, must be moved or shut down (if not already removed 6. from the project site during construction) so that birds are not attracted to the project site and immediate surrounding areas. 7. An operational monitoring programme for birds in line with applicable solar guidelines must be developed and implemented, which must include searching for mortalities. Any mortalities should be reported to the EWT/ BirdLife. 8. Birds must be prevented from nesting in and around substations and battery storage facilities through exclusion covers or spikes. 9. Careful selection of and modifications to solar facility equipment should be made where possible e.g. white borders could be applied to PV panels to reduce the resemblance of solar arrays to waterbodies. 10. Perimeter fencing must be designed to prevent entrapment of large bodied species such as korhaans between fence rows, giving them		incident and investigated Bird and bat monitoring data			

Management Objective: Operations-related activities are undertaken in a manner which prevents additional impacts to fauna and wildlife					
Management Outcome: Impacts on fauna are minimised through adherence of EMPr requirements					
sufficient space for take-off, i.e. if a double-layer of parallel fencing is used, the gap between the fences should be large enough to allow for large birds to take-off and leave the area. Where this would result in unacceptable compromises to the security of the site, large-bodied birds should be prevented from entering the gaps between parallel fence rows. Perimeter fence design to be done in consultation with an avifaunal specialist. 11. Driving at night should be avoided where possible and speed limits of 40 km/hr for refuelling tankers must be strictly enforced along all gravel roads to the facility to reduce collisions as well as unnecessary dust and noise. Further speed limit restrictions of 20km/hr for refuelling tankers must be strictly enforced within all nest buffer areas. ***Bats*** 1. Searches for bat carcasses on the ground around and beneath the PV panels must be conducted in tandem with searches for bird carcasses. The Environmental Officer must freeze bat carcasses and keep a record of the location, date and time of when it was found.					

9.3 Protection of Ground- and Surface Water Resources

Management Objective: Operational-related activities is undertaken in a manner which prevent additional impacts to ground- and surface water resources					
Management Outcome: Impacts on ground- and surface water are minimised during operations					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. All water-related infrastructure (e.g. pipes, pumps, reservoirs, toilets, taps etc.) must be regularly inspected for leaks and repaired as soon as practically possible. 2. Settled silt must be removed from runoff control berms regularly (every 6 months) and examined for contamination with oil and/ or hydraulic fluids. Contaminated material must be subjected to remediation or appropriate disposal in accordance with prevailing legislation. Clean silt can be used during re-vegetation of bare areas.	Operational Manager	Prevention of any spillage and/ or pollution of water resources	EM	Monthly	SDCs Site inspections

Management Objective: Operational-related activities is undertaken in a manner which prevent additional impacts to ground- and surface water resources					
Management Outcome: Impacts on ground- and surface water are minimised during operations					
3. The ICE must be maintained according to supplier specifications to ensure optimal functionality. 4. Potentially contaminating wastes produced during operations and maintenance activities must be stored in bunded areas until removed by a reputable contractor for disposal at an appropriately licenced disposal facility. 5. All cleaning products used on the site must be environmentally friendly and bio-degradable.					

9.4 Spills, Incidents and Pollution Control

Management Objective: To avoid, manage and mitigate potential impact on the environment due to spillages					
Management Outcome: Impacts to the environment soils, surface and groundwater is avoided (where possible) or managed					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. In the event that a pollution incident occurs on site, the Operational Manager must: ▪ Implement reasonable measures immediately to contain and minimise the impacts of the incident; ▪ Investigate and determine the root cause. This must be addressed in an Action Plan to prevent a recurrence; ▪ Notify all persons whose health is affected by the incident; ▪ Undertake clean up procedures immediately; ▪ Notify the EO and ECO of the incident immediately who will advise the employee as to the measures that must be implemented; ▪ Record the incident in the *Environmental Incident Register*; and ▪ Implement measures to prevent similar incidents from occurring in the future. 2. In the event of a significant spillage that cannot be contained and which poses a serious threat to the environment, the following Departments must be informed within forty-eight (48) hours of the incident and in accordance with Section 30 of the NEMA: ▪ The relevant municipality; ▪ Department of Water and Sanitation; ▪ The Local Fire Department; and ▪ Any other affected Department.	Operational Manager	Provision of sanitation facilities and bunding/ impervious surfaces for activities that may lead to soil and groundwater pollution Operational staff to be trained in spill management	EM	Monthly	Site inspection Inspection of Environmental Incident Register Compliance with Spill Contingency Plan Provision of spill kits

Management Objective: To avoid, manage and mitigate potential impact on the environment due to spillages					
Management Outcome: Impacts to the environment soils, surface and groundwater is avoided (where possible) or managed					
3. Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly disposed of using appropriate spill kits. Any contaminated soil from the construction site must be removed and rehabilitated or disposed appropriately at the nearest landfill site. The EO must be notified immediately when a spill occurs.					

9.5 Hazardous Substances

Management Objective: To minimise the risk of impact to the environment through the safe storage, handling, use and disposal of hazardous substances					
Management Outcome: The management of hazardous substances is undertaken in accordance with the Hazardous Substances Act (Act No. 15 of 1973)					
Impact Management Actions	**Implementation**		**Monitoring**		
General 1. Hazardous storage and refuelling areas must be bunded prior to their use on site during the construction period following the appropriate SANS codes. 2. Material Safety Data Sheets (MSDSs) for all hazardous substances must be filed in the Site Environmental File. 3. Mixing of concrete must take place on trays, shutter boards or on impermeable surfaces. 4. Drip trays with plugs must be utilised at all dispensing areas. 5. 220l drums must be kept on site to collect contaminated soil. These drums must be labelled and sealed to prevent the ingress of water. Contaminated soil must be disposed of at a licenced hazardous waste disposal facility. ***ICE*** 1. A Standard Operating Procedure (SOP) for the operation and maintenance of the ICE must be compiled by the Operations Manager in line with manufacturer specifications. 2. Inspection and maintenance procedures must be developed and documented to ensure mechanical integrity of the ICE and prevent uncontrolled releases of hazardous material from the system. These procedures must be included as part of the project SOPs.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Operational Manager	Bundling of hazardous storage sites MSDSs SOP for maintenance and operation of ICE Inspections, communications, training, and drills	EM	Monthly	Site inspection of hazardous storage areas and inspection of drip trays and impervious surfaces

Management Objective: To minimise the risk of impact to the environment through the safe storage, handling, use and disposal of hazardous substances					
Management Outcome: The management of hazardous substances is undertaken in accordance with the Hazardous Substances Act (Act No. 15 of 1973)					
3. Operators must be trained on release prevention, including drills specific to hazardous materials as part of emergency preparedness response training.					

9.6 Waste Management

Management Objective: To avoid, manage and mitigate potential waste impacts during the operational phase					
Management Outcome: Potential impacts to the environment caused by waste (general and hazardous) are avoided or managed					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Adequate rubbish bins and waste disposal facilities (general and hazardous waste) must be provided on-site and at the shared infrastructure area. 2. Recycling/ re-use of waste must be encouraged. 3. Bins and/ or skips must be supplied at convenient intervals at the operational site for disposal of waste. The bins must have liner bags for easy control and safe disposal of waste. 4. Bins must be provided to all areas that generate waste. Waste streams must not be mixed. 5. Hazardous waste bins must be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the top of the container must be covered with a lid). 6. Hazardous waste must be disposed of at a licenced hazardous waste landfill site. 7. Waste bins must be cleaned out weekly or when capacity has been reached to prevent any windblown waste and/ or visual disturbance. 8. Skips must be covered by tarpaulin or sail and bins must have lids. 9. A Waste Register must be compiled. The EM must control and record each load that leaves the site. 10. A full paper trail for waste disposal must be kept that includes: permits to operate (handle, transport waste); Waste Management Licences (for both storage and waste disposal facilities - where applicable) for Waste Handling Contractor/ s; Waste Registrations (for storage of waste, and recycling facilities - where applicable]) for Waste Handling Contractor/ s; Waste Manifests; Weighbridge Certificates; Safe Disposal Certificates and Certificates of Recycling.	Operational Manager	General camp house-keeping Provision of bins Waste Register Waste documents Awareness training on waste minimisation and re-use	EM	Monthly	Approved Waste Register Provision of waste disposal facilities (bins & skips) Proof of waste documents (SDCs, weighbridge receipts, recycling certificates)

Management Objective: To avoid, manage and mitigate potential waste impacts during the operational phase					
Management Outcome: Potential impacts to the environment caused by waste (general and hazardous) are avoided or managed					
11. The provisions of the NEM: Waste Act and Norms and Standards for the Storage of Hazardous Waste and Recycling or Recovery of Waste must be complied with.					

9.7 Lighting

Management Objective: Reasonable measures are taken to ensure intrusive visual impacts are minimised					
Management Outcome: No complaints about visual impact					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Where not prescribed by technical or local and international requirements, external lighting must be of an intermittent and coloured nature rather than constant white light to reduce the potential impact on the movement patterns of nocturnal species. 2. Lighting of the site during operation must be directional and limited to only the necessary areas to prevent light spillage. 3. Lighting fixtures should be hooded and directed downward where possible, to minimize the skyward and horizontal illumination, lighting should be motion activated where possible. 4. Lighting of the plant at night must be limited to security lighting (where this is necessary), and emergency operational lighting must only be lit when required.	Operational Manager	Complaints Register	EM	Monthly	Site inspection

9.8 Air Quality

Management Objective: To reduce air quality (emissions) impacts during operations					
Management Outcome: Emissions reduction due to adherence of management actions					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Use of low sulfur fuel, with a maximum of 500ppm. 2. Start-and-stop preventative maintenance operation of the generators is limited to day-time hours only, ideally between 10:00 and 14:00. 3. As far as is practical, the reliability tests should be conducted when seasonal conditions allow the best pollutant dispersal (August to November). 4. Regular maintenance and inspection of engines as per original equipment manufacturer requirements. 5. Regular emissions monitoring campaign, by independent contractor, on at least one engine stack per plot. 6. Once per year a 7-day ambient monitoring campaign at (minimum) 4 fence-line locations using passive sampling techniques. Monitoring of SO_2, NO_2, CO, and VOCs. 7. Appropriate dust suppression measures on access road, including regularly sweeping and or wet suppression, to minimise particulate matter build-up along access road. 8. Diesel delivery tanker trucks to be road worthy and regularly maintained. Tanker trucks to comply with Euro V emission limits or better. 9. All vehicles associated with the delivery of diesel during the operational phase must adhere to the designated speed limits on- and off-site. 10. Investigate inadequate mitigation and control measures if monitoring or complaints potential issues are indicated by non-conformance with performance indicators. 11. The Developer will be required to align GHG reporting with National Policy. 12. Continue the use of the *Complaints Register* established during construction. 13. Fence-line monitoring using passive samplers or low cost-sensors.	Operational Manager	Ambient monitoring of SO_2, NO_2, CO, and VOCs GHG reporting Fence-line monitoring of emissions Generator maintenance and repair programme ICE must be in good working condition	DEO ECO	Daily Monthly	Monitoring Reports Site inspection Monitoring Reports Inspection of Complaints Register

9.9 Noise Management

Management Objective: To avoid or prevent unnecessary noise to the environment by ensuring noisy operational activities are mitigated					
Management Outcome: Noise management is undertaken in accordance with SANS 10103 and the Occupational Health and Safety Act (Act No. 85 of 1993)					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
7. A generator enclosure must be installed (Engine Hall Building) with a façade (including roof) that meets an airborne sound insulation (DnT,w) of 30 dB. 8. Appropriate inlet and outlet attenuators must be installed in the façade to meet the façade acoustic requirements of (DnT,w) of 30 dB. 9. Extract fans must either be fitted on the side of the façade or on the roof. Extract fans must be fitted with appropriate 2D circular pod attenuators. 10. The exhaust systems must be designed to ensure that low frequency harmonics are not encouraged. The exhaust silencer/s must make use of one or more 35 dB exhaust silencer/ s. 11. Noise barriers must be used where cooling fans are located, where appropriate. 12. Noise monitoring will be required annually around the site boundary as well as the identified noise sensitive receptor. The measured noise levels must be documented and must include the following descriptors: Noise Monitoring will be required biannually around the site boundary as well as the identified noise sensitive receptor, in accordance to SANS 10103:2008. The measured noise levels must be documented and must include the following descriptors and performed in 1/3 octave bands: dBA, dBC, dBZ, LA90. Noise Measurements at noise sensitive sites mustbe performed for a full 24-hour period. Site and boundary measurements can be performed for shorter period as long as they are representative of the soundscape. 13. All construction vehicles and equipment must be kept in good repair. 14. A *Complaints Register* must be kept at the Site Office at all times.	Operational Manager	Compliance with SANS 10103 and OHS Act Annual noise monitoring	DEO ECO	Daily Monthly	Inspection of Complaints Register Site inspection

9.10 Traffic Management

Management Objective: Reasonable measures are taken to ensure the safety of public, pedestrians and staff during operations					
Management Outcome: All precautions are taken where possible to minimise the risk of injury, harm, death or complaints. Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993) and Regulations					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. The delivery of materials by trucks must be phased through the day to the reduce the impact that trucks may have on traffic congestion and dust generation. 2. On-site speed restrictions to be imposed for 15 km/hr once through the security gate and 40 km/hr on the access road to the site (turn-off from the Transnet Service Road). 3. Clear and early warning of construction vehicles at intersection Gariep/ Transnet Service Roads must be provided. 4. Throughout the period of construction, the Province, District and Local Municipalities to be made aware of the name and contact details of the Engineer (PM) that they can communicate with should any matters arise in connection with any aspects of the construction that are affecting the road.	Operational Manager	Fence-line monitoring of emissions Generator maintenance and repair programme ICE must be in good working condition	DEO ECO	Daily Monthly	Site inspection Monitoring Reports Inspection of Complaints Register

10 ENVIRONMENTAL MANAGEMENT PROGRAMME – CLOSURE AND REHABILITATION

10.1 Closure and Rehabilitation

Management Objective: Closure and rehabilitation activities are undertaken in a manner which prevents additional impacts to the EMPr					
Management Outcome: The site is rehabilitated according to EMPr specifications					
Impact Management Actions	**Implementation**		**Monitoring**		
1. The Developer is responsible for compliance with the provisions for Duty of Care and Remediation of Damage in accordance with section 28 of National Environmental Management Act (NEMA), Act No. 107 of 1998. 2. A Detailed Rehabilitation Plan for Terrestrial Habitats must be compiled by a suitably qualified and experienced ecologist and appended to the EMPr prior to construction commencing.	Contractor	Method Statement to be compiled Rehabilitation of Modified Environments SDC	EM ECO	Monthly	Approved Method Statement for the Rehabilitation of Modified Environments

Management Objective: Closure and rehabilitation activities are undertaken in a manner which prevents additional impacts to the EMPr					
Management Outcome: The site is rehabilitated according to EMPr specifications					
3. All areas that have been disturbed by construction activities (including the shared infrastructure area) must be cleared of alien vegetation. 4. The Developer must conduct bi-annual alien plant clearing for the first year post-rehabilitation. Thereafter, alien plant clearing must be undertaken annually during the wet/ growing season until such a time that further risks of alien invasion resulting from disturbance factors are considered negligible. 5. The use of locally indigenous plant species for landscaping and rehabilitation purposes is strongly recommended. Under no circumstances must exotic and invasive plants be used for landscaping purposes. 6. All remaining construction materials, building rubble and waste must be removed from the site. 7. All disturbed surfaces compacted by project must be ripped to a minimum depth of 30cm to allow organic contaminants to breakdown and promote vegetation establishment. 8. If spillages do occur, they must be cleaned up immediately and any contaminated soil must be disposed of in accordance with applicable regulatory requirements. 9. Monitoring of rehabilitation success and management should be conducted after commencement of rehabilitation activities. Seasonal inspections of rehabilitation areas should be conducted by the EM, based on criteria from the Rehabilitation of Modified Environments Method Statement. 10. Fence-line monitoring of dustfall in accordance with the National Dust Control Regulation (NDCR).					SDC

11 COMPLIANCE WITH THE ENVIRONMENTAL SPECIFICATION

The EMPr must form part of the Tender and Contract Documentation and is thus a legally binding document. It is also required for the Contractor to make provisions as part of their budgets for the implementation of the EMPr. In terms of *Polluter Pays Principle*. Section 28 of the NEMA, an individual responsible for environmental damage must pay the costs for both environmental and human health damage. As far as possible reasonable, feasible and implementable measures must be in place to reduce or prevent additional pollution and/ or environmental damage from occurring.

The EMPr must be considered to be an extension of the Conditions of Approval as set forth by the DFFE as well as any other regulatory authority for relevant permits and/ or licences. As such, non-compliance with the EMPr will constitute non-compliance with said Conditions.

The Contractor (as well as sub-contractors, service providers and suppliers) is deemed not to have complied with the Environmental Specification/ EMPr if:

- There is evidence of contravention of clauses within the boundaries of the site, site extensions, construction camps and/ or haul/ access roads;
- Environmental damage ensues due to negligence;
- The Contractor ignores or fails to comply with corrective or other instructions issued by the Developer, ECO or Engineer, within a specified time; or
- The Contractor (as well as sub-contractors, service providers and suppliers) fails to respond to complaints from the public.

Non-Compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance. Non-compliance with the conditions of the EMPr constitutes a breach of contract.

11.1 Penalties

Application of a penalty clause will apply for incidents of non-compliance. The Contractor (as well as sub-contractors, service providers and suppliers) must be allowed one non-compliance and a Written Warning Notification must be issued to the Contractor's Environmental Officer. Failure to rectify the non-compliance within one (1) working week of the issue of the warning or a repeat non-compliance will result in a penalty.

The penalty must be issued by a representative of the Developer. The penalty imposed must be per incident at the discretion of the Developer's Project Manager or any other duly authorised representative. The value of the penalty imposed shall be as defined in the contract and enforcement shall be at the discretion of the Developer. Such fines must be issued in addition to any remedial costs incurred as a result of non-compliance with the EMPr. The Developer will inform the Contractor of the contravention and the amount of the penalty and will deduct the amount from monies due under the Contract. The penalty monies must become the property of the Developer to be used for rehabilitation and maintenance of the site.

Unless stated otherwise in the project specification the penalties imposed per incident or violation must be:

Table 13: Penalties applicable

OFFENCE	AMOUNT
Failure to respond to complaints within specified timeframe	R10,000
Failure to close findings raised by the ECO within specified timeframes	R10,000
Failure to demarcate working areas	R10,000
Working outside of demarcated areas	R30,000
Failure to strip topsoil with intact vegetation	R50,000
Failure to stockpile topsoil correctly	R30,000
Failure to stockpile materials in designated areas	R10,000
Failure to take measures to prevent soil contamination	R10,000
Failure to take measures to control dust dispersion on-site and on access roads leading to site	R10,000
Pollution of water bodies and/ or groundwater	R20,000
Failure to implement stormwater management provisions during construction	R20,000
Failure to implement/ maintain erosion controls	R30,000
Failure to provide adequate sanitation	R10,000
Failure to provide adequate waste disposal facilities and services	R50,000
Failure to reinstate disturbed areas within the specified time-frame	R30,000
Destroying heritage objects without necessary permits	As determined by SAHRA*
Any other contravention of the project specific specification	R10,000

* Liable to a fine or imprisonment or both such fine and imprisonment

11.2 Removal from Site and Suspension of Works

Failure to remediate after the issue of a financial penalty, depending on the severity and significance of the impact related to non-compliance, the ECO may undertake to report directly to the DFFE (Compliance) recommending that for:

- High impact: to issue a notice to cease construction;
- Medium impact: to issue a notice instructing the Developer to implement recommended remedial action; or
- Low impact: ECO to notify, but up to discretion of DFFE to apply sanction.

The Developer, at the direction of the ECO, or of his own conviction, has the power to remove from site any person who is in contravention of the EMPr, and if necessary, the Developer can suspend part or the whole of the works, as required.

With its headquarters in Amersfoort, The Netherlands, Royal HaskoningDHV is an independent, international project management, engineering and consultancy service provider. Ranking globally in the top 10 of independently owned, non-listed companies and top 40 overall, the Company's 6,500 staff provide services across the world from more than 100 offices in over 35 countries.

Our connections

Innovation is a collaborative process, which is why Royal HaskoningDHV works in association with Developers, project partners, universities, government agencies, NGOs and many other organisations to develop and introduce new ways of living and working to enhance society together, now and in the future.

Memberships

Royal HaskoningDHV is a member of the recognised engineering and environmental bodies in those countries where it has a permanent office base.

All Royal HaskoningDHV consultants, architects and engineers are members of their individual branch organisations in their various countries.

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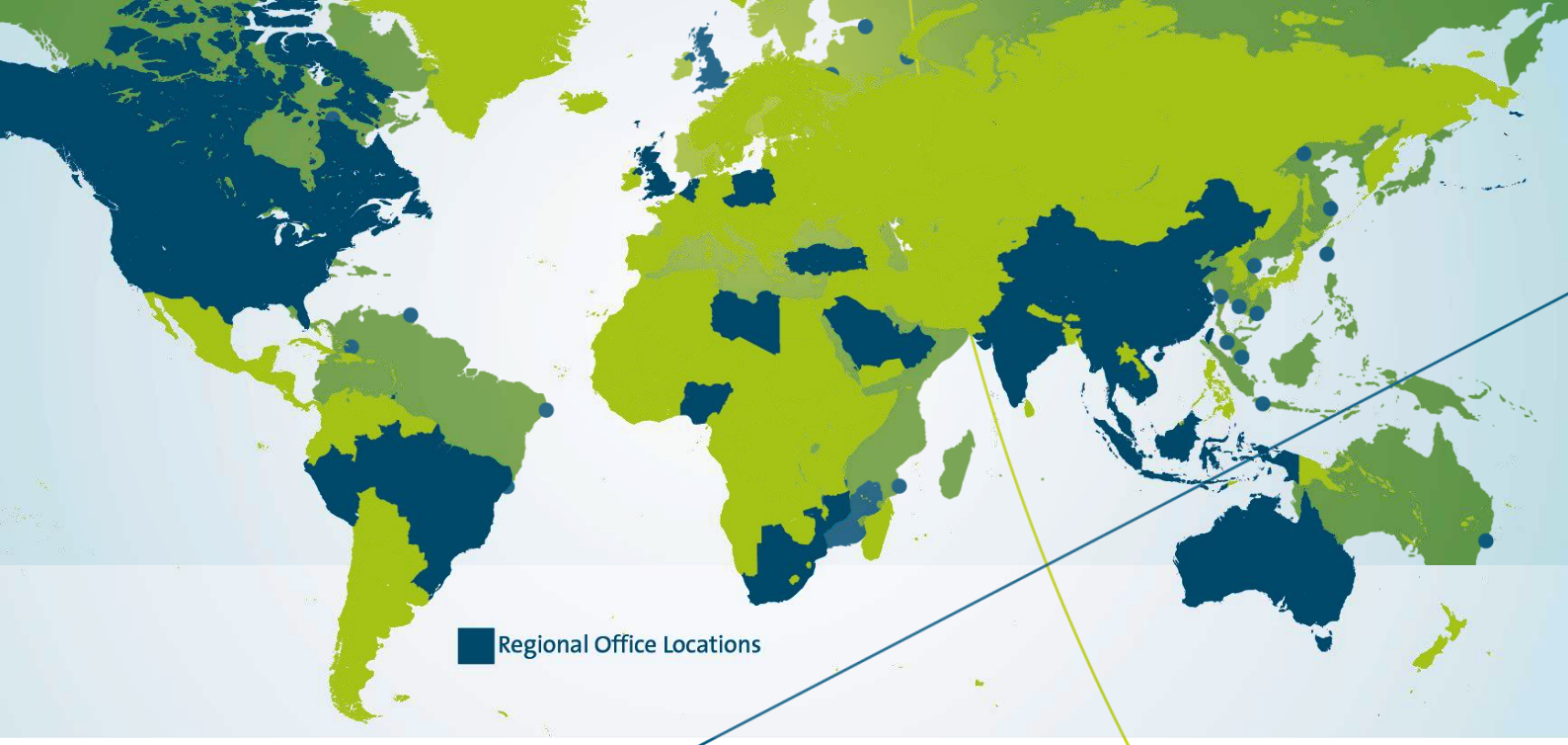

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Annexure A:
EAP CVs

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Curriculum Vitae

Seshni Govender

Roads and Rail Environmental Consultant

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Seshni is a Environmental Consultant working on strategic environmental planning and water related projects. Seshni has been involved in numerous Water Use Licence projects, including complex integrated licencing that requires understanding cumulative environmental impacts. She also has been involved in the development of the Environmental Authorisation Processes for the N11-13X Mokpane Ring Road and the development of Photovoltaic Plants in the Northern Cape Province and Gauteng Environment Outlook .

Seshni has drafted applications for complex integrated licences that include components of National Environmental Management Act and National Water Act on behalf of Eskom and private companies. This has exposed her to the intricate mechanisms of trying to integrate environmental impacts with mitigations measures that will be in line with the sustainable development principles.

As an Environmental Scientist Seshni contributes to projects through; report writing, data management and analysis, environmental impact analysis, policy review and public engagement/consultation.
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Degree
BSc Environmental Science (Hons)
Nationality
South African
Years of experience
9
Years with Royal HaskoningDHV
9

Professional experience

Basic Assessment for the Proposed Developments of Ten (10) Photovoltaic (PV) plants at the Bokpoort farm near Grobblershoop, Northern Cape

> ACWA Power Energy Africa (Pty) Ltd
> Northern Cape Province, 2019

ACWA Power Energy Africa (Pty) Ltd (hereafter referred to as ACWA Power) is proposing to construct a solar energy facility (Bokpoort II) consisting of ten (10) photovoltaic (PV) plants on the north-eastern portion of the Remaining Extent (RE) of the Farm Bokpoort 390, located 20 km north-west of the town of Groblershoop within the !Kheis Local Municipality in the ZF Mgcawu District Municipality, Northern Cape Province.

On 21 October 2016, a 900 ha, 150 MW Concentrating Solar Power (CSP) plant was authorised by the Department of Environmental Affairs (DEA). Due to the changes in the Integrated Resource Plan (IRP) published in October 2019, ACWA Power intend replacing the authorised CSP site with eight (8) new PV plants. The updated layout has been revised to incorporate the 8 new PV plants of 250 MW each, covering a total of 1200 ha (i.e. 150 ha for each plant).

Two 250 ha 75 MW PV plants including ancillary infrastructure, were also authorised by the DEA on 24 October 2016. As the PV 1 and PV 2 plants are also approved on the Farm Bokpoort 390 RE, the footprints of these approved PV plants will undergo an amendment to accommodate the 8 new PV plants and ancillary infrastructure.

Basic Assessment and Water Use Authorisation for the removal, re-instatement and repositioning of two high voltage powerlines routed through the Stellenbosch Landfill off Devon Valley Road, Stellenbosch, Western Cape

> Eskom Holdings SOC Ltd and Stellenbosch Municipality
> Western Cape Province, 2020

The Stellenbosch Municipality owns and operates the Stellenbosch Landfill situated off Devon Valley Road. The landfill comprises completed cells (cell 1 and 2) as well as an operating cell (cell 3). Cell 3 is separated from cells 1 and 2 by an area on the landfill property footprint that is used for access roads, entrance area and weighbridge, green waste chipping and rubble crushing and stockpiling activities. This area is also transversed by two high voltage Eskom powerlines. The presence of these powerlines prevents the Municipality from engineering and operating the area between completed cells 1 and 2 and operating cell 3 as waste disposal cells.

Eskom Distribution (Western Cape Operating Unit) therefore proposes removing, re-instating and repositioning the two powerlines (132kV and 66kV) routed through the landfill. The 132kV powerline will be relocated to the northern and eastern boundary of the landfill, whilst the 66kV powerline will be relocated to the eastern and southern boundary. The proposed length of each of the deviated lines are approximately 1km. Two alternative pylon structures are currently being considered i.e. monopoles and lattice towers.

Basic Assessment and Environmental Management Programme for the Borrow Pit 5.5L associated with the N11 Section 13X (N11-13X), Mokopane Ring Road, Mogalakwena Local Municipality, Limpopo province

> South African National Roads Agency Ltd
> Limpopo Province, 2019

The South African National Roads Agency Ltd (SANRAL) has commissioned the Detail Design and the Construction Monitoring of the N11-13X Mokopane Ring Road to divert the heavy vehicle traffic that travels to and from the mines on the western side of Mokopane and to Botswana, from the already congested existing N11 section which passes through the existing villages and the Mahwelereng Township.

The N11-13X Mokopane Ring Road is a “greenfields” project where a new road will be constructed. The class of the new road will be Class 1. The new road to be constructed will typically have an overall width of 13.4 m where the initial carriageway will comprise a minimum 2.5 m outer shoulder, 2 x 3.7 m lanes, and 2.5 m inner shoulder. In general, the road reserve varies between 71 – 75 m but there are wider sections where there is a deep cutting or because of allowance for future interchanges.

A limited amount of gravel (G5 – G7 quality) will be available from cut widenings within the road reserve. The remainder of the gravel required for the proposed road construction (gravel layer works) will need to be sourced from borrow pits.

Application for Postponement of Compliance Timeframes to achieve New Plant Standards at ArcelorMittal South Africa, Vanderbijlpark Works, Emfuleni Local Municipality

> ArcelorMittal South Africa
> Gauteng Province, 2019

In response to Section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004) (as amended in 2018), ArcelorMittal applied for a postponement of the compliance timeframes to achieve the new plant minimum emission standards, as well as alternative emission standards for certain plants at the Vanderbijlpark Works (AMSAVW), Emfuleni Local Municipality, Gauteng.

Application for an Alternative Plant Standard and Suspension Application for activities associated with the ArcelorMittal Pretoria Works, City of Tshwane, Gauteng.

> ArcelorMittal South Africa
> Gauteng Province, 2019

In response to Section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (as amended in 2018), ArcelorMittal intends to apply for an alternative plant standard and submit a suspension application of the compliance timeframes to achieve the new plant minimum emission standards for the Pretoria Works, City of Tshwane, Gauteng.

Water Use Licence application for the Urania-Bronville Powerline Upgrade Project, Matjhabeng Local Municipality, Free State Province

> Matjhabeng Local Municipality
> Free State Province, 2019

The construction of new overhead powerlines to replace the existing underground powerlines that are no longer operational. The works will comprise the supply, delivery, off-loading, installation, erection, commissioning and handing-over (in a proper working condition) of the following infrastructure.

The construction of a new approximately 3.3 km, 132 kV overhead line between the Welkom Main Intake Substation and Urania Substation.

The construction of a new approximately 5.5 km, 11 kV overhead line between the Industries Substation and Bronville Substation.

Water Use Licence for the Proposed Deviation of the 88kV Firnham-Platrand Powerline near Standerton, Mpumalanga Province

> Eskom Holdings SOC Limited
> Mpumalanga Province, 2018

Eskom Holdings Limited, a State-Owned Company (SoC) proposed a deviation of a portion of the existing 88kV Firham-Platrand Powerline from pole 157 to pole 180 within a servitude of 31m and a length of approximately 2km. The purpose of the deviation is to avoid a wetland in which these poles are currently located which poses a network stability risk as it is located within a wetland area.

Firham Platrand is an interconnector between Standerton and Volksrust for network stability, the line supplies Transnet Traction Stations, should the line fail, the trains in the nearby tractions will not be able to move.

Water Use Licence Application for the Proposed Site Clearance for Planning and Design of a Border Barrier, Patrol Roads and Fencing between the Republic of South Africa (RSA), Swaziland and Mozambique, Phase 1 (KM 0.0 0 KM 54.0)

> The National Department of Public Works (DPW) and KwaZulu-Natal Department of Transport (KZN DoT)
> KwaZulu-Natal Province, 2018

Proposed the upgrade of existing border control infrastructure, and development of new border control infrastructure along a portion of the South Africa (KwaZulu-Natal) - Mozambique Border in the north-eastern part of the KwaZulu-Natal (KZN) Province. This application is termed the 'Phase 1' application and forms a component of a wider project being undertaken by the DPW for the upgrading of border control infrastructure along the South Africa - Swaziland border and the southern part of the South Africa - Mozambique border (the Phase 2 Project). The Phase 1 alignment is comprised of the section of the international border with Mozambique from the high-water mark of the Indian Ocean (KM0.0) to the eastern boundary of the Ndumo Game Reserve (KM54.0).

Environmental Screening Investigation: Route Determination for the K178 between the Gauteng Provincial Border and PWV1, Gauteng Province

> Gauteng Department of Roads and Transport (GDRT)
> Gauteng, 2018

The purpose of the Gauteng Strategic Road Network (GSRN) conceived by the Gauteng Department of Roads and Transport (GDRT) some 40 years ago was to plan a robust road system, with the objective of preserving transportation corridors and serving as a guideline for the rapid development and urbanisation of Gauteng.

The route for the K178 is the section between the Gauteng Provincial Border (in the east) and the future PWV1 (in the west) with an approximate length of 18.8km. The alignment generally follows the previous planned GDRT route along the alignment of the existing R54.

In the context of integrated environmental management, screening determines whether a development proposal requires environmental assessment, and if so, what level of assessment is appropriate. Screening is thus a decision-making process that is initiated during the early stages of the development of a project.

The main purpose of the ESI was to determine at this stage of the road design whether there are aspects of the development proposal that have the potential to give rise to significant or unacceptable environmental consequences i.e. fatal flaws.

Water Use Licence Application for the Proposed Site Clearance for Planning and Design of a Border Barrier, Patrol Roads and Fencing between the Republic of South Africa (RSA), Swaziland and Mozambique, Phase 2 (KM 54.0 0 KM 524.0)

> The National Department of Public Works (DPW)
> KwaZulu-Natal and Mpumalanga Provinces, 2018

The National Department of Public Works (DPW) as the applicant, (in conjunction with the KwaZulu-Natal Department of Transport (KZN DoT) as an implementing agent) is proposing the upgrade of existing border control infrastructure, and development of new border control infrastructure along a portion of the South Africa–Mozambique-Swaziland Border in KwaZulu-Natal and Mpumalanga. This application was termed the 'Phase 2' application and forms a component of a wider project being undertaken by the DPW for the upgrading of border control infrastructure along the South Africa - Swaziland border and the southern part of the South Africa - Mozambique border. The Phase 1 alignment is comprised of the section of the international border with Mozambique from the high-water mark of the Indian Ocean (KM0.0) to the eastern boundary of the Ndumo Game Reserve (KM54.0), whilst this Application (Phase 2) is from KM54.0 to KM524.0.

The project is being undertaken by the DPW in conjunction with the Department of Agriculture Forestry and Fisheries (DAFF) and the South African National Defence Force (SANDF), and Ezemvelo KZN Wildlife (EKZNW) and the iSimangaliso Wetland Park Authority (IWPA) as partner organs of state. The KZN DoT is an implementing agent for one of the infrastructure components (the border barrier structure).

The aim of the project is to stop the illegal trafficking of stolen vehicles and contraband across this section of the international border, as well as to prevent the illegal movement of people as well as livestock that could transmit disease. South Africa has approximately 4 800 km of land border and 2 800 km of coastline border which is required to be secured. South Africa is greatly affected and financial impacted by illegal imports, smuggling and other similar illegal activities which transpire over borders. In order to effectively respond to the range of security and control challenges that are being experienced by responsible organs of the State, it is important to assess the situation and to be able to incorporate a viable solution.

Basic Assessment for the Proposed Construction of a Bridge over the Rooisloot River, Various Culverts and Borrow Pits Associated With the National Route N11 Section 13x (N11-13x) (Mokopane Ring Road) in the Mokopane Area

> South African National Roads Agency Ltd

> Limpopo Province, 2018

The South African National Roads Agency Ltd (SANRAL) has commissioned the Detail Design and the Construction Monitoring of the N11-13X Mokopane Ring Road. An Environmental Impact Assessment (EIA) study was previously conducted for the proposed re-routing of the N11-13X road. The Environmental Authorisation and subsequent approval of the Environmental Management Plan (EMP) was obtained in 2009. The subject of this Basic Assessment Process was therefore to address the infilling activities within the watercourses which pertain to the Rooisloot Bridge and the associated culverts. There were 5 Borrow Pits associated with this project that were also subject to Basic Assessment Processes.

NW Environment Outlook, South Africa

> North West Department of Rural, Environment and Agricultural Development

> Mahikeng, 2018

Compilation of the water chapter as part of the publication of the North West Environment Outlook

Integrated Water Use Licence Application for the Rehabilitation of the Existing P236 and Culvert from km 6.235 to km 14.0

> KwaZulu-Natal Department of Transport

> Ubombo,, KwaZulu-Natal, 2017

The P236 is located north of Mkhuze and starts at km 0.0 at the intersection with P2-9 and ends at km 32.0, intersecting P449. The application, however, was only for the rehabilitation of km 6.235 to km 14.0 of the P236 as well as the replacement of a culvert at Km 6.240.

Integrated Open Space for the Greater Khayalami and Ruimsig/Honeydew Sub Regions

> City of Joburg, 2017

Development of two integrated open space plans for the Greater Khayalami and Ruimsig-Honeydew Sub-regions which aim to ensure that ecological goods and services are maintained and enhanced so as to contribute to spatial planning in the City of Johannesburg, and both economic and social development.

Water Use Licence Application for the Proposed Upgrade of Dango Bridge (B1372) and Bedlane Bridge (B1336) situated along P393 (R34) Road Between Nkwalini Pass (Km0,0) and Empangeni (Km24,0)

> KwaZulu-Natal Department of Transport

> Empangeni, KwaZulu-Natal, 2017

The KwaZulu-Natal Department of Transport (DoT) proposed to improve the Provincial road P393 (R34) from P47-4 at Nkwalini Pass (km 0.0) to P230 at Empangeni (km 24.0) within the King Cetshwayo District Municipality in KwaZulu-Natal Province. The project starts at the intersection of P47-4 (R66) with P393 (R34) at Nkwalini Pass (km 0.0) and ends at P230 (km 24.0) towards Empangeni. The Bedlane river bridge (B1334) is situated at km 2.6 from Nkwalini Pass and the Dango river bridge (B1372) is situated at km 3.9 from Nkwalini Pass. The existing P393 road is 8.8m wide and the proposed road geometry for the rehabilitation is 10.0m wide including shoulders.

Water Use Licence Application for the Proposed Culvert Rehabilitation along Provincial Road P230 from Km37.0 to Km47.0

> KwaZulu-Natal Department of Transport

> Umhlathuze Local Municipality, KwaZulu-Natal, 2017

This project formed part of the Empangeni Road Rehabilitation Programme and covers the rehabilitation of the provincial road P230 between km 37,0 and km 47,0 within the uMhlathuze Local Municipality which forms part of the King Cetshwayo District Municipality (DC28), KwaZulu-Natal. Provincial Road P230 from the intersection with P393 at km 37,0 to km 47,0 near Empangeni is defined as an undivided two lane road, and has been classified as a Class R1 Rural Arterial Road (in terms of the TRH26). The P230 forms part of the R34 long distance heavy haul freight route, which connects the harbour of Richards Bay and the surrounding industrial and commercial areas, with inland provinces.

Integrated Water Use Licence Application for the Canelands Extension Development, KwaZulu-Natal

> Tongaat Hulett Developments

> Kwadukuza Municipality, KwaZulu-Natal, 2017

Tongaat Hulett Development wishes to develop the site for industrial purposes. The site lies adjacent to the existing Canelands Industrial estate. Potential land uses may include general / industrial, logistics, warehousing and distribution. These land uses will complement those of the existing Canelands Industrial Estate and will ensure that this land parcel reads as an extension to the existing development. It is proposed, due to the proximity of the floodplain and numerous other constraints located on-site, that a single platform covering an area of approximately 1.67 hectares (1.67 ha) is created. Both a servicing and traffic report has been completed, which details how this development will be accommodated by the existing bulk infrastructure within the region.

Gauteng Province Environment Outlook Report

> Gauteng Department of Agriculture and Rural Development

> Gauteng, 2017

State of the Environment Report (SoER) is a report card on the condition or quality of the environment. It provides information on how we affect the environment, how the environment affects us, and how this condition has changed over time. Environmental conditions are analysed through the use of environmental indicators which are proxies of environmental status, and which can be monitored over time and space. Reporting on the State of Environment (SoE) is therefore an important tool in identifying, assessing and setting priorities for environmental issues, as well as in determining whether environmental policies and actions are effective. Furthermore, the 'environment outlook' component attempts to describe or predict how environmental challenges will evolve in the near future, and what needs to be done to achieve a more sustainable state of living for all people in the province. The ultimate value of environmental outlook reporting lies in the degree to which that assessment can be used for adaptive environmental management to address anticipated future environmental conditions and pressures.

North West Envrionmental Outlook/State of the Environment Trend Analysis

> North West Department of Rural, Environment and Agricultural Development

> Mahikeng, 2017

The *Environmental Trend Analysis Report* focused on the publications of the North West Province State of Environment and Environment Outlook Reports dated 1995, 2002, 2008 and 2013, in an effort to expand this trend reporting to fully cover the period 1995 to 2013. This exercise followed on from the 2013 Environment Outlook Report which reported on environmental trends and made related recommendations to guide the province towards a more sustainable future. As such, the following objectives were achieved:

> The indicators for each chapter were tracked through the reporting period

> Data Gaps Identified

> the value of the indicator set determined

Environmental Impact Assessment and Integrated Water Use Licence Application for the Tinley Manor Southbanks Coastal Development, KwaZulu-Natal

> Tongaat Hulett Developments

> Kwadukuza Municipality, KwaZulu-Natal, 2017

Tongaat Hulett Developments proposes to develop the Tinley Manor Southbanks Coastal Development into a mixed-use coastal development including a large residential component. Tinley Manor Southbanks Coastal Development is an approximately 485 ha site, located between the coastal towns of Tinley Manor and Sheffield Beach within the KwaDukuza Municipality, KwaZulu-Natal.

The proposed Tinley Manor Southbanks Coastal Development is set to be the first phase of the development of Tongaat Hulett Developments' land holdings in Tinley Manor, which is situated to the south and north of the Umhlali River.

Integrated Open Space Plan – Greater Khayalami and Ruimsig-Honeydew Sub-Regions, Johannesburg, South Africa

> >Client: City of Johannesburg, 2016

Development of two integrated open space plans for the Greater Khayalami and Ruimsig-Honeydew Sub-regions which aim to ensure that ecological goods and services are maintained and enhanced so as to contribute to spatial planning in the City of Johannesburg, and both economic and social development.

Royal HaskoningDHV

Update of the Dube Tradeport State of the Environment Report
> Dube Tradeport Corporation
> KwaZulu-Natal, 2016
Compilation of the Dube Tradeport State of the Environment Report 2016/2017

Integrated Open Space Plan - Linbro Park & Greater Bassonia, Johannesburg, South Africa
> City of Johannesburg,2016
Development of two integrated open space plans for the Linbro Park and Greater Bassonia which aim to ensure that ecological goods and services are maintained and enhanced so as to contribute to spatial planning in the City of Johannesburg, and both economic and social development.

Final Consultation Basic Assessment Report for the Dismantling of a portion of the existing double-circuit power line and the construction of two (2) 7 km long 88 kV power lines within a 2 km corridor between the Grootpan and Brakfontein Substations
> >Eskom Holdings SOC Ltd
> Ogies, Mpumalanga, 2015
Eskom Holdings (SoC) Pty Ltd (Eskom Distribution – Mpumalanga Operating Unit) proposes to construct two (2) 7 km 88 kV overhead power lines within a 2 km corridor between Grootpan and Brakfontein Substations near Ogies. The existing power lines are located on GlencoreXstrata mining property. The mine has requested that Eskom relocate the lines as they are within the operational footprint of the mine. The project also involves the dismantling of a portion of the existing 88 kV double-circuit mink power line approximately 5.2 km in length. The new power lines will ensure continuity of supply and access to electricity for the surrounding communities.

Conduct Pre-Feasibility (FEL-2) Waterberg Heavy Haul Line, South Africa
> Transnet SOC Ltd
> Waterberg, 2015
High-level environmental screening investigation for the proposed +- 600km rail corridor running from Lephalale to Ermelo as part of the national Strategic Infrastructure Project (SIP) suite.

Tembisa Hub Plan, South Africa
> >Intersite Property Management Services
> Ekurhuleni Metropolitan Mucipality, 2015
Preparation of a Precinct plan for the Tembisa Urban Hub in Ekurhuleni.

Review and Update of the City of Windhoek's Environmental Policy
> Consulting Services Africa (CSA)
> Windhoek, Namibia, 2014
Review the existing City of Windhoek Environmental Management Policy, 2004 and revise and improve the existing policy so that it may be approved, launched, and implemented by the Windhoek City Council.

Green existing by-laws and develop a set of new environmental by-laws or amend the existing by-laws,
> Ekurhuleni Metropolitan Municipality
> Ekurhuleni, 2014
Review the existing Ekurhuleni by-laws by introducing environmental considerations and develop a set of new environmental by-laws if required.

Route Determination and EIA for K86, K118, K181 K208, K217 and K219,
> Gauteng Department of Roads and Transport
> Gauteng Province, 2014
Route Determination and Environmental Scan of K-routes in the Gauteng Province.

Dube Tradeport State of the Environment Report
> Dube Tradeport Corporation
> KwaZulu-Natal, 2014
Compilation of the Dube Tradeport State of the Environment Report 2013/2014

State of Environment Report (SOER) for City of Johannesburg, South Africa
> >South African Cities Network
> City of Joburg, 2014
Compilation of the State of the Environment Report for the City of Johannesburg 2014

Cornubia Human Settlement - Integrated Water Use Licence Application, South Africa
> Tongaat Hulett Developments (Pty) Ltd
> Cornubia, KwaZulu-Natal, 2013
Water Use Licence Application for the Cornubia Industrial and Business Estate, Phase 1-Retail Park, Cornubia Phase and Cornubia Bridge

Seshni Govender

NW Environment Outlook, South Africa
> North West Department of Economic Development, Environment, Conservation and Tourism
> Mahikeng, 2013
Compilation and Publication of the North West Provincial

Qualifications

2010 BSc (Hons) Environmental Science, University of KwaZulu Natal, South Africa

2009 BSc Environmental Science, University of KwaZulu Natal, South Africa

Royal HaskoningDHV

Royal HaskoningDHV
Enhancing Society Together

Curriculum Vitae

Prashika Reddy

Road and Rail

Senior Environmental Scientist

Prashika started her career in the environmental field after spending 5 years' working for the Department of Agriculture: Genetic Resources Directorate. She is a Senior Environmental Scientist in the Environmental Management and Planning Unit within the Roads and Rail Advisory Group. In 2010, she obtained her professional registration as a Natural Scientist in the field of Environmental Science. She is a registered Environmental Assessment Practitioner with EAPASA.

Prashika has built up an impressive résumé, having worked on diverse projects mainly in the petro-chemical industry, as well as various large-scale power generation projects. She has established good working relationships with key clients and has undertaken several flagship projects on their behalf, such as Sasol and Eskom's Underground Coal Gasification project.

Years of experience
19
Years with Royal HaskoningDHV
14
Professional memberships
SA Council for Natural Scientific Professions, Pr Sci Nat, 400133/10
EAPASA, Registered EAP, 2019/917
Qualifications
1999: Bachelor of Science Honours: Botany, University of KwaZulu-Natal
2006: Bachelor of Science Honours: Geography (with distinction), University of Pretoria

Professional experience

Environmental Impact Assessment (EIA), Waste Management Licence and Integrated Water Use Licence for the Underground Coal Gasification (UCG) Project and associated infrastructure in support of co-firing of gas at the Majuba Power Station, Mpumalanga, South Africa, South Africa

Start Date: 2008 - 2015
Client Name: Eskom Holdings SOC Ltd
Project Value: R 5,900,000
Eskom Holdings (SOC) Ltd appointed Royal HaskoningDHV to undertake the integrated environmental authorisation process, as well as the integrated Water Use Licence, for the UCG pilot project and associated infrastructure in support of co-firing of gas at the Majuba Power Station. UCG is a process whereby coal is converted in situ into combustible gas that can be used for power generation and is one of the new clean coal technologies being developed for implementation by Eskom that intends to diversify Eskom's fuel supply.
Position: Project Manager
Assigned Tasks: Project management, client liaison, compilation of environmental reports, management of the specialist team, authority consultation and co-management of the public participation process

Integrated Environmental Authorisations for the proposed Concentrated Solar Power (CSP) Plants on the farm Sand Draai, Northern Cape Province

Start Date: 2014 - 2016
Client Name: Solafrica Energy (Pty) Ltd
Project Value: R 1,500,000
Solafrica appointed Royal HaskoningDHV to undertake the integrated environmental authorisation and waste licence processes for two CSP plants (central receiver and parabolic trough) with an electricity generation capacity of between 100 - 150MW to be constructed on the farm Sand Draai, Upington.
Position: Environmental Scientist
Assigned Tasks: Compilation of environmental reports

Environmental Impact Assessment for the Pumped Storage Power Generation Facility in the Steelpoort area, Mpumalanga and Limpopo Provinces

> Start Date: 2005 - 2007
> Client Name: Eskom Holdings SOC Ltd
> Project Value: R 1,300,000

As part of the increased electricity supply plan, Eskom will be constructing a Pumped Storage Scheme (PSS) in the Steelpoort area, Limpopo and Mpumalanga Provinces. It is planned that the scheme will have an installed capacity of approximately 1520MW. The proposed scheme consists of the following components: upper and lower reservoirs; underground power house complex and associated waterways that link the reservoirs; and ancillary works.
Position: Project Manager
Assigned Tasks: Completion of the EIA study and reports (EIA Report and EMP), project management, client liaison, management of the specialist team, authority consultation and co-management of the public participation process

Basic Assessment Study for Eight New PV Developments on the Farm Bokpoort, Groblershoop

Start Date: 2019
Client Name: ACWA Power Africa Holdings (Pty) Ltd
Project Value: R 966,123
Due to the changes in the Integrated Resource Plan published in October 2019, ACWA Power intend replacing the authorised CSP site with 8 new PV plants. The updated layout has been revised to incorporate the 8 new PV plants of 200MW each, covering a total of 1200ha (i.e. 150ha for each plant) on Remaining Extent of the Farm Bokpoort 390.
Position: Environmental Scientist and Project Manager
Assigned Tasks: Compilation of environmental reports and project management

Basic Assessment Study for Seven 9.9MW Internal Combustion Engines (ICE) at the Previously Authorised PV Developments on the Farm Bokpoort, Groblershoop

Start Date: 2020
Client Name: ACWA Power Africa Holdings (Pty) Ltd
Project Value: R 153 000
Recently, the Department of Mineral Resources and Energy issued a Request For Proposal (RFP) to which ACWA Power will be participating. A condition in the RFP requires Bidders to not tap into the national grid for power and requires that a reliability test be undertaken at specified generation rate and time. In meeting the RFP requirements, ACWA Power has decided to supplement their already authorised project infrastructure by the addition of ICE infrastructure in the projects to be bid.

Position: Environmental Scientist and Project Manager
Assigned Tasks: Compilation of environmental reports and project management

Environmental Screening Investigation for the Establishment of a Solar Based Electricity Generation System on a Build, Own, Operate and Maintain Basis – 118MW Photovoltaic Plant at the Tubatse Chrome Plant, Steelpoort, Limpopo
Start Date: 2020
Client Name: Samancor Chrome
Project Value: R 146 000
As part of the Transaction Advisory Services, Royal HaskoningDHV's Environmental Management and Planning (EM&P) Knowledge Group have been appointed to conduct a high-level desktop Environmental Screening Investigation (ESI) of twelve (12) sites to investigate the environmental sensitivities, opportunities and constraints associated with the proposed project for the proposed 118MW PV plant at the Tubatse Chrome Plant in the Steelpoort area, Limpopo Province.
Position: Environmental Scientist
Assigned Tasks: Compilation of environmental reports and project management

Environmental Impact Assessment (EIA), Waste Management Licence and Integrated Water Use Licence for the Matimba Power Station Ash Disposal Facility, South Africa
Start Date: 2012 - 2016
Client Name: Eskom Holdings SOC Ltd
Project Value: R 5,800,000
Approximately 4.8 million tons of ash is produced annually from the Matimba Power Station. This ash is currently being disposed by means of 'dry ashing' ~3km south of the power station. The proposed ash disposal facility will ensure that the power station is able to accommodate the 'ashing' requirements for the remaining life (approximately 44 years) of the Power Station.
Position: Environmental Scientist, Project Manager
Assigned Tasks: Compilation of environmental reports (EIA Report and EMPr), project management, management of the public participation process and specialist team

Charlie 1 Landfill Stormwater Management & Optimisation Project, Sasol Secunda, South Africa
Start Date: 2015 - 2016
Client Name: Sasol Chemical Industries (Pty) Ltd
Project Value: R 735,000
The Sasol Synfuels, Secunda, Charlie 1 landfill site was authorised in 1993 as a Class II Site, in terms of the Environmental Conservation Act (ECA) (Act No. 73 of 1989). Recent legislation changes such as the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and the new Waste Classification and Management Regulations, August 2013 (GN 634) have implications for the management of waste disposal sites. The latest audits conducted at Charlie 1 landfill site highlighted that the water management is not in accordance with the permit requirements. Therefore, the Pollution Control Dam (PCD) of approximately 16000m3 will be constructed to ensure compliance with the existing permit requirements. It will be constructed to ensure effective management of leachate and stormwater.
Position: Project Manager
Assigned Tasks: Project management

Scoping Study for the Full-Scale Composting of Sludge Waste Streams, South Africa
Start Date: 2014
Client Name: Sasol Chemical Industries (Pty) Ltd
Project Value: R 850,000
The proposed project involves constructing a full-scale compositing site that will be able to handle approximately 200000 - 300000t/a of sludge generated at the Sasol Secunda plant.
Position: Project Manager
Assigned Tasks: Project management, quality review of Environmental Scoping Report and public participation documentation

Waste Management Licence for the BMW Waste Facility, South Africa
Start Date: 2010
Client Name: BMW SA (Pty) Ltd
Project Value: R 168,797
Position: Project Manager
Assigned Tasks: Project management, client management, authority consultation, report compilations and internal review of work

EIA and Water Use Authorisation for the Removal, Re-Instatement and Re-Positioning of Two High-Voltage Powerlines routed through the Devon Valley Landfill, Stellenbosch
Start Date: 2019
Client Name: Stellenbosch Municipality
Project Value: R 820,000
The Stellenbosch Municipality owns and operates the Stellenbosch Landfill situated off Devon Valley Road. The landfill comprises completed cells (cell 1 and 2) as well as an operating cell (cell 3). Cell 3 is separated from cells 1 and 2 by an area on the landfill property footprint that is used for access roads, entrance area and weighbridge, green waste chipping and rubble crushing and stockpiling activities. This area is also transversed by two high voltage Eskom powerlines. The presence of these powerlines prevents the Municipality from engineering and operating the area between completed cells 1 and 2 and operating cell 3 as waste disposal cells.
Position: Project Manager and Environmental Scientist
Assigned Tasks: Project management, compilation of environmental reports, management of specialist team

Site Clearance: Planning and Design for Maintenance and/or Upgrade of the Patrol Roads and Fencing on the Borders between RSA, Swaziland and Mozambique
Start Date: 2016
Client Name: Department of Public Works
Project Value: R 2,598,000
Undertake the Basic Assessment study, mining permitting as well as Water Use Licencing application processes associated with the border patrol road and fence.
Position: Project Manager
Assigned Tasks: Project management

Basic Assessment and Water Use Licence for the rehabilitation of the existing P236 gravel road from km6.235 to km14.0 in Ubombo, KwaZulu-Natal
Start Date: 2016
Client Name: KwaZulu-Natal Department of Transport
Project Value: R 546,186
This project is a rehabilitation of a portion of the existing P236 road from km6.235 to km14.0, where the surfaced width will be increased by 2.5m and where there are climbing lanes; the surfaced width will increase by 5.6m. In areas where there will be horizontal curve widening, the width will be increased by 4.5m. Furthermore, existing culverts with be lengthened where required to accommodate the increase in the road bed width. A culvert at a stream crossing, is also planned to be replaced at km6.240 of the P236.
Position: Strategic Environmental Advisor
Assigned Tasks: Quality review of environmental reports and public participation documentation

Basic Assessment and Water Use Licence for the proposed bridge crossing over the uMfolozi River linking the Esiyembeni and Novunula areas within the Mtubatuba Local Municipality, KwaZulu-Natal
Start Date: 2016
Client Name: KwaZulu-Natal Department of Transport
Project Value: R 522,225
The KwaZulu-Natal Department of Transport (KZN DoT) is planning to construct a bridge over the uMfolozi River and associated link road that will serve to link the Esiyembeni and Novunula local communities situated on either side of the uMfolozi River which is currently impassable save for the existing N2 bridge crossing to the east near Mtubatuba.
Position: Strategic Environmental Advisor
Assigned Tasks: Quality review of environmental reports and public participation documentation

Basic Assessment for the construction of two 7km long 88kV Power Lines Grootpan / Brakfontein, South Africa
Start Date: 2015
Client Name: Eskom Holdings SOC Ltd
Project Value: R 458,021
The proposed project involves the construction of two (2) 7km 88kV power lines and dismantling of two (2) 88kV power lines from Grootpan to Brakfontein, south of Ogies in Mpumalanga.
Position: Project Principal
Assigned Tasks: Quality review and overall project management

Proposed Tinley Southbanks Beach Enhancement Project in the KwaDukuza Municipality, KwaZulu-Natal
Start Date: 2016
Client Name: Tongaat Hulett Developments (Pty) Ltd
Project Value: R 925,270

The Tinley Manor Southbanks development provides for the coastal resort, however, it does not provide for what is critical for the success of the resort and that is a safe swimming beach in close proximity to the resort. The lack of a safe swimming beach with public amenities adjacent the development was identified as a major constraint. This EIA is therefore targeted at dealing with this constraint and to enable the provision of a new beach resort that has all the requirements to be able to attract international investment, including specifically a safe, swimming beach.
Position: Strategic Environmental Advisor
Assigned Tasks: Provide strategic advice on project, review of environmental reports

Environmental Impact Assessment for the Cornubia Phase 2 Development, KwaZulu-Natal, South Africa
Start Date: 2012
Client Name: Tongaat Hulett Developments (Pty) Ltd
Project Value: R 989,660
Conduct a full Environmental Impact Assessment (EIA) for the proposed Cornubia Mixed Use Phased development - Phase 2 in Mount Edgecombe, KwaZulu-Natal.
Position: Strategic Environmental Advisor
Assigned Tasks: Provide strategic advice on project, review of environmental reports

Cornubia Retail Park - EIA, South Africa
Start Date: 2012
Client Name: Tongaat Hulett Developments (Pty) Ltd
Project Value: R 370,120
Undertaking the EIA, Public Participation Process (PPP), attending client progress meetings and providing environmental input into the planning of the proposed Phase 2 Retail Development.
Position: Strategic Environmental Advisor
Assigned Tasks: Environmental Scientist. Strategic project advice, quality review and approval of reports

Centurion Metropolitan Core Masterplan: Stormwater and Flooding, South Africa
Start Date: 2012
Client Name: City of Tshwane Metropolitan Municipality
Project Value: R 4,300,000
The City of Tshwane requires a multi-disciplinary project team to assist the Client with the Preparation of a Master Plan of the Centurion Metropolitan Core Study Area.
Position: Environmental Scientist
Assigned Tasks: Environmental Screening Investigation

Environmental Screening for the Commercial 125MW CSP, South Africa
Start Date: 2012
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 185,000
Environmental Screening Investigation for the proposed 125MW commercial concentrated Solar Power Plant located in Upington.
Position: Project Principal
Assigned Tasks: Project Management, financial management, review of Environmental Screening Report

Route Determination and Environmental Screening Investigation of 14 K-routes, South Africa
Start Date: 2016-2019
Client Name: Gauteng Department of Roads and Transport
Project Value: R 5.6 Million
Route determination and ESI for routes K
Position: Environmental Scientist
Assigned Tasks: Environmental Screening Investigation and compilation of the ESI Report

City of Tshwane: Waste Transfer Facilities, South Africa
Start Date: 2014
Client Name: City of Tshwane Metropolitan Municipality
Project Value: R 150,000
Report on environmental and sustainability considerations in Waste to Energy (WtE) Plants when they are co-fired with Municipal Solid Waste. Concept designs and environmental screening of various waste transfer stations. Situational assessment of other closed landfill facilities.
Position: Environmental Scientist
Assigned Tasks: Advise the client on Environmental authorisation requirements

Basic Assessment for the Sasol C3 Expansion Project, Sasol Industrial Complex, South Africa
Start Date: 2013
Client Name: Sasol Polymers
Project Value: R 267,614
The C3 expansion project was initiated to address an estimated 105ktpa additional propylene that will be

available in 2014 as a result of various optimisation projects on the upstream Sasol Synfuels facilities. An opportunity was identified for the additional propylene to be utilised as feed for the polypropylene (PP) plants, namely PP1 and PP2. The C3 expansion project involves upgrading and implementing changes to the existing PP1 and PP2 process equipment to accommodate the increase in throughput.
Position: Project Principal
Assigned Tasks: Strategic project advice, quality review and approval of reports

BA for the Sasol Iso-Octanol Long Term Phase II Project, Sasol Industrial Complex, South Africa
Start Date: 2012
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 261,184
The Iso-octanol long-term phase 2 project involves a process whereby aldehydes are converted in the existing Iso-alcohol stream (in Octene Train III) by hydrogenation to its corresponding alcohols to achieve the desired product specification for the Iso-octanol product. A new reactor and a new distillation column with its associated equipment will be installed for this purpose. The expected Iso-octanol production will range between 7 and 9kt/annum. In addition, a storage tank with a capacity of approximately 400m3 and a loading pump will be installed to enable storage and loading of the final Iso-octanol product.
Position: Project Principal
Assigned Tasks: Strategic project advice, quality review and approval of reports

Environmental Impact Assessment for the C3 Stabilisation Project situated on the Sasol Secunda Site, South Africa
Start Date: 2010
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 447,172.00
Environmental Impact Assessment for the C3 Stabilisation Project situated on the Sasol Secunda Site
Position: Project Manager
Assigned Tasks: Project Management, review and compilation of EIA documentation, management of public process, liaise with client and authorities

Environmental Impact Assessment for the proposed Biogas to Power Plant Project at Sasol Synfuels, South Africa
Start Date: 2009
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 167,865
Basic assessment study for the Biogas to power plant project.
Position: Project Manager
Assigned Tasks: Project management, compilation of environmental reports

Environmental Impact Assessment for the proposed Sasol Bioworks upgrade, South Africa
Start Date: 2008
Client Name: Sasol Technology (Pty) Ltd
Project Value: R306,101 Sasol One Bioworks Expansion
Position: Project Manager
Assigned Tasks: Overall Project Management and quality control

EIA or the Amendment of Mining Right for the UCG Pilot Plant, South Africa
Start Date: 2008
Client Name: Sasol Technology (Pty) Ltd
Project Value: R 404,000
Environmental Impact Assessment and Mining Authorisation for the Underground Coal Gasification Pilot Project located in Secunda Mpumalanga Province.
Position: Project Manager
Assigned Tasks: Overall Project Management and quality control

Department of Public Works: ECO Work in Pretoria, South Africa
Start Date: 2010 - 2017
Client Name: Department of Public Works
Project Value: R 2,100,000
Environmental Control Officer and Occupational Health and Safety for the demolition activities associated with the HG de Witt Building in Pretoria.
Position: Project Manager
AssignedTasks: Project Managementand Environmental Control Officer (ECO) work

AEL OEMPr Compilation
Start Date: 2019
Client Name: AEL Africa
Project Value: R 100,000
Position: Senior Environmental Scientist
Assigned Tasks: Compilation of OEMPr for the ISAP and Nitrate Plant

Environmental Status Quo for the Scottsville Local Area Plan
Start Date: 2018
Client Name: Msunduzi Municipality
Project Value: R 2.5 million
Position: Environmental Scientist
Assigned Compilation of Environmental Status Quo chapter

White Mfolozi Bridge & Link Road, South Africa
Start Date: 2016
Client Name: Kwa-Zulu Natal Department of Transport
Project Value: R 0.8 million
Position: EAP
Assigned Tasks: Compilation of the Basic Assessment Report and EMPr in support of the necessary Environmental Authorisations and permits

Sundumbili Wastewater Treatment Works, South Africa
Start Date: 2015
Client Name: Ilembe Municipality
Project Value: R2 000 000
Position: EAP
Assigned Tasks: Environmental Screening and Environmental Impact Assessment

Rustenburg Integrated Rapid Public Transport Network (IRPTN), South Africa
Start Date: 2009
Client Name: Rustenburg Local Municipality
Project Value: R 3,000,000,000
Planning, design and implementation of the Rustenburg Rapid Transport project in Rustenburg.
The final system, which will consist of several phases, will compromise of approximately 900 busses, 600 kilometres (km), 50 bus routes, 35 km segregated bus lanes, 30 stations, 3 depots, 1 transport management centre, and zero compromise in public transport service quality. Royal HaskoningDHV are the project managers in charge of the Design and Construction, as well as the designers for the Intelligent Transportation Systems and Urban Traffic Control.
Position: Environmental Scientist
Assigned Tasks: Environmental Screening Investigation and Ad Hoc environmental advice

Previous Experience

2010 - 2012
SSI Engineers and Environmental Consultants (Pty) Ltd
Associate

2008 – 2010
SSI Engineers and Environmental Consultants (Pty) Ltd formerly known as Bohlweki Environmental (Pty) Ltd
Senior Environmental Consultant

2006 – 2008
Bohlweki Environmental (Pty) Ltd
Junior Environmental Consultant

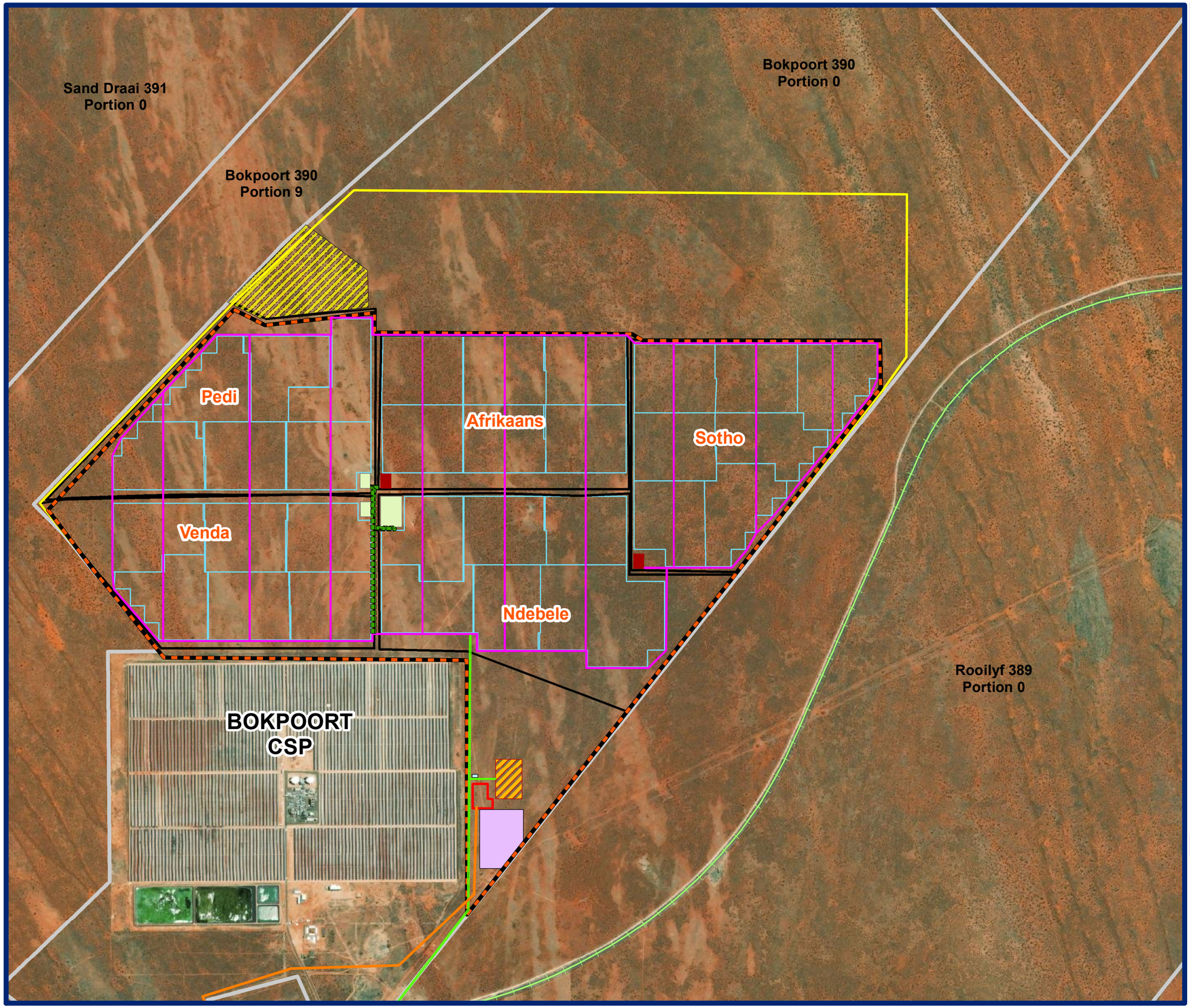
2001 – 2006
Department of Agriculture
Senior Plant and Quality Control Officer

Royal HaskoningDHV

Annexure B:
Maps

Development of two 9.9MW Internal Combustion Engines at the farm Bokpoort 390, Groblershoop

Locality Map



Legend

- Internal Roads
- Underground Cables
- 132 kV Transmission Line
- Access Road
- Fence
- Sishen-Saldhana Iron Ore Railway
- Additional ICE
- Authorised ICE
- Accommodation Rooms and Site Office (Temp Facilities)
- Administrative Buildings
- Project Boundary
- Shared infrastructure (Previously Approved)
- BESS Plant
- IPP Step-Up Station 2
- PV Plant Subsite
- PV Trackers
- Cadastral

0 0,275 0,55 1,1 Kms

N

Source:
ESRI
CSG:DALRRD

Scale 1:20000

Royal HaskoningDHV
Enhancing Society Together

Development of two 9.9MW Internal Combustion Engines at the farm Bokpoort 390, Groblershoop

Sensitivity Map

Sand Draai 391
Portion 0

Bokpoort 390
Portion 9

Bokpoort 390
Portion 0

Rooilyf 389
Portion 0

Pedi

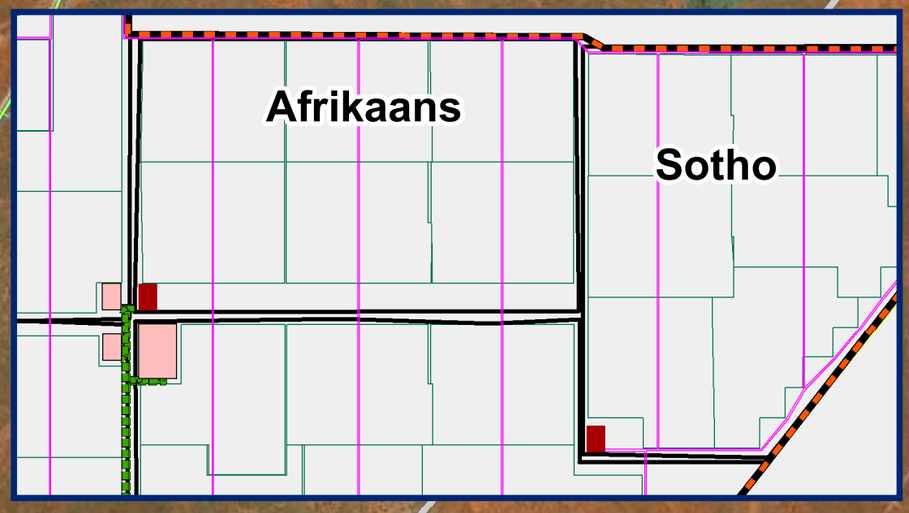
Afrikaans

Sotho

Venda

Ndebele

BOKPOORT
CSP



Legend

- Internal Roads
- Underground Cables
- 132 kV Transmission Line
- Access Road
- Fence
- Sishen-Saldhana Iron Ore Railway
- Accommodation Rooms and Site Office (Temp Facilities)
- Additional ICE
- Authorised ICE
- Project Boundary
- Administrative Buildings
- Shared infrastructure (Previously Approved)
- BESS Plant
- IPP Step-Up Station 2
- PV Plant Subsite
- PV Trackers
- Cadastral

Development Sensitivity Zoning

- Acceptable
- Not Preferred
- Preferred Area

0 0,35 0,7 1,4 Kms

N

Scale 1:26444

Source:
ESRI
CSG:DALRRD

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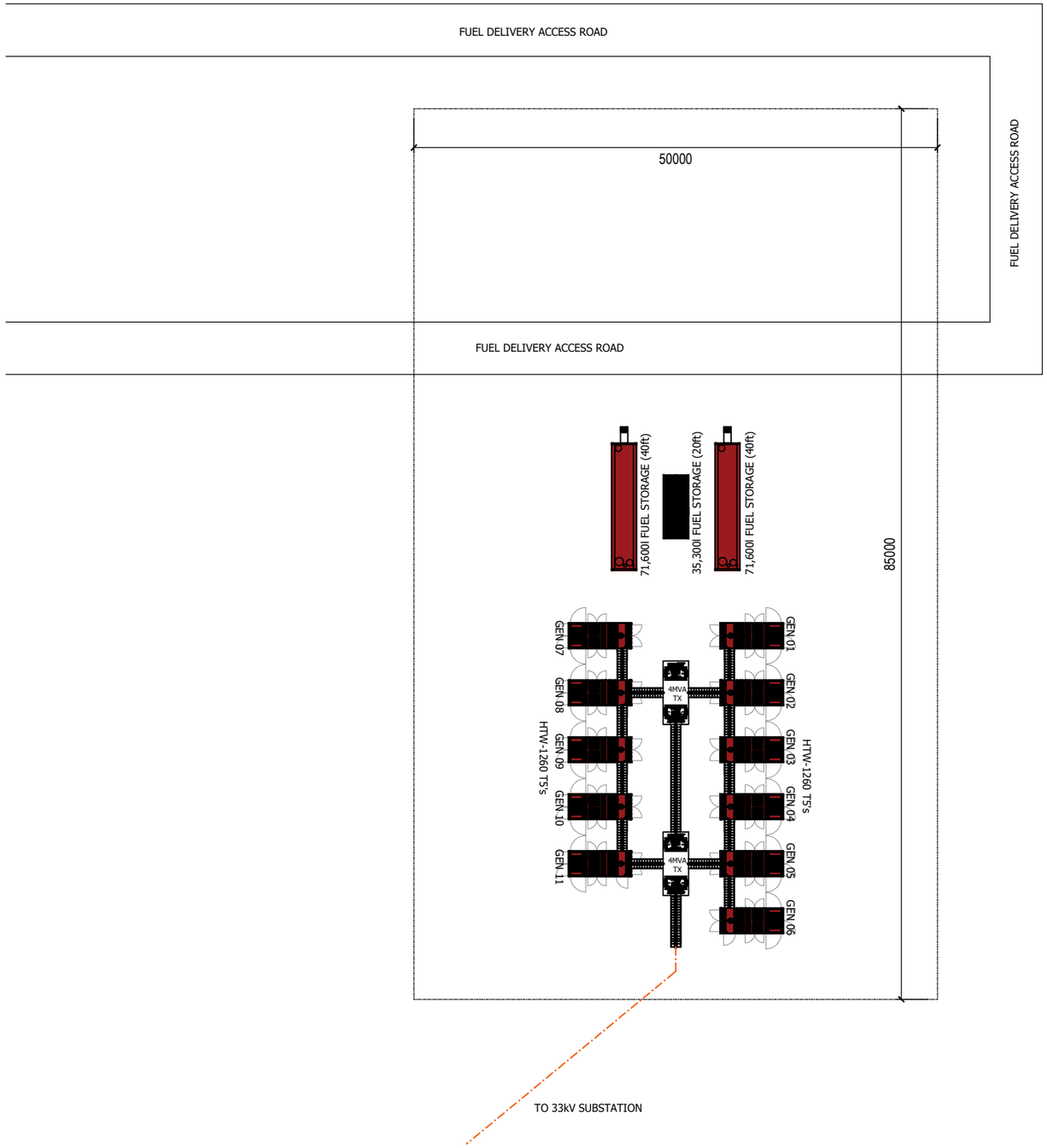
ICE 2
AFRIKAANS



SCALE BAR:

1m 10m 10m

N

1
006

ACWA - Site Layout: ICE 2 33kV COP Diesel Plant

scale 1: 500 at A3

HIMOINSA

REVISIONS

no.	date	details
-	21.04.22	First Issue

Client Name	ACWA
Project Name	ICE 2 33kV COP Diesel Power Plant
Drawing Title	Site Layout

Proposal	Himoinsa South Africa	
Date 21.04.2022	**Drawn** PJS	**Scale** Shown at A3
Drawing No 0199 - 006	**Revision** -	

Annexure C:
Ecology Walkthrough Report

Ecological Management Services

DRAFT

ECOLOGICAL WALK-THROUGH REPORT

Produced for

ACWA Bokpoort Solar Project

On behalf of

Environmental Impact Management Services (Pty) Ltd

May 2021

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APPENDICES

1 INTRODUCTION

1.1 Background

Ecological Management Services has been appointed to provide a pre-construction walk-through of the ACWA Power Bokpoort photovoltaic plants. The purpose of the walk-through is to identify and locate species of conservation concern which may occur within the development footprint, with the purpose to ensure that this information can be used for the permit applications required before construction of the development can commence.

The proposed site is situated within one of South Africa's eight renewable energy development zones, and has therefore been identified as one of the most suitable areas in the country for renewable energy development.

The proposed individual 200 MW PV Solar Development will comprise of the following appurtenant infrastructure:

- Solar PV modules that will comprise of monocrystalline PV modules that will be able to deliver up to 200 MW to the Eskom National Grid;
- Inverters that convert direct current (DC) generated by the PV modules into alternating current (AC) to be exported to the electrical grid;
- A transformer that raises the system AC low voltage (LV) to medium voltage (MV). The transformer converts the voltage of the electricity generated by the PV panels to the correct voltage for delivery to Eskom;
- Transformer substation;
- Inclusion of a Battery Energy Storage System (BESS) on all 10 PV sites, with an anticipated storage capacity of 150 MW and a footprint of 16 ha on each of the 10 sites; and
- Instrumentation and control consisting of hardware and software for remote plant monitoring and operation of the facility.

Appurtenant infrastructure:

- Mounting structures for the solar panels;
- Cabling between the structures, to be lain underground where practical;
- A new 132 kV overhead power line which will connect the facility to the national grid via Eskom's existing Garona
- Substation;
- The powerline will be approximately 5 km in length and will be located within a servitude spanning 15.5 meters on both sides. The powerline towers will be 35 meters high; and

- Internal access roads (4 – 6 m wide) will be constructed where necessary, but existing roads will be used as far as possible, with appropriate fencing (approximately 3 m in height).
- Shared infrastructure consisting of buildings, including a workshop area for maintenance, storage (i.e. fuel tanks,etc.), laydown area, parking, warehouse, and offices (previously approved).

During the construction of the ACWA Power Bokpoort photovoltaic plants, the site would be cleared and all vegetation removed from the site.

The development area is situated on the remaining extent of the Farm Bokpoort 390, which is situated 20 km north-west of the town of Groblershoop within the !Kheis Local Municipality in the ZF Mgcawu District Municipality, Northern Cape Province. The proposed total photovoltaic development will cover 1,500ha in totality (development footprint).

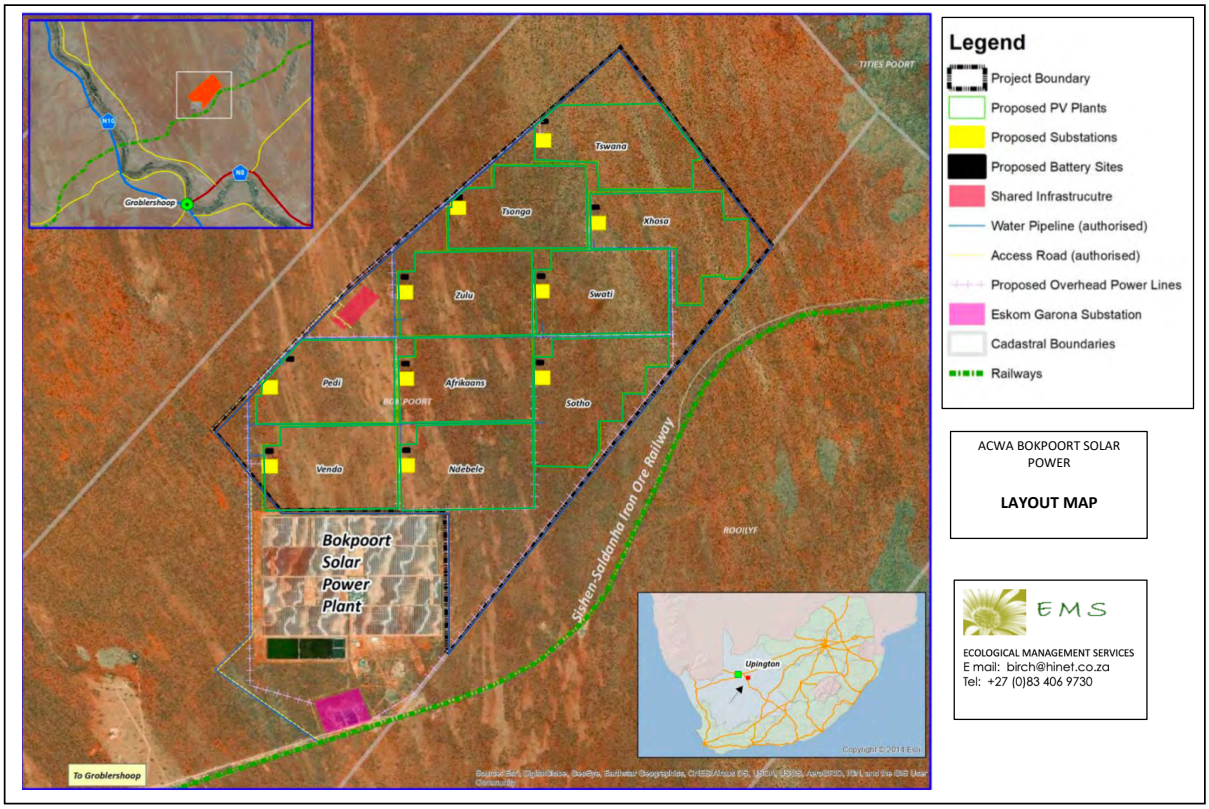

Figure 1 The location of the site and project layout.

1.2 Scope of Work

Determine the biodiversity permitting requirements for the development in terms of the following aspects:

- National Forests Act
- Conservation of Agriculture Act
- National Environmental Management: Biodiversity Act
- Provincial legislation

- IUCN Red List Categories and Criteria and all other applicable International requirements

Conduct a baseline review of plant species known to be present on the site and identify listed and protected species which may be affected by the development footprint. Following the walk-through, provide details on the identity and number of individuals of each species affected.

1.3 Methodology

The walk through survey was conducted from 20 April – 23 April 2021. The 1500ha development footprint was surveyed to locate and count the number of species of conservation concern (SCC) present within the development footprint. A grid system was used to divide the site into systematic units based on plant community distribution and topography. Within each grid a number of 100m X 100m transects were randomly sampled, all SCC occurring within the transects were counted. The transects were used to provide a density per ha count of the more commonly occurring SCC. In addition to the transects the grids were walked through on a serpentine pattern to locate additional individuals that did not occur commonly within the landscape. A total of 150 1ha transects were sampled, which equates to 10% of the total area to be cleared.

Assumptions & Limitations

It is not practical to assume that each and every SCC can be counted especially when some species are small and cryptic and can easily be overlooked, 1500ha is also a large area in which to work, and it is not practical and/or feasible to actively search every square meter given the time constraints. Therefore a density per ha count is a recognised method to establish population size. . The homogenous nature of the vegetation (the low alpha, beta and gamma diversity of the region) further allows for the extrapolation of the density figures as there is very little variation.

2 WALK THROUGH RESULTS

2.1 The Project Area

The vegetation of the site is classified as Kalahari Karroid Shrubland and Gordonia Duneveld. The northern part of the Study Area is characterised by undulating dune hills which support the Gordonia Duneveld vegetation type, while the southern area adjacent to the existing facility consists of flat plains characterised by Kalahari Karroid Shrubland. Within the Kalahari Karroid Shrubland vegetation type calcareous low shrub plains and open shrub plains occur.

The calcareous low shrub plains is characterised by low shrubs and grasses, the underlying soils consist of whitish calcareous and compact sandy soils that are grey-brown in colour. Prominent species include the grasses *Enneapogon desvauxii, Eragrostis obtusa, Eragrostis truncata, Fingerhuthia africana, Stipagrostis ciliata*, the shrub *Salsola etoshensis* and the forbs *Pentzia calcarea, Eriocephalus spinescens,*