ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAr)

in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

File Reference Number:
14/12/16/3/3/2/2267

Project Title:
The proposed development of a 300MW Solar Photo Voltaic (PV) plant and associated infrastructure on Portion 3 & Remainder of Farm Goedehoop 26 C, Portions 3, 5, 6 & 7 of Farm Leuwe Fountain 27 C, Remainder of Farm Barends Kuilen 38C, Portion 1, 2, 6 & Remainder of Kwanselaars Hoek 40 C, and Portion 1, 2, 3, Remainder of Farm Riet Fountain 39 C and Portion 3 & 4 of Farm Taaibosch Fontein 41 C, registration district Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality; Northern Cape Province.

Prepared for:

Soventix South Africa (Pty) Ltd
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DOCUMENT CONTROL

Table 1: Document Control.

PHASE	AUTHOR	STATUS	REV	DISTRIBUTED ON	SIGNATURE
Author	Avhashoni Nemukombane	Draft	00	23 May 2023	
Review	Justin Bowers	Draft	01	31 May 2023	
Approve	Shaun MacGregor	Draft	02	05 June 2023	

Table 2: General Site Information.

The following general site information is provided:
21-digit Surveyor General codes of all affected farm portions
The 21-digit Surveyor General Codes of each cadastral land parcel are as follows: • Portion 3 of farm Goedehoop 26 C C03000000000002600003 • Remainder of farm Goedehoop 26 C C03000000000002600000 • Remainder of Farm Riet Fountain 39 C C03000000000003900000 • Portion 1 of Farm Riet Fountain 39 C C03000000000003900001 • Portion 2 of Farm Riet Fountain 39 C C03000000000003900001 • Portion 3 of Farm Riet Fountain 39 C C03000000000003900003 • Remainder of Farm Barends Kuilen 38 C C03000000000003800000 • Portion 3 of Farm Leuwe Fontein 27 C C03000000000002700003 • Portion 5 of Farm Leuwe Fontein 27 C C03000000000002700005 • Portion 6 of Farm Leuwe Fontein 27 C C03000000000002700006 • Portion 7 of Farm Leuwe Fontein 27 C C03000000000002700007 • Portion 1 of farm Kwanselaars Hoek 40 C C03000000000004000001 • Portion 2 of farm Kwanselaars Hoek 40 C C03000000000004000002 • Portion 6 of farm Kwanselaars Hoek 40 C C03000000000004000006 • Remainder of farm Kwanselaars Hoek 40 C C03000000000004000000 • Portion 3 of Farm Taaibosch Fontein 41 C C03000000000004100003 • Portion 4 of Farm Taaibosch Fontein 41 C C03000000000004100004
Coordinates of activities
Approximate Centre Point of Solar PV: 30°50'16.03"S, 24°18'57.95"E. **Connecting Overhead Powerline:** Start: 30°51'28.46"S, 24°20'48.91"E; Middle: 30°52'23.19"S, 24°18'59.05"E; End: 30°53'9.87"S, 24°18'44.42"E. **On-Site 132 kV switching sub-station:** 30°51'26.71"S; 24°20'47.13"E

PV plant design specifications including:	
Type of technology	Solar PV Plant of PV panels using polycrystalline solar module technology and associated infrastructure including grid integration infrastructure with an on-site 132 kV switching sub-station and distribution line
Panel Array height	4m
Sub-station heights	Lightning conductors: 21m Overhead floodlights: 20m Telecommunication towers: 35m
Surface area to be covered (including associated infrastructure such as roads)	450ha
Surface orientation of panel arrays	Northern direction
Laydown area dimensions (construction period)	4 ha
Generation capacity	300Mwac
Generation capacity of the facility as a whole at delivery points.	300Mwac, less intrinsic losses.

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Table 3: Checklist - Content of Environmental Impact Assessment Report in terms of Appendix 3 of the EIA Regulations, 2014.

(1) ***"An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include- "***		
(a) details of-	YES	NO
(i) the EAP who prepared the report; and	**x**	
(ii) the expertise of the EAP, including a curriculum vitae;	**x**	
(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:	**x**	
(i) the 21-digit Surveyor General code of each cadastral land parcel;	**x**	
(ii) where available, the physical address and farm name;	**x**	
(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	**N/A**	
(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it	**x**	
(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	**x**	
(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	**N/A**	
(d) a description of the scope of the proposed activity, including-	**x**	
(i) all listed and specified activities triggered and being applied for; and	**x**	
(ii) a description of the associated structures and infrastructure related to the development;	**x**	
(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	**x**	
(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	**x**	
(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	**x**	
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report; including;	**x**	
(i) details of all the development footprint alternatives considered;	**x**	

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(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	**x**	
(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	**x**	
(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**x**	
(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	**x**	
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	**x**	
(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community, that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**x**	
(viii) the possible mitigation measures that could be applied and level of residual risk;	**x**	
(ix) if no alternatives development footprints for the activity were investigated, the motivation for not considering such and	**x**	
(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	**x**	
(i) full description of the process undertaken to identify, assess and rank the impacts, the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including;	**x**	
(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	**x**	
(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	**x**	
(j) an assessment of each identified potentially significant impact and risk, including-	**x**	

(i) cumulative impacts;	**x**	
(ii) the nature, significance and consequences of the impact and risk;	**x**	
(iii) the extent and duration of the impact and risk;	**x**	
(iv) the probability of the impact and risk occurring;	**x**	
(v) the degree to which the impact and risk can be reversed;	**x**	
(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	**x**	
(vii) the degree to which the impact and risk can be mitigated;	**x**	
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	**x**	
(l) an environmental impact statement which contains-	**x**	
(i) a summary of the key findings of the environmental impact assessment:	**x**	
(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred **[site]** development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and	**x**	
(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	**x**	
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	**x**	
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	**x**	
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	**x**	
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	**x**	
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	**x**	
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post	**x**	

construction monitoring requirements finalised;		
(s) an undertaking under oath or affirmation by the EAP in relation to:	**x**	
(i) the correctness of the information provided in the reports;	**x**	
(ii) the inclusion of comments and inputs from stakeholders and l & APs;	**x**	
(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	**x**	
(iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	**x**	
(u) an indication of any deviation from the approved scoping report, including the plan of study, including-	**x**	
(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	**x**	
(ii) a motivation for the deviation;	**x**	
(**v) any specific information that may be required by the competent authority; and**	**x**	
(w) any other matter required in terms of section 24(4)(a) and (b) of the Act.	**x**	
(1) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report the requirements as indicated in such notice will apply.	**x**	

EXECUTIVE SUMMARY

In 2016 Ecoleges undertook a Scoping & Environmental Impact Assessment (S&EIA) on behalf of Soventix South Africa (SA), for the development of a 225 MW Solar Photo-Voltaic (PV) facility between Hanover and De Aar in the Northern Cape. Three alternative footprints (PV01, PV02, PV03) were investigated during the assessment process. The central footprint (PV02) was identified as the preferred option because of its lower environmental impact and proximity to an existing 400kV Eskom powerline, which has adequate capacity to receive additional electricity inputs, in this case from renewable energy projects. The National Department of Environmental Affairs granted an environmental authorisation (DEA Reference: 14/12/16/3/3/2/998) on the 16th of April 2018.

An amendment to increase the capacity (not the footprint) of the facility to 300 MW, due to technological advancements in solar photovoltaic efficiency and electrical output, was granted on the 24th of November 2020.

Soventix are now applying for environmental authorisation to develop a solar PV development on the PV03 footprint (now referred to as Phase 2) that was considered during the initial S&EIA (PV02 now referred to as Phase 1). The additional 300 MW facility (Phase 2) will feed into the authorised Main Transmission Sub-station (MTS) on the Phase 1 footprint. The proposed Phase 2 solar PV facility entails the construction of a 300 MW solar photo-voltaic (PV) facility, in the form of 3 interconnected 100 MW plants of approximately 150 ha each. Hence, the total proposed development footprint for a 300 MW solar PV facility is approximately 450 ha.

In addition to an environmental authorisation for Phase 2, General Authorisations will also be required to undertake associated water uses during the construction and operation of the facility, specifically Section 21 (a), (b), (c), (g) & (i) in terms of the National Water Act (Act 36 of 1998).

The project proponent, Soventix South Africa, have appointed Ecoleges Environmental Consultants as the Environmental Assessment Practitioner (EAP), to undertake an application for Environmental Authorisation (EA) for Listed Activities in terms of the EIA Regulations (2014) as amended, to be submitted to the National Department of Forestry, Fisheries and the Environment (DFFE), as the designated Competent Authority.

The National Environmental Management Act (NEMA, Act 107 of 1998) prescribes that all Environmental Impact Assessments, which are to be utilised in informing an application for environmental authorisation, must identify and investigate the alternatives to the activity on the environment, and include a description and comparative assessment of the advantages and disadvantages that the proposed activity and feasible and reasonable alternatives will have on the environment and on the community, that may be affected by the activity. The Environmental Scoping & Impact Assessment processes identified the potential positive and negative environmental (biophysical and social) impacts associated with the proposed

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establishment of a Solar PV Plant and associated infrastructure. A number of risks & impacts were identified by the EAP and appointed Specialists during the Scoping & Environmental Impact processes, which have been assessed in terms of pre-mitigation impact significance, for which mitigations have been provided to reduce impacts and risk likelihood, including the identification and mitigation of residual impacts & risks.

The general objectives of public participation have been undertaken to provide the registered interested and affected parties the opportunity to comment at different stages of the S&EIA process including a public meeting and receipt of project information and associated statutory reports. The comments and responses will be recorded and form part of the final Environmental Impact Report (EIR).

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ABBREVIATIONS, ACRONYMS AND DEFINITIONS

Table 4: List of terms for abbreviations and acronyms used in this document.

Abbreviation	Description
CA	Competent Authority
DFFE	Department of Forestry, Fisheries and the Environment (National)
DMR	Department of Mineral Resources
DENC	Department of Environment and Nature Conservation (Northern Cape)
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ELM	Emthanjeni Local Municipality
ELU	Existing Lawful Use
GA	General Authorisation
GWh	Gigawatt per hours
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IRP	Integrated Resource Planning
LA	Listed Activity (EIA Regulations, 2014)
LN1	Listing Notice 1: GN R. 983, 4 December 2014 as amended
LN2	Listing Notice 2: GN R. 984, 4 December 2014 as amended
LN3	Listing Notice 3: GN R. 985, 4 December 2014 as amended
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MTS	Main Transmission Station
NEMA	National Environmental Management Act (Act 107 of 1998)
NERSA	National Energy Regulator of South Africa
NCNCA	Northern Cape Nature Conservation Act (Act 9 of 2009)
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
PDM	Pixley ka Seme District Municipality
PPA	Power Purchase Agreement
REFIT	Renewable Energy Feed-in Tariff
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
WUL	Water Use License

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Table 5: Definitions of some terms used in this document.

Term	Source	Definition
Development	EIA Regulations, 2014 as amended	The building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.
Development footprint	EIA Regulations, 2014 as amended	Any evidence of physical alteration as a result of the undertaking of any activity.
Environment	ISO 14001:2015	Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their relationships.
Environment	National Environmental Management Act (Act 107 of 1998)	The surroundings within which humans exist and that are made up of (i) the land, water, and atmosphere of the earth; (ii) micro-organisms, plant, and animal life; (iii) any part or combination of (i) and (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 well-being.
Environmental aspect	ISO 14001:2015	Element of an organization's activities or products or services that interacts or can interact with the environment.
Environmental impact	ISO 14001: 2015	Change to the environment, whether adverse or beneficial, wholly, or partially resulting from an organisation's environmental aspects.
Interested party	ISO 14001: 2015	Person or organisation that can affect, be affected by, or perceive itself to be affected by a decision or activity.
Impacts	ISO 14001:2015	Any change to the environment, whether adverse or beneficial, wholly, or partially

		resulting from an organization's environmental aspects.
Significant impact	EIA Regulations, 2014 as amended	An impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.
Sustainable development	National Environmental Management Act (Act 107 of 1998)	The integration of social, economic, and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.
Watercourse	EIA Regulations, 2014 as amended	(a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, pan, lake or dam into which, or from which, water flows; and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998); and (d) a reference to a watercourse includes, where relevant, its bed and banks.

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SECTION A: DETAILS OF THE EAP AND APPLICANT

Details of:
(i) The EAP who prepared the report; and
(ii) The expertise of the EAP, including a curriculum vitae

Environmental Assessment Practitioner	Ecoleges Environmental Consultants
Contact Person	Shaun MacGregor
Postal Address	PO Box 516, Machadodorp, 1170
Telephone	+27(0)83 644 7179
E-mail	shaun@ecoleges.co.za

Project Applicant	Soventix South Africa (Pty) Ltd
Trading Name (if any)	Soventix South Africa
Contact Person	Jean-Paul de Villiers
Physical Address	Portion No 2, Farm Number 78 Devon Valley Stellenbosch Road Stellenbosch, 7600 South Africa
Postal Address	As above
Postal Code	7130
Telephone	+27(0)21 852 7333
Cell	+27(0)82 550 6672
Fax	+27(0)21 852 5089
Email	Jp.devillers@soventix.com

Abbreviated Curriculum Vitae of Shaun Donovan MacGregor.

Name	Shaun Donovan MacGregor
Date of birth / ID No.	01 October 1976 7610015437089
Nationality	South African
Marital Status	Divorced with two children
Current Address	• Moditlo Wildlife Estate, Hoedspruit • Mobile: +27 (0)64 885 2240 • e-mail: shaun@ecoleges.co.za
Languages	English
Driver's Licence	Code 08
Specialisations	Undergrad: BSc – Grassland Science, Faculty of Agriculture Postgrad: MSc – Grassland Science, Faculty of Agricultre Key Fields: Ecologist (Pr.Sci.Nat.), Environmental Control Officer (ECO), Compliance Auditor, Environmental Assessment Practitioner (EAP).
Qualifications & Courses Attended	**1994-1997** BSc., University of Natal, Pietermaritzburg **1998-2001** MSc., University of Natal, Pietermaritzburg **2001-2002** Field Guides Association of Southern Africa (FGASA) Level 1 **2002-2005** FGASA Level 2 & 3 **2008** IEMA Approved Foundation Course in Environmental Auditing **2009** SAATCA Accredited Environmental Management System ISO 14001 Audit: A Lead Auditor Course based on ISO 19011 & ISO 17021
Memberships & Registrations	• South African Council for Natural Scientific Professions (SACNASP) (Pr. Sci. Nat. - Reg. No. 400222/08). • Grassland Society of Southern Africa (GSSA). • International Association for Impact Assessment, South Africa (IAIAsa) (Membership No. 6928). • Environmental Assessment Practitioner Association of South Africa (EAPASA, Reg. EAP No. 2019/1306).
Latest Publication	Alberts, R.C., Retief, F.P., Roos, C., Gillars, D.P., Moolman, J., Bowers, J., MacGregor, S., Weir, F.H. & Olivier, I. (2022). Beyond

	legal compliance: The environmental performance of luxury safari lodges. African Journal of Hospitality, Tourism and Leisure, 11(2): DOI: https://doi.org/10.46222/ajhtl.19770720.252
Career Summary	**Feb 2001 – Nov 2005** Professional Field Guide for Private Game Reserves in the Sabi Sand Wildtuin (Lionsands and Singita). **Dec 2005 – Mar 2007** Created and managed a small business. **Apr 2007 – Present** Member & Senior Environmental Consultant.

SECTION B: LOCATION OF THE PROPOSED ACTIVITY

Including:

(i) The 21-digit Surveyor General code of each cadastral land parcel;

(ii) where available, the physical address and farm name;

(iii) *where the required information in terms (i) and (ii) is not available, the coordinates of the boundary of the property or properties;*

The 21-digit Surveyor General Codes of each cadastral land parcel are as follows:

- Portion 3 of farm Goedehoop 26 C C03000000000002600003
- Remainder of farm Goedehoop 26 C C03000000000002600000
- Remainder of Farm Riet Fountain 39 C C03000000000003900000
- Portion 1 of Farm Riet Fountain 39 C C03000000000003900001
- Portion 2 of Farm Riet Fountain 39 C C03000000000003900001
- Portion 3 of Farm Riet Fountain 39 C C03000000000003900003
- Remainder of Farm Barends Kuilen 38 C C03000000000003800000
- Portion 3 of Farm Leuwe Fontein 27 C C03000000000002700003
- Portion 5 of Farm Leuwe Fontein 27 C C03000000000002700005
- Portion 6 of Farm Leuwe Fontein 27 C C03000000000002700006
- Portion 7 of Farm Leuwe Fontein 27 C C03000000000002700007
- Portion 1 of farm Kwanselaars Hoek 40 C C03000000000004000001
- Portion 2 of farm Kwanselaars Hoek 40 C C03000000000004000002
- Portion 6 of farm Kwanselaars Hoek 40 C C03000000000004000006
- Remainder of farm Kwanselaars Hoek 40 C C03000000000004000000
- Portion 3 of Farm Taaibosch Fontein 41 C C03000000000004100003
- Portion 4 of Farm Taaibosch Fontein 41 C C03000000000004100004

Several of the above-mentioned properties are associated with the District "Burgerville" Road 2448.

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SECTION C: LOCATION PLAN OF THE PROPOSED ACTIVITY

"a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is:

(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities to be undertaken; or

(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken".

The following coordinates are provided for the indicative alignment of the distribution line, which is further represented on the site layout plan:

Start: 30°51'28.46"S, 24°20'48.91"E; **Middle:** 30°52'23.19"S, 24°18'59.05"E; **End:** 30°53'9.87"S, 24°18'44.42"E.

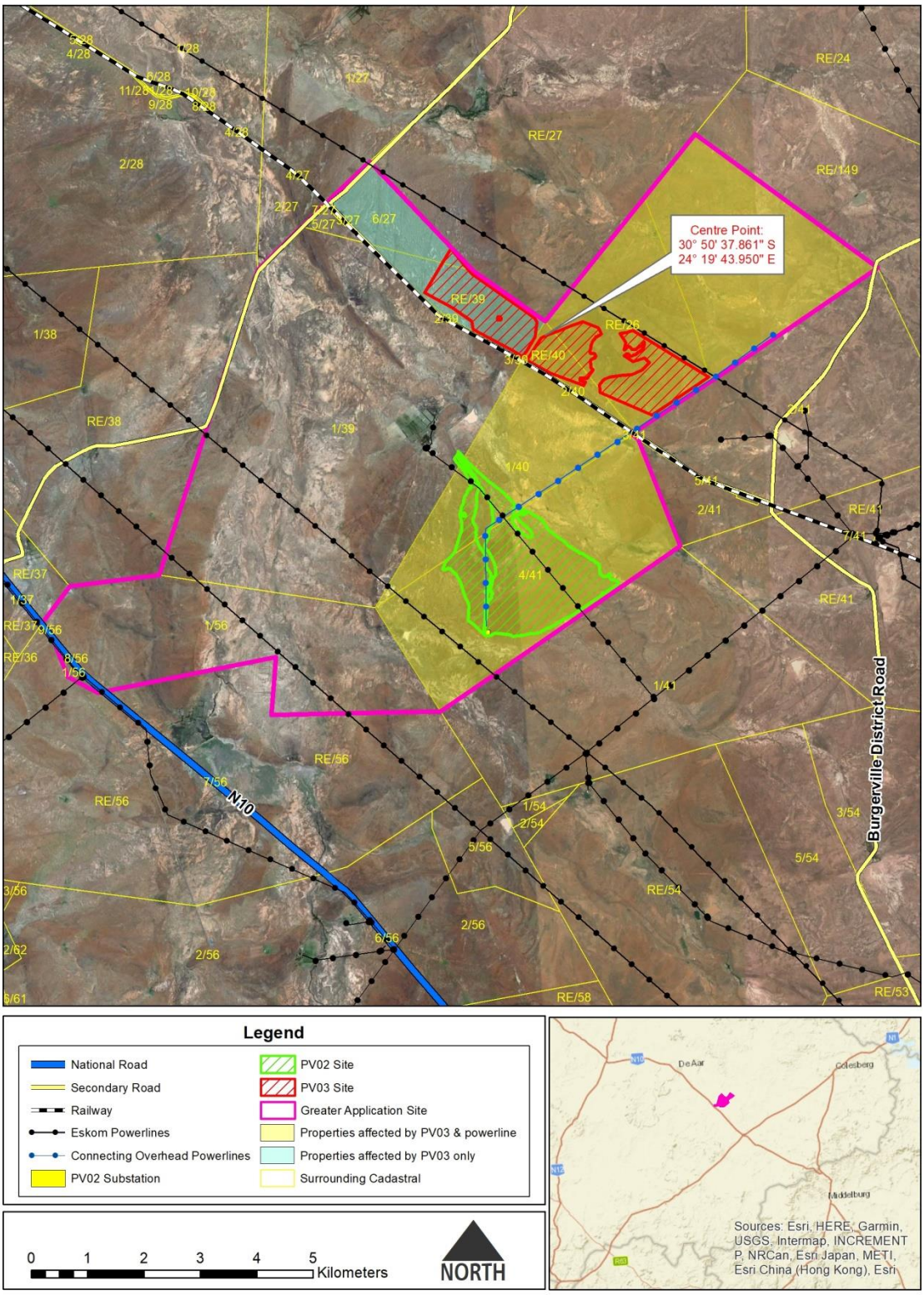

Figure 1: Site Layout plan for the proposed phase 2 solar PV plant (red polygon) and associated grid integration infrastructure (blue line denoted distribution line between Phase 2 & Phase 1), including the Phase 1 (PV02) (Sun Central Cluster 1) footprint (green polygon) in which the Main Transmission Sub-station (MTS) is located.

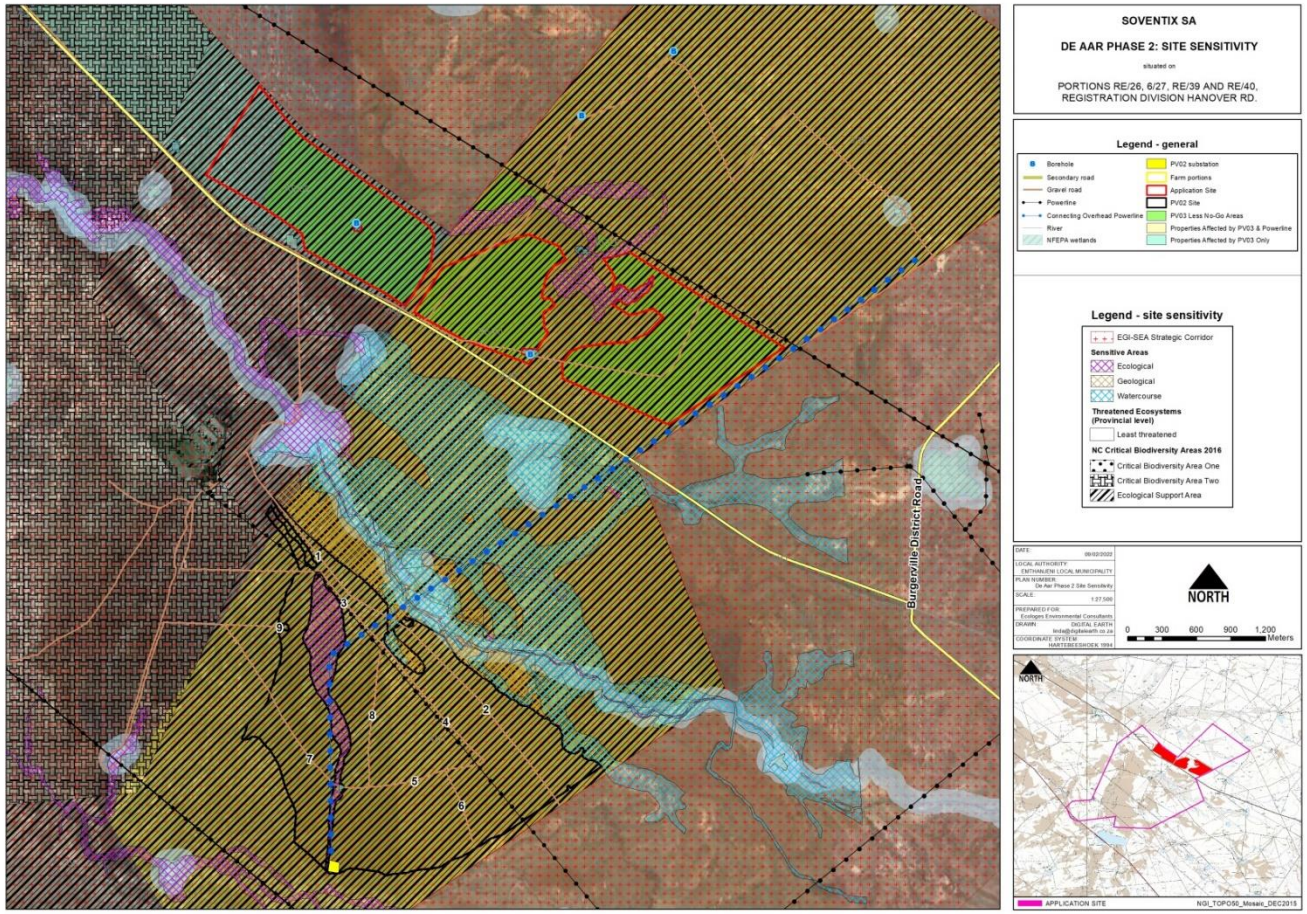

Figure 2: Site sensitivity map for the proposed Phase 2 solar PV plant (red outlined polygon) and associated grid integration infrastructure (blue line denoted distribution line between Phase 2 & Phase 1), including the Phase 1 (Sun Central Cluster 1) footprint (black outlined polygon) and associated Main Transmission Sub-station (MTS) (yellow polygon).

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SECTION D: DESCRIPTION OF THE SCOPE OF THE PROPOSED ACTIVITY

Including:
(i) all listed and specified activities triggered;
(ii) a description of the activities to be undertaken, including associated structures and infrastructure"

Legal requirements must be met before any person may commence with any Listed or Specified Activity in terms of the EIA Regulations (2014) of the National Environmental Management Act (Act 107 of 1998).

National Environmental Management Act, 1998

The provisions and regulations published in Government Notice No. R. 982, R. 983, R. 984, and R. 985 in Government Gazette No. 38282 of 04 December 2014, promulgated in terms of sections 24(5), 24M and 44 of the National Environmental Management Act (Act 107 of 1998), as amended regarding control over listed activities which may have a detrimental effect on the environment, must be complied with (Table 6).

Table 6: Potential listed activities triggered in respect of the proposed project.

Activity and Notice No.	Listed Activity	Motivation including a Description of the Activity
11, GNR 983, 2014 as amended	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is— (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length;	The Phase 2 solar PV facility and associated Dx Switching Sub-Station will be connected to the Phase 1 Main Transmission Sub-station (MTS), by way of an approximately 5.5 km overhead 132 kV distribution powerline, installed outside an urban area.

	(c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	
19, GNR 983, 2014 as amended	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater but excluding where such infilling, depositing, dredging, excavation, removal or moving- (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies".	Development & upgrading activities within watercourses and high stormwater runoff areas, including solar PV & associated infrastructure, widening and development of roads, installation of distribution powerlines, fibre optic cables & water pipelines, will result in the moving of more than 10 cubic metres of soil. The 132 kV distribution line from the on-site sub-station to the MTS will traverse a tributary of the Brak River and associated floodplain including the installation of supporting pylons within these aquatic environments. The length of the powerline within the delineated edge of the Brak River tributary and floodplain is approximately 2.4 km including a service road and associated watercourse crossings.
28, GNR 983, 2014 as amended	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban	The land use is currently zoned agriculture and will retain in part its agricultural use for livestock grazing but will convert approximately 450ha to commercial Solar PV.

	area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	
48, GNR 983, 2014 as amended	The expansion of – (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding - (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs	Existing infrastructure including stormwater structures, occurring within a watercourse and high-stormwater runoff areas, will need to be upgraded and expanded to accommodate construction & operational activities of the project. Areas of high stormwater drainage (excluding buffers) is 15 hectares in extent.

	within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.	
56, GNR 983, 2014 as amended	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.	Upgrades will be required to the Burgerville district road (D2448.), to facilitate the safe and efficient delivery of equipment to site, including the heavy load Dx sub-station transformers and associated service sub-station service road. The upgrades may require widening of the existing road (currently wider than 8m at several sections) to include passing lanes during the upgrades and adequate turning circles.
67, GNR 983, 2014 as amended	Phased activities for all activities— (i) listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices; excluding the following activities listed in this Notice— 17(i)(a-d); 17(ii)(a-d); 17(iii)(a-d); 17(iv)(a-d); 17(v)(a-d); 20; 21; 22; 24(i); 29; 30; 31; 32; 34; 54(i)(a-d); 54(ii)(a-d); 54(iii)(a-d); 54(iv)(a-d); 54(v)(a-d); 55; 61; 64; and 65; or (ii) listed as activities 5, 7, 8(ii), 11, 13, 16, 27(i) or 27(ii) in Listing Notice 2 of 2014 or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices.	A first phase solar PV project (known as Phase 1) was approved and authorised under EA 14/12/16/3/3/2/998 in 2018. Less than 20 hectares of indigenous vegetation will be cleared for Phase 1. While Phase 2 is a stand-alone project, the two phases are integrated with regard to the energy generation being supplied to the national grid by way of Loop-In Loop-Out of one of the two Hydra-Poseidon 400 kV transmission lines into the new Main Transmission Sub-station (MTS) on phase 1. Accordingly, more than 20 hectares of vegetation will be cleared cumulatively between both phases.
1, GNR	The development of facilities or	Renewable energy will be generated

984, 2014 as amended	infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.	from Solar PV technology. The facility is rated as 300 MW.
15, GNR 984, 2014 as amended	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Vegetation will be cleared for various aspects of the project including the establishment of a construction camp including storage and laydown areas, installation of the infrastructure and structures associated with the solar PV facility including the mounting structures and in-field transformers, as well as service tracks between the panel arrays. More than 20 ha of indigenous vegetation will be cleared, including the phased nature of phases 1 & 2.
14, GNR 985, 2014 as amended	The development of – (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs - (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within	Infrastructure and structures will be developed with a watercourse, floodplain, and high-stormwater runoff areas, whose footprint will exceed $10m^2$ within the specified geographic areas of Critical Biodiversity (CBA) & Ecological Support Areas (ESA), including the 132 kV distribution powerlines (concrete footings), access roads and fibre optic cables between Phase 2 & Phase 1 where they cross the Brak River and one of its tributaries.

	existing ports or harbours that will not increase the development footprint of the port or harbour. g. Northern Cape i. In an estuary; ii. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; no (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an international convention; as above (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined.	
18, GNR 985, 2014	The widening of a road by more than 4 metres, or the lengthening of	Existing roads will be upgraded, that is graded, shaped for runoff, and

as amended	a road by more than 1 kilometre. g. Northern Cape i. In an estuary; ii. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves.	compacted to access the laydown area, construction camp, and components of the PV system, including the operational area, the on-site substation and to each field transformer. Passing lanes will be placed at strategic areas. Some road crossings may need to be widened to accommodate large delivery trucks. Additionally upgrades will be required to the Burgerville district road (D2448.), to facilitate the safe and efficient delivery of equipment to site, including the heavy load Dx sub-station transformers. The upgrades may require widening of the existing road to include passing lanes during the upgrades.
23, GNR 985, 2014 as amended	The expansion of— (i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— (a) within a watercourse; (b) in front of a development setback adopted in the prescribed manner; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of	Existing infrastructure including roads and associated stormwater structures, occurring within a watercourse and high-stormwater runoff areas, will need to be upgraded and expanded to accommodate construction & operational activities of the project. Additionally, upgrades will be required to the Burgerville district road (D2448.) and associated watercourse crossings (including the Brak River), to facilitate the safe and efficient delivery of equipment to site, including the heavy load Dx sub-station transformers.

	infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. g. Northern Cape i. In an estuary; ii. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or iii. Inside urban areas: (aa) Areas zoned for use as public open space; or	

	(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	

Detailed Description of the Scope of the Proposed Activity

The size of the proposed development footprint is approximately 450ha. This area includes three 100 MW solar PV plants (150ha each), with associated infrastructure, including inverters, field transformers and a connecting powerline between Phases 2 & 1. Existing roads will be used for main access, which will need to be enlarged to allow large equipment to access the site during construction, including provision of passing lanes.

There are no alternative development footprints considered, as three potential sites were considered for the Phase 1 project, one of which has already been approved (PV02), with PV01 located in several sensitive areas and not being suitable for development, leaving PV03 (now called Phase 2) as the remaining feasible option.

Photovoltaic Renewable Energy

Photovoltaic (PV) is a method of generating electrical power by converting solar radiation into direct current electricity. This is done by using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels composed of a number of solar cells containing a photovoltaic material. These materials exhibit this property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current results, that can be used as electricity.

Solar Panels

A single PV device is known as a cell. To boost the power output of PV cells, they are connected in chains to form larger units known as modules or panels. Each module is 2.2 by 1.1 m (or 2,42 m^2) in size. Modules are connected to form arrays. The arrays are mounted onto a single-axis tracker and supported by steel or aluminium racks approximately 7.4 m apart.

PV systems also include mounting structures (or racks) that point panels toward the sun. The results of the geotechnical assessment will determine whether the racks are held in place by either a ballast or piled foundation. Two rows of twenty-three modules each will be attached to a steel and aluminium rack. Consequently, each rack would accommodate approximately 110 m^2 of panel. Solar arrays will be orientated in a northern direction and track the sun from east to west.

Height of the Modules (or panels)

The arrays will be placed over intact vegetation. Any vegetation taller than 60 cm must be cropped which within reason will be the undertaking of the current sheep herds on the property. Sheep farming is the dominant agricultural activity on the affected properties and will continue within the fenced solar PV facilities to reduce impact on agricultural activities as well as activity as a vegetation control mechanism.

The solar panels sit in two in portrait (not landscape – they are rectangular shaped), so from the centre pivot point, 2.2 m each way (as each panel is 2.2 m long). They stow overnight horizontally to reduce wind loading. The height of the array above the ground in the stow position will be 2.3 m (Figure 3). The solar panels cannot move to a vertical (90º) position; the maximum angle of inclination is 50º to the horizontal. The panels would only incline to a position of 50 degrees when facing East and West. At full tilt the ground clearance will be 0.6 m with a maximum height of 4 m (3.4 m +0.6 m).

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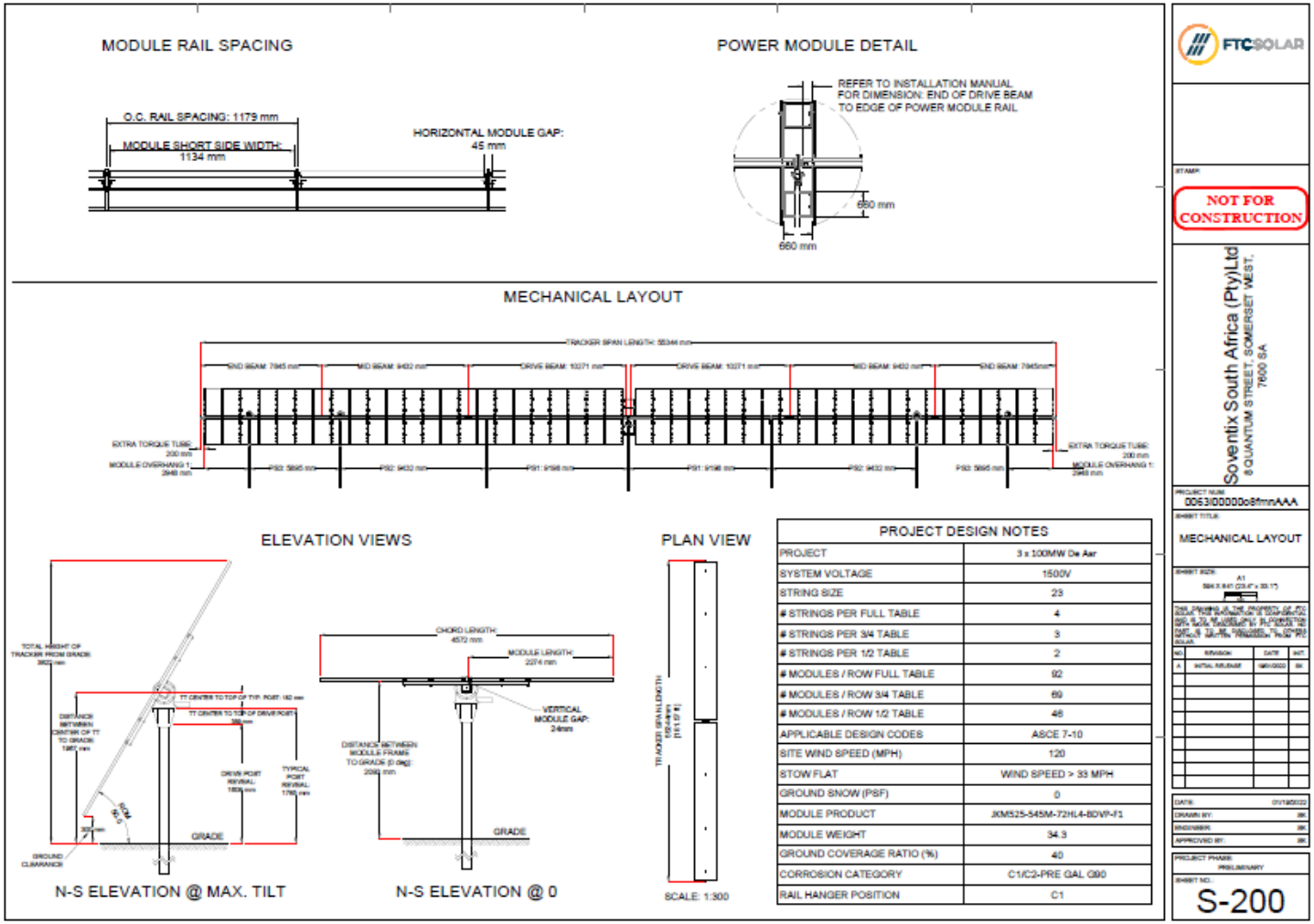

Figure 3. Preliminary design of single axis tracking units.

Vegetation Clearance

Vegetation will be cleared from the physical footprint of the construction camp, inverters, field transformers, on-site substation, rack foundations, pylon footings (linear), underground cables and water pipes (linear), roads (linear), a fire-break road and fencing posts (linear), operational area (1 ha, but within the construction camp footprint), and water storage tanks and deionization plant(s).

Borrow Pits

Any fill material required for road construction will be obtained from existing borrow pits (no mining permit is required as per the exemption afforded in section 106 of the MRPDA) (Figure 4).

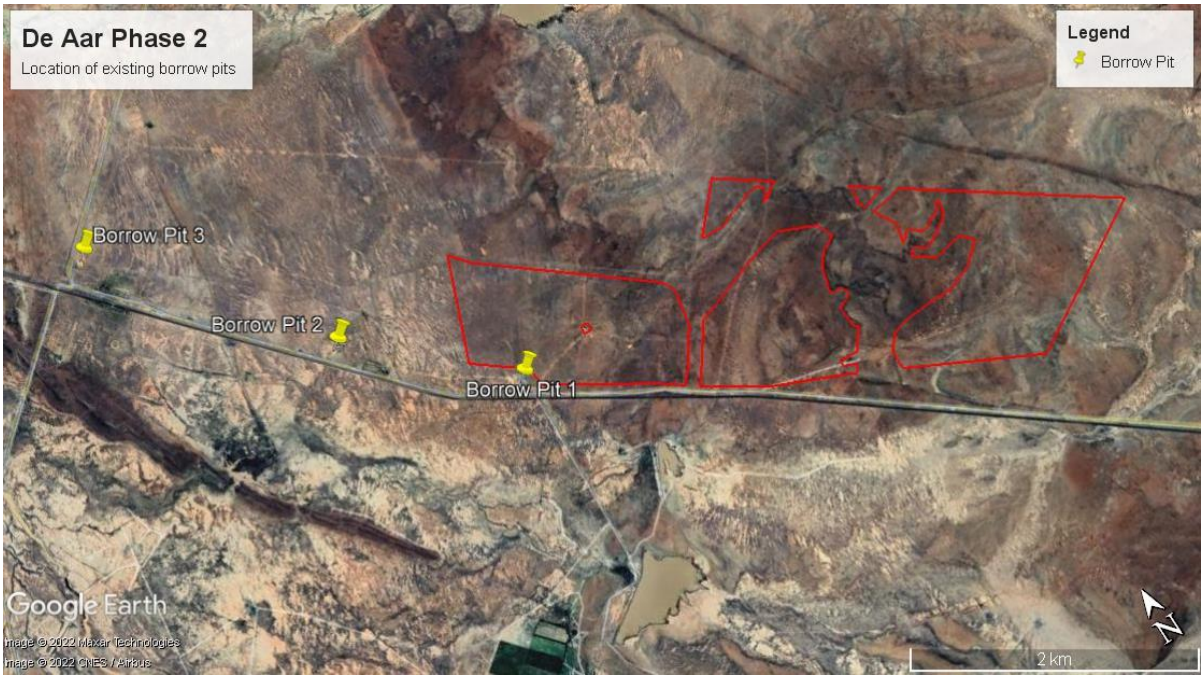

Figure 4. Location of existing borrow pits from which material can be sourced for Phase 2.

The preliminary layout is shown below in Figure 5.

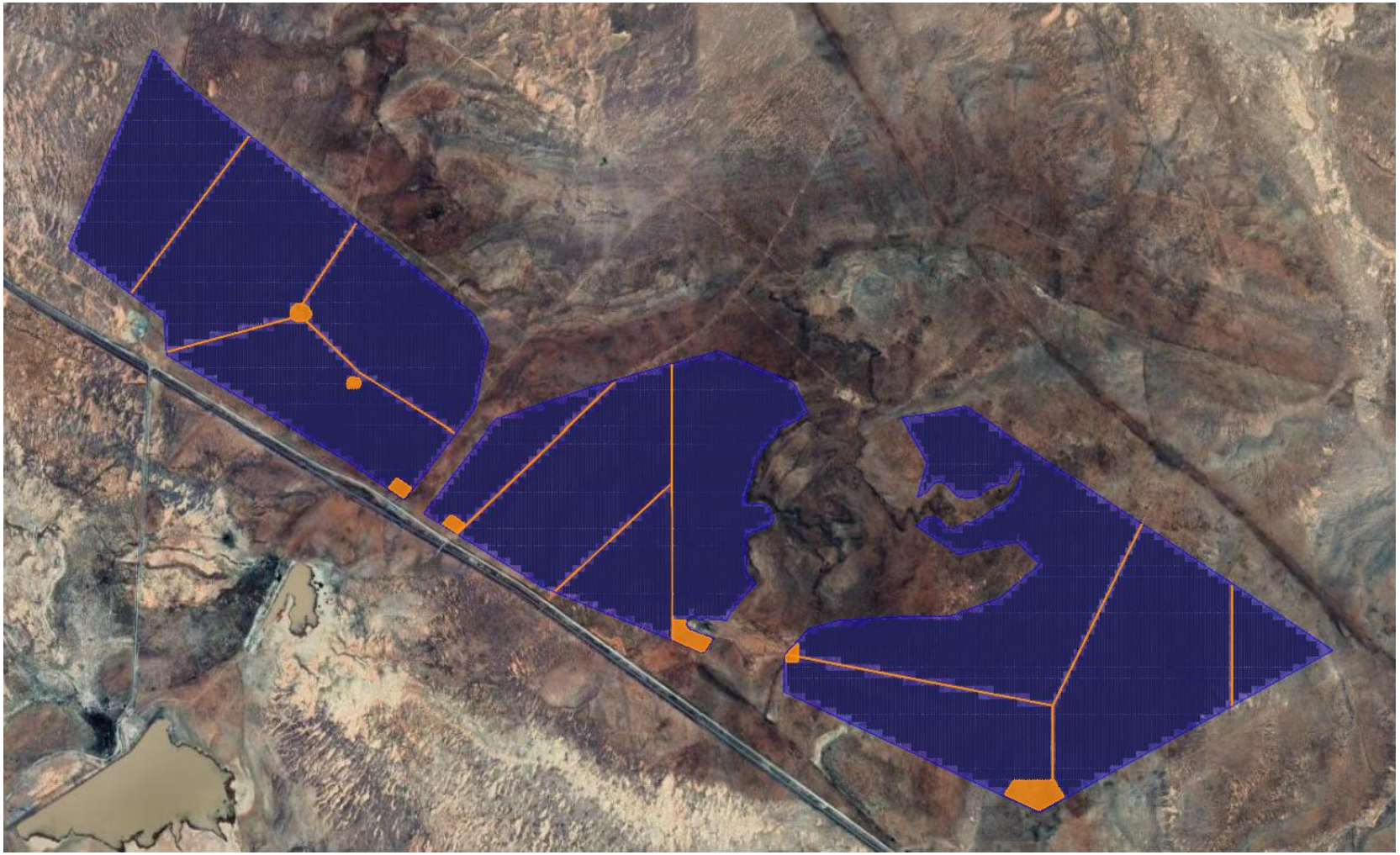

Figure 5. Preliminary layout of the 300 MW Phase 2 Solar PV Plant.

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Reg: 2006/023163/23

Project phases

Construction Phase

Each 100 MW phase will be built sequentially, e.g., Phase 2 will be built in 3 x 100 MW blocks. That way it is possible to limit the amount of people on site, as well as mitigate the need for massive amounts of equipment, storage etc. There will also be some overlap between construction and operation. In other words, once the first 100 MW block is complete, it will start feeding electricity into the national grid while the second and subsequent 100 MW blocks are being built. Consequently, construction items from fencing and roads to the on-site substation and operational offices must be completed first under the civil construction phase, usually no more than 4 months. Subsequent construction of each 100 MW block typically takes 12 to 15 months from start to finish. During this period, approximately 130 people would work on site. A large number of the workforce would be sourced from the local labour force in and around De Aar and Hanover (Table 7). The appointed contractor would be required to establish a construction camp and laydown area. It is anticipated that an area of approximately 1.5 ha per phase would be required for these purposes.

Table 7: Preliminary work force for construction phase.

Job description	Anticipated level of Education and/or skill	Actual number of employees	Duration of employment	Total Person Months Committed
Project management	Skilled	2	12 Months	51
Construction Management	Skilled	4	12 Months	84
Project Support	Skilled	2	12 Months	57
Logistic	Skilled	3	12 Months	83
HR	Skilled	2	12 Months	36
HSE	Skilled	2	12 Months	48
QC	Skilled	3	12 Months	69
Material Management	Skilled	3	12 Months	77
Security	Skilled	3	12 Months	0
Training	Skilled	1	12 Months	0
Surveyor	Skilled	1	12 Months	26
Artisans - Electrical	Skilled	4	12 Months	106
Artisans - Sub-Structure	Skilled	2	12 Months	54
Artisans - Civils	Skilled	2	12 Months	58
Semi Skilled - Electrical	Semi-Skilled	6	12 Months	149
Semi Skilled - Sub-Structure	Semi-Skilled	5	12 Months	128
Civil Semi-skilled operators	Semi-Skilled	11	12 Months	271
Labourers - Electrical	Unskilled	19	12 Months	450
Labourers - Sub-Structure	Unskilled	37	12 Months	885
Labourers - Civils	Unskilled	11	12 Months	270
Fencing Sub-Contractor		0		0
Project-/construction HO Mngmt	Skilled	3	12 Months	60
Quality engineers	Skilled	1	12 Months	22
Total		**128**		

It is anticipated that the construction equipment will include at least the following:

- Water tankers,
- Grader,
- Tipper trucks,
- Concrete mixers,
- Compaction equipment,
- Light delivery vehicles,
- Drilling rigs (down to 2m),
- Mobile pile ramming machines (down to 3m at the most),
- Excavators,
- TLBs,
- Heavy delivery vehicles (for the transformers).

Operational Phase

The operational phase is expected to last in excess of 20 years and has a preliminary staff complement as per Table 8. While the operational phase falls outside the scope of this environmental authorisation process, the labour force figures have been provided to help determine water usage requirements etc. for the full project duration.

Table 8: Proposed labour force for operational phase.

Job description	Anticipated level of Education and/or skill	Actual number of employees
O&M Exco	Skilled	2
Site Manager	Skilled	2
Site Technician	Skilled	2
Administrator	Skilled	2
Electrical maintenance	Skilled	2
Module cleaning	Semi-Skilled	16
Grounds maintenance	Un-Skilled	5
Offices cleaning	Un-Skilled	1
Security Supervisor	Skilled	2
Security	Semi-Skilled	8
Total		**42**

It is proposed that local labour from the surrounding community would be employed as far as possible.

Decommissioning Phase

The decommissioning phase falls outside the scope of this environmental authorisation process However, in the interest of Life Cycle understanding, the Lease Agreement with the Landowner (and any subsequent Power Purchase Agreements) is valid for a period of 20 years after which the Agreement would be renewed or the power plant decommissioned and the site rehabilitated. Extensions of the life of the plant of up to 10 to 20 years would depend on the choice of technology and the development of the technology over the first operational period. If the power plant is decommissioned the site would revert back to current land use activities (namely the grazing of small game and livestock). During decommissioning approximately 50 to 100 people would be working on site over a period of six to 12 months. A large number of the workforce, if not all, would be sourced from the De Aar / Hanover area.

Description of Associated Structures and Infrastructure

Rezoning and land-use

The site is currently zoned *Agricultural* and will require the necessary approvals relating to Sub-division of Agricultural Land Act (SALA, Act 70 of 1970) including written Ministerial approval of lease of agricultural land.

On-site Substation and Distribution Line

All three 100 MW blocks will feed into an on-site substation. A 10 to 15 m lightning mast will be erected within proximity to the on-site substation. The field transformer voltage is 33kV. It's unlikely that 33kV will be sufficient to evacuate the full phase 2 capacity (300 MW). It would imply that the distribution voltage from the respective phases would then be at a higher voltage of 132 kV. Consequently, the substation on Phase 2 will be linked to the on-site substation on Phase 1 via a 132 kV distribution line. The distribution lines are approximately 20 m high, and the servitude width is approximately 32 m. The on-stie substation would further host a microwave telecommunications tower as well as significant mast lighting.

Transformer and inverter

Several solar PV arrays are connected to an inverter. Inverters convert the voltage from direct current (DC) to alternating current (AC). The inverters are cabled to field transformers. There will be five inverters per MW (500 inverters per 100 MW block). Twenty-five inverters are connected to a field transformer, so there will be twenty field transformers per 100MW.

Access roads

The main access is off the N10 between De Aar & Hanover, which enters the site from the west. The provincial unsurfaced road (Burgersville Road) and the existing farm access road would also be utilised.

- Two-track roads

Access tracks will occur between the parallel arrays during the construction phase and largely remain in place during the operation phase (lower frequency of use).

A 5 m-wide fire break, comprising a surveillance dirt road and adjacent mowed vegetation will be created inside the perimeter fence.

- Cleared/Graded Roads

Existing roads will be upgraded (graded, imported material, shaped for runoff, and compacted), including road crossings that will link the two areas separated by a watercourse. Precast box culverts or pipes will also be required for road crossings. Roads will provide access to the construction camp, which includes the laydown area and remains the site for the

operational area, as well as to access components of the PV system, specifically field transformers and the on-site substation.

With the exception of passing lanes, upgraded roads will not exceed 5 – 6 m wide. Existing roads within 100 m of a watercourse or wetland may be widened by more than 4 m.

- Passing Lanes

Passing lanes up to ± 8 m wide will be placed at strategic areas on existing roads.

Buildings

Various operations and maintenance buildings would be constructed, including:

- Main building including offices and workshops (± 0.70ha), which would be shared by control and security staff,
- Main electrical substation,
- Transformers (max 500 m^2 fenced area) and Inverter structures in between arrays (each ± 15 m^2) – prefabricated concrete or steel structures, and
- Transformer structures – small concrete or steel structures. The buildings would be single storey and would be constructed from brick or stone with metal sheet roofing.

No accommodation facilities will be constructed. Staff will be required to leave the site at the end of the day.

Lighting

The solar PV facility will not be lit up at night. The fence line will be secured using multiple FLIR PTZ cameras which have a 2km range in absolute darkness. The obvious areas that would have lights is the control and security office, as well as the on-site substation.

The illumination levels for any substation shall be according to the OHS Act (Act 85 of 1993). Minimum average illumination level of 10 lux within the high voltage yard and 20 lux at the transformer bays and reactor bays. Uniformity ratio of 5 within the high voltage yard. The illumination level shall be sufficient for personnel to observe obstructions & other hazards while moving within the high voltage yards, and to read high voltage apparatus identification labels, mounted at heights not exceeding 2m above the ground level. To ensure the safety of maintenance personnel, the floodlighting installations shall be mounted on 21m high masts having a maintenance platform and caged ladder.

Fencing

The permitter of the facility will be fenced off with a suitable galvanised mesh security fence. The fence is embedded 300mm into the ground and is 1.8 m high. Access will be controlled using a security gate.

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Services

Water supply

Groundwater will be used for construction and operational purposes. There are two existing boreholes withing the Phase 2 footprint, which would be used to abstract groundwater:
Borehole 1: 30°51'5.62"S, 24°20'3.37"E,
Borehole 2: 30°50'25.79"S, 24°19'9.33"E.

Figure 6 shows the location of the boreholes within the Phase 2 development footprint.

Figure 6. Location of two existing boreholes for which raw water will be sourced for Phase 2.

This water would be stored in above-ground JoJo type storage tanks with a capacity not exceeding 100 cubic metres (100 m^3). It is anticipated that approximately 100 kL of water would be required every 3 months during the operational phase. This water would be used to clean the modules / solar array and general office use (e.g. toilets, drinking water, etc.) and supply water to the sheep that will retain access to the solar farm for grazing purposes as a complementary vegetation management tool.

The construction phase would require approximately 43 kl of water per day during the construction phase including dust suppression along access roads. Dust suppression will be augmented by the use of treated wastewater from the various on-site wastewater treatment works (package plants) and will include the use of soil binders to reduce overall dust suppression water requirements. Dust suppression figures have not factored in climatic conditions including rainfall days, and assume dust suppression is required every workday hence, the water usage figures present a worst case scenario. Accordingly, raw water would

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be largely for drinking & construction (mixing of concrete etc.) purposes and replenishment of sanitation facilities (the NewGen containerised WWTW will recycle 70% of the treated effluent for reuse in toilet cisterns, requiring 30% raw water replenishment).

The operational phase water is estimated at 22 kl per day, including washing all the solar panels every quarter.

Tables 9 & 10 provide a breakdown of the envisaged water uses and usage during the construction & operational phases, respectively. The raw water estimates for dust suppression in both phases equates to two 16,000 lt tankers per day during construction, and one tanker during operations, and includes the estimated volumes of treated effluent to be included for dust suppression. The number of tankers used per day assumes the use of effective soil binders to reduce the overall volumes and frequency of dust suppression events.

Table 9: Water uses and usage for the construction phase.

Construction Phase Raw water usage (s21a)						
Facility	lt/unit	Nr. Units	Volume	Total/day (m3)	Total/month (m3)	Total/year (m3)
Ops building	25	60	1500	1.5	33.0	396.0
NewGen WWTW	3	400	1200	1.2	26.4	316.8
Dust Suppression	23 600	1	23600	23.6	519.2	6230.4
Construction use	5000	1	5000	5.0	110.0	1320.0
Sheep in enclosure	225	11	2475	2.5	74.3	891.0
Construction camps/staff	15	600	9000	9.0	198.0	2376.0
Totals				**42.8**	**961**	**11530**

Table 10. Water use and usage estimated for the operational phase.

Operational Phase Raw water usage (s21a)						
Facility	lt/unit	Nr. Units	Volume	Total/day (m3)	Total/mnth (m3)	Total/year (m3)
Ops building	25	60	1500	1.5	33.0	396.0
Dust Suppression	14 800	1	14800	14.8	325.6	3907.2
Sheep	11	225	2475	2.5	74.3	891.0
Washing of panels	1035	300	310500	3.4	103.5	1242
Total				**22.2**	**536**	**6436**

Borehole No. 1 is located on the Remainder of Farm Kwanselaars Hoek 40. This farm is 841927.92 m^2 or 84.2 hectares in size. Consequently, the landowner is entitled to abstract no more than 3788.7 m^3 of groundwater per year from this borehole.
Borehole No. 2 is located on the remainder of Farm Rietfontein 39. This farm is 2201594.84m^2 or 220.16 hectares in size. Consequently, the landowner is entitled to abstract 9,907.2 m^3 of groundwater per year from this borehole.
The total available from both boreholes is thus **13,695.9** m^3/a.

The affected properties fall within the D62D catchment. General Authorisation GN 538, GG 40243, 2 September 2016 allows for 2000m^3 per property per year of surface water and 45m^3 per hectare per year of groundwater abstraction (but no more than 40 000 m^3 of ground water may be taken per year on a property) and storage. Hence, the water volumes required for the construction phase (approx. 11,500 m^3/a), and operational phase (approx. 6500 m^3/a) fall within the promulgated limits.

Electricity supply

Electricity would be obtained from Eskom via the existing 11 kV supply to the site.

Sewerage treatment

Three forms of wastewater treatment will be utilised during the construction phase namely BioRock, NEWGen and portable chemical toilets and/or “enviro-loos”.

NEWGen is a decentralised toilet-block (containerised) treatment system which treats the sewage directly from flushed toilets and re-cycle >99% of the ‘flushed’ water back to the toilets. The system is an autonomous, solar-powered, compact and off-grid (ideal for remote locations with no access to services) sewage treatment system which utilizes membrane biotechnology for the treatment of sewage. The summarised advantages of the NEWGen system includes:

- >99% recycle of toilet water for re-use in toilets
- ‘Off-the-grid’ operation – solar powered

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• Safe, hygienic and reliable
• Containerized, modular, compact and easy to install
• Autonomous operation - very low operating costs

The NEWGen system for Phase 2 will include the following components:
 Designed for: 400 users per day,
 Discharge Limit: Toilet Flushing Standards (General Standard for section 21(f) water uses in General Authorisation GN 665, 6 September 2013),
 Layout: 1 x 6m Shipping container for NEWGen™
 4 x 12m Toilet containers – 10 toilets per container.

Waste streams from the system include,
(1) Screening and grit removal,
(2) Sludge,
(3) Biogas (CO_2 and Methane); and
(4) Treated effluent.

A sub-surface soakaway will be required to dispose of the 'unrecycled' or excess treated effluent that cannot be reused for dust control/suppression.

Figures 7 -14 provide a graphical overview the NEWGen & BioRocks and how they work.

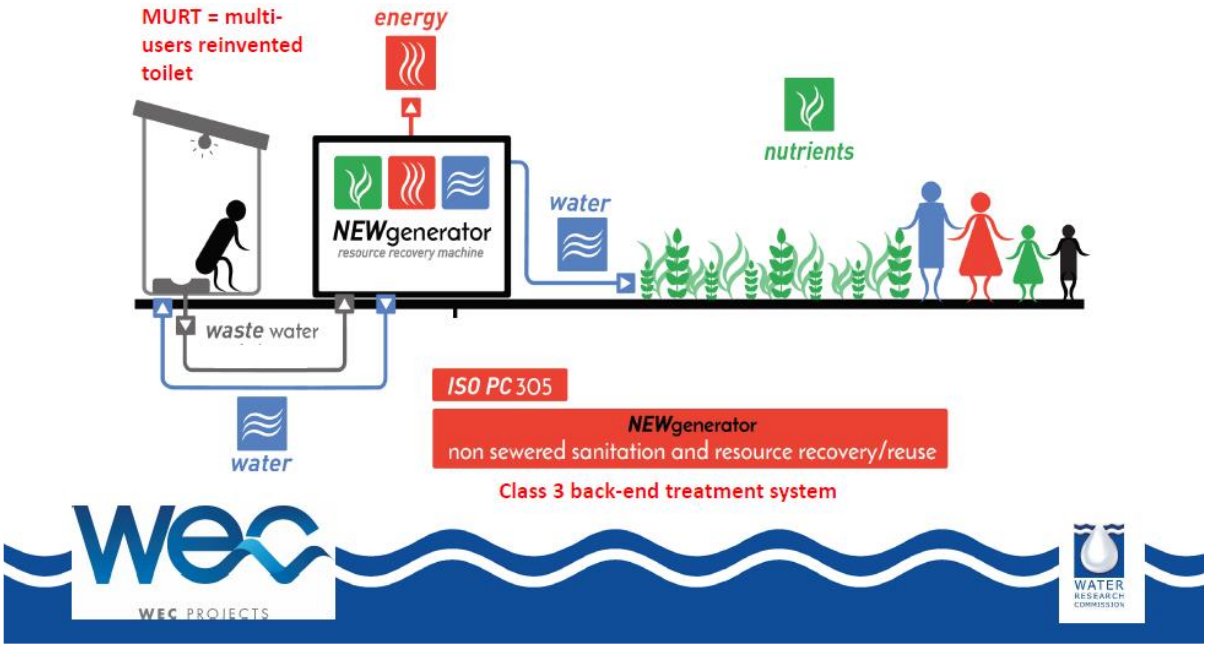

Figure 7. Waste flow through the NEWGen system.

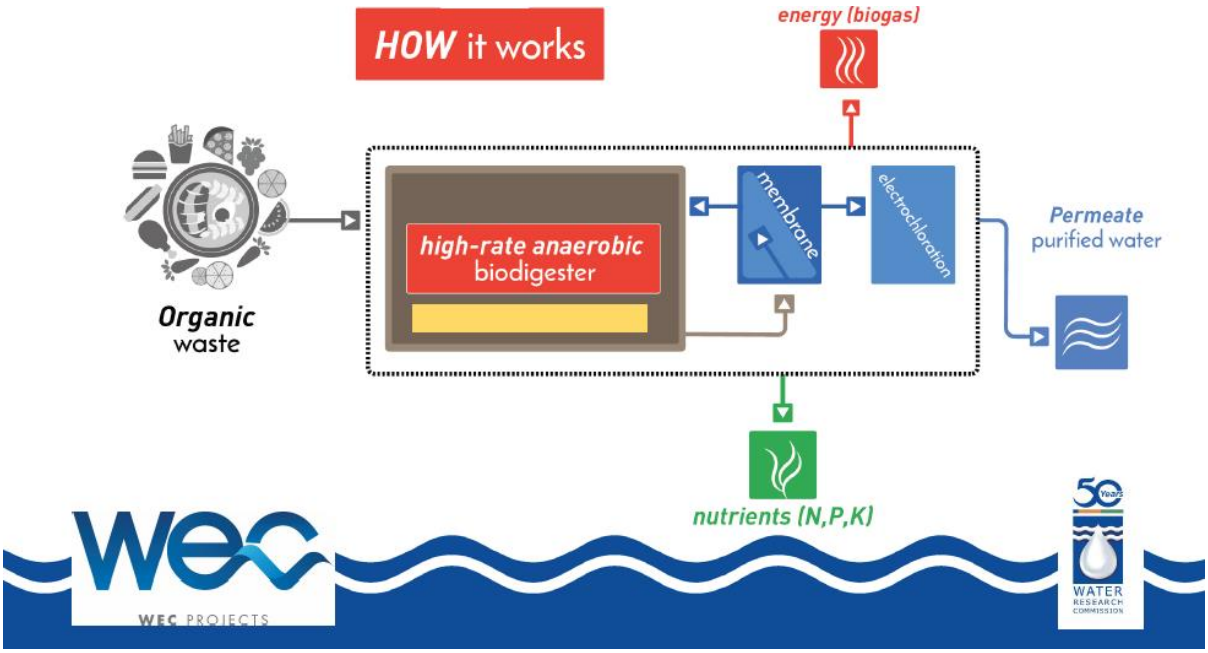

Figure 8. NEWGen treatment process and resulting by-products.

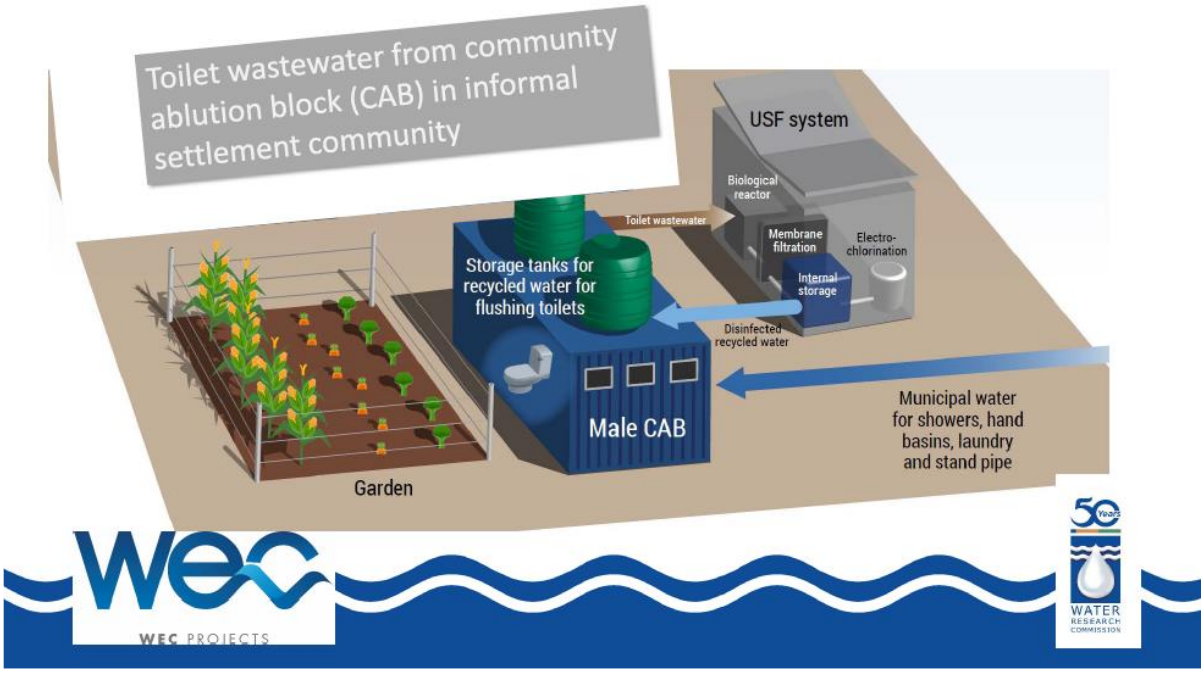

Figure 9. Overview of a typical single-container NEWGEN treatment system.

Figure 10. NEWGEN treatment container.

The BioRock^{TM} MULTIROCK 5010 package plant has been identified as a suitable treatment solution for the operational offices. Again, the treated effluent will comply with General Limits for reuse for dust suppression and/or release by way of soak-away. The MULTIROCK system utilises an effective biological purification technique and doesn't require any electricity and has no moving parts, making maintenance and operational costs particularly low. The MULTIROCK IS built with the ECOROCK-5010 treatment units installed in parallel, hence, MULTIROCK is a modular system which can be adapted to site-specific requirements (Figure 13).

The BIOROCK^{TM} media used in the ECOROCK systems carry a 10-year warranty, and the BIOROCK ECOROCK vessel has a 25-year warranty.

The MULTIROCK 60 treatment system shall accommodate the predicted 60 staff during operation, and still have capacity to accommodate for occasional increases in staff during, for example, stakeholder meetings and site inspections.

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Figure 11. Treatment technology of BioRock system.

The BIOROCK WWTW will be made up of four 6 m^3, 3-chambererd primary (septic) tanks, and two (2) 5 m^3 ECOROCK-5010 treatment unit(s). The primary tank clarifies the sewage water of fats, oils, greases and organic solids before the sewage then passes through an effluent filter and discharges into the ECOROCK-5010 units. The aerobic purification (secondary treatment) and the filtration (tertiary treatment) processes take place in the ECOROCK-5010 units.

According to the BIOROCK System Application Report (Report #1315590177 dated 2022/04/22), 100 persons (Flow 50 L/PE, BOD 25 g/PE, Ammonia 5g/PE) equates to a 'Load on system' of 42 Person Equivalents (PE). Each ECOROCK-5010 unit can accommodate up to 30 P.E., so 2 units connected in parallel will accommodate up to 60 P.E. (up to 100 persons).
The treated effluent will be discharged by a submersible pump into three 10 m^3 treated effluent storage tanks. The tank system will provide about 4 to 5 days of storage of the treated effluent before it will overflow, but it may significantly deteriorate if stored for more than 24-48 hrs. Hence, the treated effluent will be disinfected and preserved in the tanks with a simple floating chlorine basket (contact chlorination). Alternative means of disinfection include germicidal UV-light radiation, and dilution, using rainwater when available.

Waste streams of the system include,
(1) Sludge, and
(2) Treated effluent.

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A sub-surface soakaway will be required to dispose of the treated and disinfected effluent that cannot be reused for dust control/suppression.

Figure 12. Step-wise breakdown of the treatment process of BIOROCK.

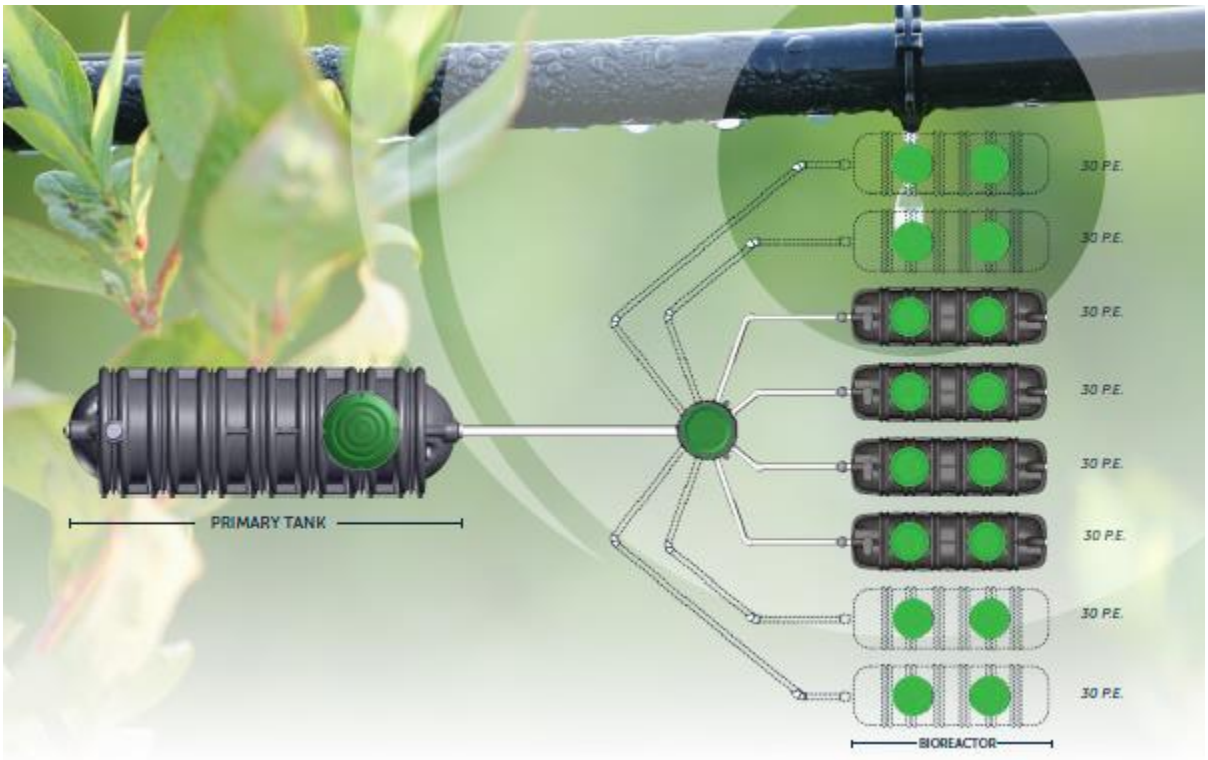

Figure 13. Example of how ECOROCK can be placed in parallel via the multi-way splitter box to increase on-site treatment capacity.

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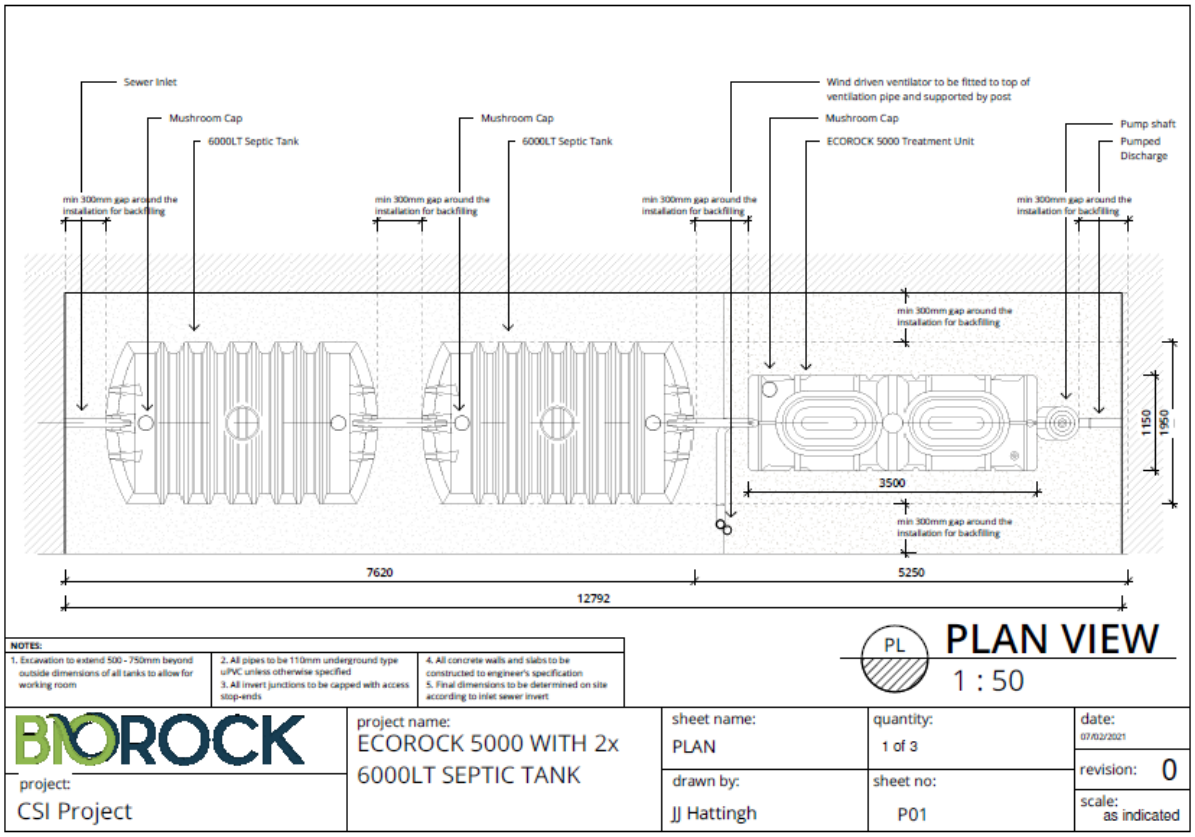

Figure 14. Plan view of the ECOROCK 5000 system including two septic (buffer) tanks.

The BIOROCK service includes a set of water samples professionally analysed by an accredited laboratory to determine the process performance of the sewerage treatment system (every 12 months). A sample set comprises two samples, one taken from the primary tank, and the second from the outlet of the ECOROCK-5010 unit(s) (before disinfection). The results are presented in a laboratory analyses report, as well as a summary analyses report by BIOROCK Africa. Sample analysis and reporting will take 7-14 days from submission to the laboratory.

Waste disposal

All non-recyclable waste would be disposed of at the De Aar licensed landfill site and hazardous waste removed and disposed of by a licensed operator. An Integrated Waste Management Plan will be need to be compiled to implement the waste management hierarchy.

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SECTION E: DESCRIPTION OF THE POLICY AND LEGISLATIVE CONTEXT

"a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process".

List of Applicable Legislation and Other Documents

The following legislation, guidelines, departmental policies, environmental management instruments and/or other decision-making instruments that have been developed or adopted by a competent authority in respect of activities associated with a development of this nature, were identified and considered in the preparation of this EIA process, and subsequent amendments.

1. Agenda for Sustainable Development adopted by the General Assembly of the UN. September 2015. Sustainable Development Goals (SDGs).
2. Astronomy Geographic Advantage Act (Act 21 of 2007). GG No. 31157, 17 June 2008.
3. Carbon Emission Tax Act (Act 15 of 2019). GG No. 42483, 23 May 2019 and associated regulations.
4. Conservation of Agricultural Resources Act (CARA, Act 43 of 1983). Government Gazette (GG) No. 8673, Government Notice (GN) No. 883, dated 27 April 1983; and subsequent regulations (including dealing with declared weeds and invader plants) under section 29 of the Act, in Government Notice R1048 in Government Gazette 9238, dated 25 May 1984, amended in Government Notice R2687 in Government Gazette 10029, dated 6 December 1985 and Government Notice R280 in Government Gazette 22166, dated 30 March 2001.
5. Constitution of the Republic of South Africa.
6. Convention on Biological Diversity, 1992.
7. DEA (undated). Booklet guideline for the administration of emergency incidents.
8. DEA. 2010. Guideline on Need and Desirability, Integrated Management Guideline Series 9, Department of Environmental Affairs (DEA), Pretoria, South Africa.
9. DEA. 2010. Public Participation, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs, Pretoria, South Africa.
10. DEA. 2011. National list of ecosystems that are threatened and in need of protection. GN 1002, GG 34809, 9 December 2011.
11. DEA&DP. 2010. Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning.
12. DEAT. 2002. Specialist Studies, Information Series 4, Department of Environmental Affairs and Tourism, Pretoria.
13. Department of Agriculture. 2003. Sustainable Utilisation of Agricultural Resources (draft legislation).

14. Department of Energy. 02 December 1998. White Paper on the Energy Policy of the Republic of South Africa.
15. Department of Energy. November 2003. White Paper on Renewable Energy.
16. Department of Energy. 25 March 2011. Integrated Resource Plan 2010.
17. Department of Energy. 26 March 2009. Renewable Energy Feed-in Tariff.
18. Department of Forestry, Fisheries and the Environment. 28 July 1997. White Paper on Biodiversity.
19. Department of Forestry, Fisheries and the Environment. 3 August 2009. National Biodiversity Framework.
20. Department of Forestry, Fisheries and the Environment. 2005 & 2015. South Africa's National Biodiversity Strategy and Action Plan (NBSAP).
21. Department of Forestry, Fisheries and the Environment. 2008 & 2016. National Protected Areas Expansion Strategy (NPAES).
22. Department of Forestry, Fisheries and the Environment (DFFE) and South African National Biodiversity Institute (SANBI). 2011 & 2018. National Biodiversity Assessment (NBA).
23. DWA. 2007. Guideline for Developments within a Flood line (Edition 1), Department of Water Affairs and Forestry, Pretoria, South Africa.
24. DWS. 2016. General Authorisation in GN No. 509, Government Gazette No. 40229 dated 26 August 2016.
25. DWS. 2016. General Authorisation in GN No. 538, Government Gazette No. 40243 dated 2 September 2016.
26. Electronic Communications Act (Act 36 of 2005).
27. Environmental Conservation Act (Act 73 of 1989), including noise control regulations.
28. EIA Regulations, GG No. 38282, GN No. R. 982, 983, 984, 985, 4 December 2014, amended in GG No. 40772, GN No. R. 324, R. 325, R. 326, R. 327, R. 328, 07 April 2017, GG No. 41766, GN No. 706, 13 July 2018, GG No. 43358, GN No. 599, 29 May 2020 and GG No. 44701, GN No. 517, 11 June 2021.
29. Electricity Regulation Act (Act 4 of 2006). Government Notice 660 in Government Gazette 28992 dated 5 July 2006. As amended by: Electricity Regulation Amendment Act 28 of 2007, Government Notice 23 in Government Gazette 30676, dated 21 January 2008.
30. Emthanjeni Local Municipality. 2021 – 2022. Integrated Development Plan (IDP).
31. Emthanjeni Local Municipality. 2007. Spatial Development Framework (SDF).
32. Environment Conservation Act, 1989 (Act 73 of 1989), including Schedules 4 and 5 of the national regulations regarding Noise Control made under Section 25 of the Environment Conservation Act, 1989 (Act 73 of 1989) in GN No. R 154 of Government Gazette No. 13717 dated 10 January 1992 (Note that this particular section of the Environment Conservation Act is not repealed by NEMA (Act 107 of 1998)).

33. Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947).
34. International Union for Conservation of Nature. 1 July 1975. The Convention on International Trade in Endangered Species of Wild Fauna and Flora.
35. Minerals and Petroleum Resources Development Act (Act 28 of 2002). Gazette No. 23922, Notice No. 1273 dated 10 October 2002. As amended by: Minerals and Energy Laws Amendment Act 11 of 2005, Gazette No. 27897, Notice No. 824 dated 15 August 2005. Mineral and Petroleum Resources Development Amendment Act 49 of 2008, Gazette No. 32151, No. 437 dated 21 April 2009. Mineral and Petroleum Resources Development Amendment Act 49 of 2008, Gazette No. 32151, No. 437 dated 21 April 2009.
36. Municipal Systems Act (Act 32 of 2000).
37. National Biodiversity Assessment (NBA), 2011 & 2018.
38. National Biodiversity Framework, 2009.
39. National Energy Act (Act 34 of 2008).
40. National Environmental Management Act (Act 107 of 1998), Gazette No. 19519, Notice No. 1540. As amended by: National Environmental Management Act 56 of 2002 - Gazette No. 24251, No. 97. Mineral and Petroleum Resources Development Act 28 of 2002 - Gazette No. 23922, No. 1273. National Environmental Management Act 8 of 2004 - Gazette No. 26570, No. 842. National Environmental Management Act 46 of 2003 - Gazette No. 26018, No. 175. National Environmental Management Act 62 of 2008 - Gazette No. 31789, No. 22. National Environment Laws Amendment Act 44 of 2008 - Gazette No. 31685, No. 1318. National Environment Laws Amendment Act 14 of 2009 - Gazette No. 32267, No. 617. National Environmental Management Laws Second Amendment Act 30 of 2013 - Gazette No. 37170, No. 1019, dated 18 December 2013. National Environmental Management Laws Amendment Act 25 of 2014 – Government Notice 448 in Government Gazette 37713, dated 2 June 2014.
41. National Environmental Management: Air Quality Act (Act 39 of 2004). Gazette No. 27318, Notice No. 163. As amended by: National Environment Laws Amendment Act 44 of 2008 - Gazette No. 31685, Notice No. 1318. National Environment Laws Amendment Act 14 of 2009 - Gazette No. 32267, Notice No. 617. National Environmental Management Laws Amendment Act 14 of 2013 – Gazette No. 36703, No. 530 dated 24 July 2013. National Environmental Management: Air Quality Amendment Act 20 of 2014 – Gazette No. 37666, No. 390 dated 19 May 2014; including the list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage in Government Notice 893 in Government Gazette 37054 dated 22 November 2013. As amended by: Government Notice 551 in Government Gazette 38863 dated 12 June 2015. The National Dust Control Regulations are also relevant during the construction

phase – GG No. 36974, GN No. R 827 dated 1 November 2013 read in combination with SANS 1929: 2005.

42. National Environmental Management: Biodiversity Act (Act 10 of 2004). Gazette No. 26436, Notice No. 700. As amended by: National Environment Laws Amendment Act 14 of 2009 – Gazette No. 32267, No. 617. National Environment Laws Amendment Act 14 of 2009 – Gazette No. 32267, No. 617. National Environmental Management Laws Amendment Act 14 of 2013 – Gazette No. 36703, No. 530 dated 24 July 2013; including the alien and invasive species regulations in Government Notice R598 in Government Gazette 37885 dated 1 August 2014, and species lists in GN No.599, amended in GG No. 40166, GN No .864 dated 29 July 2016, amended in GG No. 43386, GN No. 627 dated 03 June 2020.
43. National Environmental Management Protected Areas Act (Act 57 of 2003). Gazette No. 27274, GN No. 131. As amended by: National Environmental Management: Protected Areas Amendment Act 15 of 2009, Gazette No. 32660, GN No. 748.
44. National Environmental Management: Waste Act (Act No. 59 of 2008) ("NEM: WA"). Gazette No. 32000, Notice No. 278. As amended by: National Environmental Management Laws Amendment Act 14 of 2013 – Gazette No. 36703, No. 530 dated 24 July 2013. National Environmental Management: Waste Amendment Act 26 of 2014, Government Notice 449 in Government Gazette 37714 dated 2 June 2014. National Environmental Management Laws Amendment Act 25 of 2014, Government Notice 448 in Government Gazette 37713 dated 2 June 2014.
45. National Forest Act (Act 84 of 1998). Gazette No. 19408, Notice No. 1388 dated 30 October 1998. As amended by: National Forest and Fire Laws Amendment Act 12 of 2001 – Gazette No. 22479, No. 660. Forestry Laws Amendment Act 35 of 2005 – Gazette No. 28602, No. 220.
46. National Heritage Resources Act (Act 25 of 1999).
47. National Land Transport Act (Act 5 of 2009).
48. National list of ecosystems that are threatened and in need of protection, 2011.
49. National Protected Areas Expansion Strategy (NPAES), 2008 & 2016.
50. Natural Scientific Professions Act (Act 27 of 2003).
51. National Veld and Forest Fire Act, 1998 (Act 101 of 1998). Government Gazette No. 19515 dated 27 November 1998.
52. National Water Act, 1998 (Act 36 of 1998). Gazette No. 19182, Notice No. 1091. As amended by: National Water Amendment Act 45 of 1999 – Gazette No. 20706, No. 1476. National Water Amendment Act 27 of 2014 – Government Notice 450 in Government Gazette 37715, dated 2 June 2014; including Sections 27, 28,29,30,31 and 39 (Sections dealing with General Authorisations and Water Use Licenses).
53. Natural Scientific Professions Act (Act 27 of 2003).
54. Northern Cape Climate Response Strategy.
55. Northern Cape Provincial Growth and Development Strategy (2004-2014 & 2019).
56. Northern Cape Provincial Spatial Development Framework, (2012).

57. Northern Cape Nature Conservation Act (Act No. 9 of 2009).
58. Pixley-Ka-Seme District Municipality, Spatial Development Framework, 2013 – 2018.
59. Pixley-Ka-Seme District Municipality, Integrated Development Plan, 2022 – 2027. 7 June 2022.
60. Promotion of Access to Information Act (Act 2 of 2000).
61. Promotion of Administrative Justice Act (Act 3 of 2000).
62. Protection of Personal Information Act (Act 4 of 2013).
63. South Africa's National Biodiversity Strategy and Action Plan (NBSAP), 2005 & 2015.
64. South African National Standard (SANS) 10103:2008: The measurement and rating of environmental noise with respect to annoyance and speech communication.
65. Sub-Division of Agricultural Land Act (Act 70 of 1970) as amended by Subdivision of Agricultural Land Amendment Act, No. 55 of 1972, Subdivision of Agricultural Land Amendment Act, No. 19 of 1974, Subdivision of Agricultural Land Amendment Act, No. 18 of 1977, Subdivision of Agricultural Land Amendment Act, No. 12 of 1979, Subdivision of Agricultural Land Amendment Act, No. 18 of 1981, Subdivision of Agricultural Land Amendment Act, No. 33 of 1984, Constitution of the Republic of South Africa Act, No 200 of 1993 (Proc. No. 100 of 31 October 1995), General Law Amendment Act, No 49 of 1996, Abolition of Racially Based Land Measures Act, No. 108 of 1991 (Proc. No. 116 of 24 June 1994).
66. Sustainable Utilisation of Agricultural Resources (Draft Legislation), 2003.
67. The Landscape Institute. 2003. Guidelines for Landscape and Visual Impact Assessment (GLVIA), Second Edition.
68. United Nations. 1992. Convention on Biological Diversity.
69. United Nations. 1 November 1983. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979).
70. United Nations. 2 February 1971. The Convention on Wetlands (RAMSAR Convention).
71. United Nations. 21 March 1994. The United Nations Framework Convention on Climate Change.
72. Western Cape Department of Environmental Affairs & Development Planning. 15 April 2005. Visual and Aesthetic Guidelines.
73. World Bank. 30 April 2007. General Environmental, Health and Safety Guidelines of the IFC.
74. World Bank. 2007. Environmental Health and Safety Guidelines for Electric Power Transmission and Distribution of the IFC.
75. World Heritage Convention Act (Act 49 of 1999).
76. World Resources Institute. 2005. Millennium Ecosystem Assessment (MEA).

1. Legislative Context of the Proposed Activity

A review of relevant legislation, policies and documents pertaining to the energy sector indicate that solar energy and the establishment of photovoltaic power plants are supported at a national, provincial and local level. The following review is not exhaustive but focusses on some of the more pertinent sets of legislation, policies or guidelines governing the proposed development.

Constitution of the Republic of South Africa, 1996

The Constitution of the Republic of South Africa 1996 can be regarded as one of the most progressive constitutions in the world. Human rights are enshrined in the South African Constitution, which forms the basis of all the country's legislation. Chapter 2 consists of a Bill of Rights, which explicitly spells out the rights of every South African citizen. The human rights relevant to the environmental management field that are safeguarded by the Constitution of the Republic of South Africa 1996 in the Bill of Rights, include:

- Right to a healthy environment,
- Right of access to land and to security of tenure; and
- Right to adequate housing and protection against evictions and demolitions.

The right to a protected biophysical environment, the promotion of social development and trans-generational equity is explicitly included in the Constitution of the Republic of South Africa 1996, which states:

"Everyone has the right -

1) *To an environment that is not harmful to their health and wellbeing, and*
2) *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*
    i. *Prevent pollution*
    ii. *Promote conservation, and*
    iii. *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."*

When considering an environment that is not harmful to peoples' health and wellbeing, it is important to reflect on the interconnectedness of biophysical, economic and social aspects. The impact of development on people, and the true cost of development, as well as the consideration of "who pays the price?" versus "who reaps the benefits?" cannot be ignored in a discussion about human rights and the environment. The right to a generally satisfactory environment is increasingly seen as a human right in Africa (Du Plessis, 2011), and South Africa's environmental legislation support this.

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Relevance to the Project: It allows the environmental rights of all South African citizens to be upheld through the implementation of all types of projects and ensure due legal process and stakeholder engagement where every individual has the right to comment on the project throughout its various phases and processes.

National Environmental Management Act (Act 107 of 1998) including amended EIA Regulations, 2014 published in Government Notice No. R. 324, R. 325, R. 327 and R. 328 in Government Gazette No. 40772 dated 07 April 2017 and Government Notice No. 599 in Government Gazette No. 43358 dated 29 May 2020.

The National Environmental Management Act (NEMA) 107 of 1998 states that the State must respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the needs of previously disadvantaged communities. It states further that sustainable development requires the integration of social, economic and environmental factors in the planning, evaluation and implementation of decisions to ensure that development serves present and future generations.

Chapter 1 of NEMA contains a list of principles and states clearly that environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests (NEMA, 1998). It states further that negative impacts on the environment and on peoples' environmental rights must be anticipated and prevented, and if they cannot be prevented, they should be minimised and remedied. It elaborates further on the equity of impacts, and the fact that vulnerable communities should be protected from negative environmental impacts. It refers to the principle that everyone should have equal access to environmental resources, benefits and services to meet their basic human needs (NEMA, 1998). Therefore, there is a clear mandate for environmental and restorative justice in the act, something that must be considered in this project.

Another important aspect of NEMA is the principle of public participation. It states that people should be empowered to participate in the environmental governance processes, and that their capacity to do so should be developed if it does not exist. All decisions regarding the environment should take the needs, interest and values of the public into account, including traditional and ordinary knowledge (NEMA, 1998). There are also specific environmental management acts that fall under NEMA, such as the National Environmental Management, Air Quality Act 39 of 2004 (NEM: AQA), and the National Environmental Management, Waste Act 59 of 2008 (NEM: WA). These acts require similar public participation processes to NEMA and the principles of NEMA also apply to them (Western Cape Department of Environmental Affairs & Development Planning (DEA&DP), 2010).

Chapter 6 of NEMA elaborates on the public participation requirements. This is supplemented by the EIA regulations published in GN 982 of 4 December 2014, which

contained requirements for public participation (GN 982 in GG 38282 of 4 December 2014). It provides requirements for the public participation, the minimum legal requirements for public participation processes, the generic steps of a public participation process, requirements for planning a public participation process and a description of the roles and responsibilities of the various role players. A compulsory Public Participation Guideline that was published in 2017 (DEA, 2017) in terms of section J of NEMA (NEMA, 1998) complements these requirements. According to the guidelines, public participation can be seen as one of the most important aspects of the environmental authorisation process. Public participation is the only requirement of the environmental impact assessment process for which exemption cannot be given, unless no rights are affected by an application. This stems from the requirement in NEMA that people have a right to be informed about potential decisions that may affect them and that they must be given an opportunity to influence those decisions.

The principles of NEMA 107 of 1998 declare further that community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, sharing of environmental knowledge and experience and any other appropriate means. It states that the social, environmental and economic impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions taken must be appropriate given the assessment and evaluation. NEMA 107 of 1998 recognises that the environment is held in public trust for the people, and therefore the beneficial use of environmental resources must serve the peoples' interest and protect the environment as the peoples' common heritage.

NEMA takes a holistic view of the environment, and promotes the consideration of social, economic and biophysical factors to obtain sustainable development and achieve effective management of the biophysical environment.

Relevance to the Project: The project development and authorisation process will align with the processes, principles and requirements of NEMA including but not limited to a full public participation process and S&EIA process as the vehicle to environmental authorisation for the listed activities that have been triggered. Central to S&EIA is the Impact Assessment process which will endeavour to reduce principal impacts by ensuring suitable footprint selection to areas that have the lowest sensitivity with the lowest concomitant loss of and impact to biodiversity and ecosystem function. The development of an Environmental Management Programme (EMPr) will mitigate/management activities throughout the project cycle likely to cause impacts to the receiving environment.

National Environmental Management: Air Quality Act (Act 39 of 2004) including the dust control regulations.

National Environmental Management: Air Quality Act (NEM:AQA, Act 39 of 2004) regulates air emissions to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and to provide for air quality monitoring and specific air quality measures.

Relevance to the Project: The development of the solar PV facility is going to include the various dust generating activities, the most significant of which will be haulage of material for road upgrades and vehicle movement along unsurfaced roads and tracks. These activities will likely result in dust emissions, which need to comply with thresholds stipulated in the National Dust Control Regulations (GG No. 36974, GN No. R. 827, 1 November 2013). Effective management of dust emissions will be required including dust suppression, which will be assessed and mitigated and included in the EMPr.

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

The National Environmental Management: Biodiversity Act (NEM:BA, Act 10 of 2004) provides for the protection of ecosystems and species that require national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources and the establishment and functions of the South African National Biodiversity Institute (SANBI).

Relevance to the Project: The S&EIA process, including the appointment of a SACNASP registered ecologist, will involve the identification, protection and management of species, ecosystems and areas of high biodiversity value. This includes the implementation of the threatened or protected species regulations and associated lists of species that are threatened or protected published in GG 36375 and GN 388 & 389, respectively. Furthermore, the alien and invasive species regulations published under NEM:BA will also be considered in the management measures stipulated in the EMPr.

National Environmental Management: Waste Act (Act 59 of 2008)

The National Environmental Management: Waste Act (NEM:WA, Act 59 of 2009) aims to reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

Relevance to the Project: The project will implement the waste hierarchy principles that the Waste Act introduces, to minimise and reduce waste created from the project, whilst encouraging the recycling and reuse of any suitable waste generated to prevent increased disposal at local landfills.

Environmental Conservation Act (Act 73 of 1989)

The Environmental Conservation Act (ECA, Act 73 of 1989) published noise control regulations in terms of section 25 of ECA in Government Notice R154 in Government Gazette 13717 which have been repealed in Gauteng by GN 5479/PG 75/19990820, Free State by GN 24/PG 35/19980424; and Western Cape by RN 627/PG 5309/19981120. The main aspect of noise control regulations is that you may not exceed the prevailing ambient noise levels, above which a noise disturbance is created.

Relevance to the Project: The project will need to undertake construction activities in a noise sensitive manner so as not to create nuisance or disturbing noise which may affect any sensitive receptors including surrounding land users and faunal species.

Conservation of Agricultural Resources Act (Act 43 of 1983) and the regulations dealing with declared weeds and invader plants.

The Conservation of Agricultural Resources Act (CARA, Act 43 of 1983) has the stated objective *"to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of the land, by the combating and prevention of erosion and weakening or destruction of the water resources, and the protection of the vegetation and the combating of weeds and invader plants".* Hence, CARA provides for the control of the utilization of the natural agricultural resources and to promote the conservation of the soil, the water sources and the vegetation including the combating of weeds and invader plants.

Relevance to the Project: The project area contains several declared weeds and invader plants listed under the regulations promulgated under section 29 of CARA (GN R. 1048, GG 9238, 25 May 1984 as amended). Accordingly, all Category 1, 2 & 3 plants will need to be controlled in accordance relevant control measures stipulated by CARA and associated regulations, which will also be explicitly included in the project-specific Environmental Management Programme (EMPr). Additionally, the project aims to retain the current principle agricultural activities on the property, by providing continued access to the solar PV footprint by livestock. Soils have been delineated to soli form level and combined with grazing capacity values to ensure livestock grazing impacts within the fenced footprints are sustainable, will not lead to overgrazing, topsoil loss and erosion, or impacts on the receiving watercourses.

National Heritage Resources Act (Act 25 of 1999)

The National Heritage Resources Act (NHRA, Act 25 of 1999) requires that the responsible heritage resource authority is notified of any new development which exceeds certain thresholds including:

"38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

- *(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 50 m in length;*
- *(c) any development or other activity which will change the character of a site:*
  - *(i)* ***exceeding 5 000 m^2 in extent; or***
  - *(ii) involving three or more existing erven or subdivisions thereof; or*
  - *(iii)involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
  - *(iv)the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- *(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or*
- *(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority."*

Relevance to the Project: An Archaeological and Cultural Heritage Impact Assessment will be undertaken as roads will be extended beyond 300m and sites changes in character exceeding 5 000m^2. Any sites or features of heritage or archaeological significance must be located and documented during a physical survey. In terms of section 34 of the National Heritage Resources Act (NHRA, 25 of 1999), significant buildings or structures need to be located. In terms of section 35 of the NHRA, archaeological sites need to be located. In terms of section 36 of the NHRA, graves or gravesites and burial grounds need to be located. However, awareness must still be maintained during construction where the possibility exists for heritage artefacts to be exposed/discovered, which will be catered for in the EMPr.

National Water Act, 1998 (Act No. 36 of 1998), Sections 27, 28,29,30,31 and 39 (Sections dealing with General Authorisations and Water Use Licenses)

Chapter 1 of the National Water Act (NWA, Act 36 of 1998) states that sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. It affirms that the guiding principles recognise the basic human needs of present and future generations and the need to promote social and economic development using water. Chapter 2 of the NWA states amongst others that the purpose of the Act is to ensure that everyone has equitable access to water, and that the results of past racial and gender discrimination are redressed. It aims to promote the efficient, sustainable, and beneficial use of water in the public interest, and to facilitate social and economic development. The NWA recognises that the nations' water

resources are held in public trust for the people, and therefore the sustainable, equitable and beneficial use of water resources must serve the peoples' interest.

Relevance to the Project: The project will require the registration of water uses for 1. sections 21 (c) for impeding or diverting a watercourse, 2. Section 21(e) for engaging in a controlled activity (irrigating with wastewater), 3. Section 21(g) for disposing of waste in a manner which may detrimentally impact on a water resource; and for 4. Section 21 (i) for the altering of the beds, banks of a watercourse; under General Authorisation, for which a Risk Assessment has been undertaken by a SACNASP certified Aquatic Specialist.

National Forest Act (Act 84 of 1998)

The National Forest Act (NFA, Act 84 of 9918) aims *inter alia* to provide special measures for the protection of certain forests and trees.

Relevance to the Project: The proposed development may affect a protected tree listed in GN 635 of 2019 namely, *Boscia albitrunca* which should be avoided and left *in situ* as far as possible, or for which a permit may be required for translocation, from the Department of Agriculture.

National Veld and Forest Fire Act (Act 101 of 1998)

The purpose of the National Veld and Forest Fire Act (Act 101 of 1998) is to prevent and combat veld, forest and mountain fires throughout the Republic.

Relevance to the Project: The proposed project will be constructed on an area of natural veld, which will require the annual implementation of effective fire breaks and management. While there is currently no established Fire Protection Association (FPA) in the area, it is currently being discussed and formulated amongst the community.

National Energy Act (Act 34 of 2008)

One of the objectives of the National Energy Act, 2008 (Act 34 of 2008) is to promote diversity of supply of energy and its sources. The preamble to the act states that the aim of the act is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation. The development of energy resources must take environmental management requirements and interactions amongst economic sectors into account. The act also aims to assist with increased generation and consumption of renewable energies.

Relevance to the Project: The project is part of international and national initiatives to increase generation of renewable energy and the Act identifies the need for implementing environmental management within the planning of such projects.

Electricity Regulation Act (Act 4 of 2006)

The Electricity Regulation Act's, 2006 (Act 4 of 2006) was established to *inter alia* regulate the reticulation of electricity by municipalities; and to provide for matters connected therewith. It's objective to provide control over the generation and supply of electricity, and the existence of NERSA and other related matters. The issuing of licences, determination of process, settling disputes, collecting information are the functions of NERSA.

Relevance to the Project: The project will require a generation licence from NERSA.

National Land Transport Act (Act 5 of 2009)

The National Land Transport Act (Act 5 of 2009) requires the integration of land transport planning with the land development process and the preparation of integrated transport plans which constitutes the transport component of the integrated development plans of municipalities. These integrated transport plans include the regulation and provision of transport infrastructure for all modes of transport. According to the National Land Transport Act, property developments within a transport area are subject to traffic impact and transport assessments.

The National Land Transport Act 5 of 2009 (NLTA) Section 38 does not set out any regulation as to what is required in a TIA. However, Section 38(2b) of the Act states that "developments on property within the area of the planning authority are subject to traffic impact assessments and public transport assessments as prescribed by Minister."

The National Road Traffic Act 93 of 1996 (NRTA) provides for road traffic matters to be applied uniformly throughout the Republic and for matters connected therewith.

Relevance to the Project: The TIA will evaluate the expected traffic impact of the proposed Solar Photovoltaic (PV) facility and associated electrical grid infrastructure with the main focus on access and traffic distribution during the Construction, Operational and Decommissioning phases of the project. In other words, the objective of the TIA is to assess the impact of the activities of the proposed PV facility on the existing external road network surrounding the development during these phases. The report identifies the preferred access route to the site, comments on the condition of the existing roads in the vicinity of the site, identifies possible access points to the site and recommends road improvements to minimise the impact on the surrounding road network where necessary (Sturgeon, 2022).

Astronomy Geographic Advantage Act, 2007 (Act 21 of 2007)

The purpose of the Act is to preserve the geographic advantage areas that attract investment in astronomy. The entire Northern Cape excluding the Sol Plaatjie Municipality had been declared an astronomy advantage area. The Northern Cape optical and radio telescope sites were declared core astronomy advantage areas. The Act allowed the declaration of the

Southern Africa Large Telescope (SALT), MeerKat and Square Kilometre Array (SKA) as astronomy and related scientific endeavours that had to be protected.

Relevance to the Project: The project is within the Northern Cape geographic advantage area and will need to consult and receive comments from the Southern Africa Large Telescope (SALT).

Promotion of Access to Information Act (Act 2 of 2000)

The Promotion of Access to Information Act (PAIA, Act 2 of 2000) gives effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights.

Part 2 of the Act contains substantive provisions regarding the right and manner of access to records of public bodies while Part 3 provides for access to records of private bodies, including sections dealing with the publication and availability of certain records, the manner of access, and grounds for refusal of access to records. PAIA also provides for appeals against decisions (Glazewski, 2005)

Relevance to the Project: The Public Participation Process will be undertaken in accordance with *inter alia* the requirements of PAIA as well as ensuring all relevant information is made available to public and private parties with an interest in the project.

Promotion of Administrative Justice Act (Act 3 of 2000)

The Bill of Rights in the Constitution of the Republic of South Africa 1996 states that everyone has the right to administrative action that is legally recognised, reasonable and procedurally just. The Promotion of Administrative Justice Act (PAJA) 3 of 2000 gives effect to this right. The PAJA applies to all decisions of all State organisations exercising public power or performing a public function in terms of any legislation that negatively affects the rights of any person. The Act prescribes what procedures an organ of State must follow when it takes decisions. If an organ of State implements a decision that impacts on an individual or community without giving them an opportunity to comment, the final decision will be illegal and may be set aside. The Promotion of Administrative Justice Act 3 of 2000 also forces State organisations to explain and give reasons for the manner in which they have arrived at their decisions and, if social issues were involved, and how these issues were considered in the decision-making process.

The Promotion of Administrative Justice Act 3 of 2000 therefore protects the rights of communities and individuals to participate in decision-making processes, especially if these processes affect their daily lives.

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Relevance to the Project: All potential and Interested & Affected Parties (I&APs) including Competent and Commenting Authorities will be consulted with through all phases and processed relating to application for environmental & water use authorisation.

Protection of Personal Information Act (Act 4 of 2013)

The stated intentions of the Protection of Personal Information Act (POPIA) are to *inter alia "**promote the protection of personal information** processed by public and private bodies and to introduce certain conditions so as to **establish minimum requirements for the processing of personal information,** recognising that section 14 of the Constitution of the Republic of South Africa, 1996, provides that **everyone has the right to privacy**; the right to privacy includes **a right to protection against the unlawful collection, retention, dissemination and use of personal information**; bearing in mind that consonant with the constitutional values of democracy and openness, requires the removal of unnecessary impediments to the free flow of information, including personal information; and in order to regulate, in harmony with international standards, the processing of personal information by public and private bodies in a manner that gives effect to the right to privacy subject to justifiable limitations that are aimed at protecting other rights and important interests.*

Relevance to the Project: Regulation 42 of the Environmental Impact Assessment Regulations, 2014, as amended (EIA Regulations) provides for the opening and maintenance of a register of interested and affected parties (I&APs), by the proponent or applicant, which must contain personal information (names, contact details and addresses). It is therefore the duty of the proponent or applicant to collect the information that must be contained in the register and that these registers must be submitted to the competent authority (CA). There is no legal requirement in the EIA Regulations that such registers must be included in the reports that are published for public consultation purposes or be made publicly available as part of the EIA process. Since the information in the registers is personal/private information, it should not be included in or attached to reports and be made available in the public domain.

Regulation 19(1)(a) of the Environmental Impact Assessment Regulations 2014 (EIA Regulations) provides that where basic assessment must be applied to an application, the applicant must, within 90 days of receipt of the application by the CA submit to the CA a basic assessment report, inclusive of any specialist reports, an EMPR, a closure plan or the plans, reports and calculations contemplated in the Financial Provisioning Regulations, which have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the CA. There are similar requirements for the scoping report and the environmental impact assessment reports required in terms of the EIA Regulations.

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The applicant or EAP on behalf of the applicant is therefore required by law to submit reports, including comments received on such reports, summaries of the issues raised, and an indication of the manner in which the comments/issues were incorporated or reasons for not incorporating comments/issues in the reports, where such are not incorporated. It is not expressly required that names or personal information of those who provided comments should be included in the reports. It is therefore important to be able to indicate the comment received in relation to the person/entity who submitted this.

For the current scenario the EAP and applicant has a legal duty to perform a function in terms of the EIA Regulations, which function requires the preparation of reports, that include comments made by process participants. POPIA must therefore be interpreted in a manner that does not prevent the applicant or EAP from performing its functions/duties under the EIA Regulations, as far as such functions/duties relate to the processing of personal information, and provided the processing is in accordance with POPIA and meets the requirements of the EIA Regulations. Furthermore, in light of the fact that the reports submitted by the EAPs are meant to provide the CAs with adequate information that will enable them to decide on applications received, adequate information may, at times, include incorporation of personal information in order for the reports to facilitate decision-making.

Section 12(1) of POPIA provides that personal information must be collected directly from the data subject. In this case, at the invitation of the EAP, the commenting parties submit their comments and names directly to the EAP and therefore there is compliance with this requirement. Section 12(2)(b) provides that it is not necessary to comply with subsection 12(1), and to collect data directly from the data subject, if, amongst other things, the data subject has consented to the collection of the information from other sources. In the context of the EIA process it is reasonable to conclude that EIA process participants are aware that information collected by EAPs will eventually be used by CAs to make decisions on relevant development applications. Since the commenting parties are aware and intend that their comments should be considered during the decision-making process by the CA it is not necessary that the CA receive the comments and names of commenting parties directly from the commenting parties. Furthermore, as contemplated in section 12(2)(c), the collection (receipt) of the reports and comments (including the names of persons) by the CA from the EAP (and not directly from the commenting party) would not prejudice the legitimate expectations of the commenting party since the purpose of the submission of the comments to the EAP and the CA is to give effect to the legitimate expectation of the commenting parties that their comments would be considered during the decision-making process by the CA.

Section 11(1)(a) of POPIA provides that personal information may only be processed if the data subject consents to the processing. On the other hand, section 11(1)(c) provides that personal information may only be processed if processing complies with an obligation

imposed by law on the responsible party. The comments (and names of commenting parties) are included in the reports as a result of the requirements of the EIA Regulations and are submitted to the CA to enable informed decision-making.

Section 18(1) of POPIA requires that if personal information is collected, the responsible party must take reasonably practicable steps to ensure that the data subject is aware of, amongst other things, the information being collected, the name and address of the responsible party (in this case the EAP and applicant), the purpose for which the information is collected, whether or not the supply of the information by the data subject is voluntary or mandatory, the consequence of the failure to provide the required information, further information such as the recipient of the information, as well as the existence of the right to object to the processing of the personal information. It is therefore necessary that the relevant information be communicated by the EAPs to the commenting parties (DFFE communication following IAIAsa event).

Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947)

The Act is underpinned by the requirement that no person may sell any fertiliser, farm feed, agricultural or stock remedy unless they are registered under the Act. Apart from requiring the registration of any dealer in the above-mentioned four products, the Act also requires the registration of pest control officers, defined as *"a person who has, in the course of his trade or occupation, administered agricultural remedies for the purposes for which they are intended."*

Relevance to the Project: The project endorses the responsible use of pesticides (especially selective as opposed to non-selective options) where required under the direction of a pest control officer.

White Paper on the Energy Policy of the Republic of South Africa (1998)

This paper identifies the need for demand side management and the development and promotion of energy efficiency in South Africa. It requires energy policies to consider 'energy efficiency and energy conservation' within the Integrated Resource Planning (IRP) framework from both supply and demand side in meeting energy service needs; *"Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future".*

The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, such as the proposed De Aar Solar One Photovoltaic Power Project. These renewable applications are in fact in most cases the most cost effective; more so when social and environmental costs are taken into account.

Government policy on renewable energy is thus concerned with meeting the following challenges:

- Ensuring that economically feasible technologies and applications are implemented;
- Ensuring that an equitable level of national resources are invested in renewable technologies, given their potential and compared to investments in other energy supply options; and
- Addressing constraints on the development of the renewable industry.

The White Paper also acknowledges that South Africa, even though the country's renewable energy resource base is extensive and many appropriate applications exist, has neglected the development and implementation of renewable energy applications. The White Paper also notes that renewable energy applications have specific characteristics that need to be considered.

Advantages include:

- In comparison with traditional supply technologies there are less environmental impacts in operation; and
- Generally high labour intensities and lower running costs and.

Disadvantages include:

- Higher capital costs in some cases;
- Lower energy densities; and
- Depending on specific conditions, especially with sun and wind based systems, provide lower levels of availability.

Relevance to the Project: The White Paper underlines the fact that the state must establish a national energy policy which will ensure that the national energy resources shall be adequately tapped and developed to cater for the needs of the nation. Energy should therefore be available to all citizens at an affordable cost. Energy production and distribution should not only be sustainable but should also lead to improvement of the standard of living for all the country's citizens.

White Paper on Renewable Energy (2003)

Following Cabinet approval of the White Paper, the DoE proceeded with the development of its renewable energy strategy. The implementation plan of the various technologies was identified in a macroeconomic study undertaken in 2003.

The White Paper's target of 10 000GWh renewable energy contribution to final energy consumption by 2013 was confirmed to be economically viable with subsidies and carbon financing. Achieving the target will:

- Provide approximately 1.667MW new renewable energy capacity, with a positive impact on GDP as high as R1.071 billion per year;
- Secure additional government revenue of 299 million;
- Create additional income flow to low income households by as much as R128 million, stimulating over 20 000 jobs; and
- Leading to water savings of 16.5 million kilolitres, which equates to a R26.6 million saving.

The White Paper on Renewable Energy supplements the White Paper on Energy Policy (1998) that recognise that the medium and long-term potential of renewable energy is significant. It states that renewable energy needs to assume a significant role in supporting economic development. The White Paper express that government is committed to the introduction of greater levels of competition in electricity markets, and that promoting renewable energy will contribute towards the diversification of electricity supply and energy security. Renewable energy that is produced from sustainable natural sources will contribute to sustainable development.

Relevance to the Project: The project will support the government's commitment to the introduction of greater levels of competition in electricity markets by promoting renewable energy which will contribute towards the diversification of electricity supply and energy security. Renewable energy that is produced from sustainable natural sources will contribute to sustainable development.

Integrated Resource Plan (2010)

The Integrated Resource Plan (IRP) 2010-30 was promulgated in March 2011. It was indicated at the time that the IRP should be a "living plan" which would be revised by the Department of Energy (DoE) every two years. Since the promulgation of the Integrated Resource Plan (IRP) 2010-30 there have been a number of developments in the energy sector in South and Southern Africa. In addition, the electricity demand outlook has changed markedly from that expected in 2010. The objective of the IRP 2010 is to develop a sustainable electricity investment strategy for generation capacity and transmission infrastructure for South Africa over the next 25 years. The IRP 2010 is intended to, *inter alia*, consider environmental and other externality impacts and the effect of renewable energy technologies:

- allocates 43% of new energy generation facilities in South Africa to renewables;
- allows for an additional 14 749 MW of renewable energy in the electricity blend in South Africa by 2030;
- an accelerated roll-out of renewable energy options to derive the benefits of localisation in these technologies.

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While there are a number of renewable energy options (including, *inter alia*, wind, solar and hydropower) being pursued in South Africa, many more renewable energy projects are required to meet the targets set by the IRP 2010. With regards to photovoltaic solar energy the IRP 2010 expresses the need for firm commitment to this sector in order to facilitate the connection of the first units to the grid in 2012. It also identifies the need to provide security of investment in order to ramp up a sustainable local industry cluster.

Relevance to the Project: The project has the potential to help achieve the national renewable energy targets. The proposed renewable energy development is within the power corridor identified in the Northern Cape and in which renewable energy projects are to be focused to help the provincial energy mix.

Renewable Energy Feed-in Tariff

The South African Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) is a competitive tender process that was designed to facilitate private sector investment into grid-connected renewable energy (RE) generation in South Africa. The Renewable Energy Feed-In Tariff (REFIT) provides incentives to renewable energy developers, making the developments economically feasible and it will support the achievement of national renewable energy targets.

The NERSA 'Renewable Energy Feed-in Tariff'' (REFIT) guidelines were published in 2009 under the Electricity Regulation Act (Act 4 of 2006) pledging attractive rates of payment for renewable energy sold back to the grid. An innovative initiative to encourage investment within the sector of renewable energy and to help achieve the national renewable energy targets.

The REFIT programme includes a number of phases as follows:

- Phase 1: Including quotas for wind, small hydro, landfill gas and Concentrated Solar Power (CSP),
- Phase 2: Including quotas for Solar though without storage and central tower, additional CSP and photovoltaic systems including large ground or roof based and concentrating photovoltaic (CPV), as well as biomass solid and biogas technologies.

Relevance to the Project: The REFIT provides incentives to renewable energy developers, making the developments economically feasible and it will support the achievement of national renewable energy targets. This project will however not form part of the REFIT program and the energy will be "wheeled" through the Eskom grid for private offtake.

Northern Cape Provincial Growth and Development Strategy (2004-2014 & 2019)

At a provincial level, the 2004 – 2014 Northern Cape Provincial Growth and Development Strategy (NCPGDS) refers for the need to ensure the availability of inexpensive energy for the Northern Cape. The NCPGDS notes:

"*the development of energy sources such as solar energy, the natural gas fields, bio-fuels, etc., could be some of the means by which new economic opportunity and activity is generated in the Northern Cape*".

The NCPGDS highlights the importance of close co-operation between the public and private sectors for the economic development potential of the Northern Cape to be realised. The NCPGDS features the importance of enterprise development and noted that current levels of private sector development and investment in the Northern Cape are low. It also noted that the Northern Cape lags in the key policy priority areas of small, medium and micro enterprise (SMME) development and Black Economic Empowerment.

The 2019 iteration of the Northern Provincial Growth and Development Strategy (2019) aims to place the Northern Cape Province on a new development trajectory of sustainable development which forms part of its long-term strategic approach. The document mainly relies heavily on the 2015 Sustainable Development Goals (SDGs'), the blue print of global development agenda to achieve a better and more sustainable future for all. The NC PGDS recognises that social wellbeing is a complex concept, and refers to several aspects relating to human life, such as happiness, material fulfilment and personal needs. Although many aspects of social well-being can only be achieved by an individual and his/her subjective feelings and experiences, access to basic infrastructure and economic opportunities acts as a catalyst for achieving various levels of human well-being.

The sun, wind, vast open spaces, the ocean, the various minerals and semi-precious stones, amongst others provides the province with competitive and comparative advantages. Environmental sustainability can only be achieved if the province's environmental assets and natural resources are protected and enhanced. The Northern Cape Province is endowed with rich natural resources and mineral deposits which offers the opportunity to fund the transition to a low-carbon future and a more diverse and inclusive green economy if used responsibly (Pixley-Ka-Seme IDP, 2022 – 2027).

Relevance to the Project: The proposed project has the potential to create opportunities that promote private sector investment and the development of SMMEs in the Northern Cape. The proposed project will contribute significantly to sustainable development objectives and targets within the District.

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Northern Cape Climate Response Strategy

The Northern Cape Government is in the process of finalising a Provincial Climate Change Response Strategy. The key aspects of this strategy were, however, summarised in the MEC's (Northern Cape Provincial Government: Environment and Nature Conservation) 2011 budget speech. These are:

- commitment to develop and implement policy in accord with the National Green Paper for the National Climate Change Response Strategy (2010);
- an acknowledgement of the Northern Cape Province's extreme vulnerability to climate-change driven desertification.

Relevance to the Project: The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly identified as an important element of the Provincial Climate Change Response Strategy.

Northern Cape Province Strategic Plan (2020-2025)

The development of the Provincial Medium Term Strategic Framework Programme of Action (MTSF POA) 2019-2024 constitutes the high-level Provincial Growth and Development 5-Year Implementation Plan as it reflects the sequenced interventions and targets based on the Provincial Growth and Development Plan (PGDP) Pillars, Drivers and High Impact Investment Projects aimed at growth, development and prosperity. The development of the Provincial Programme of Action coincides with the review of the PGDP with the objective to ensure alignment between the PGDP and the MTSF 2019-2024.

The Strategic Plan for the 2019-2024 MTSF Programme of Action / PGDP 5-Year Implementation Plan and Monitoring Framework, is the instrument by which the province directs its effort and resources to the delivery of the Provincial Growth and Development Plan in line with the 7 MTSF priorities. The strategic focus for the duration of the 2020 to 2025 period is to strengthen the integration and synergy of the Provincial Departments and its affairs.

The 7 priorities are listed as follows:

1) Building a capable, ethical and developmental state,
2) Economic transformation and job creation,
3) Education, skills and health,
4) Consolidating the social wage through reliable and quality basic services,
5) Spatial integration, human settlements and local government,
6) Social cohesion and safe communities; and
7) A better Africa and world.

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Part of the Strategic plan is to endure the finalisation of the Northern Cape Renewable Energy Strategy / Provincial Energy Strategy. The Northern Cape is one of the best sites in the world to produce solar renewable energy and that this potential has attracted to the province a large number of investors who are developing their CSP and PV plants under the DoE's Renewable Energy Independent Power Producer Procurement Programme (RE IPP). Given these facts, the finalisation of the draft Northern Cape Renewable Energy Strategy was identified as key. Since the approval of the initial Strategic Plan, government's focus with regard to energy has shifted since. This means that the Province will need to develop a Provincial Energy Strategy that does not only align the exploitation of renewables with the PGDP and PSDF focus, but also take into account the opportunities for improved energy efficiency and exploration of gas and oil reserves as the means for improved energy security and socio-economic development in the Northern Cape. The Department of Economic Development and Tourism is mandated to prioritise the development of the Provincial Energy Strategy.

Relevance to the Project: The successful authorisation and implementation of this Solar PV project is a preferred technology identified for the northern cape aligning with the key development priorities identified for the province.

Pixley ka Seme District Municipality Integrated Development Plan (IDP) (2021-2022)

"Pixley ka Seme District Municipality's Integrated Development Plan (IDP) provides the framework to guide the Municipality's planning and budgeting over the course of a set legislative time frame. It is an instrument for making the Municipality more strategic, inclusive, responsive and performance driven. The IDP is therefore the main strategic planning instrument which guides and informs all planning, budgeting and development undertaken by the Municipality in its municipal area" (executive summary of the Pixley ka Seme District Municipality Integrated Development Plan (IDP) (2021-2022)).

Table 19 entitled "Summary of objectives" indicates the objectives and actions under each chapter of the IDP that impact on local government and to which the Municipality can contribute where possible. Several project-relevant desired outcomes are listed along with associated objectives in Table 11 below as well as various pressures on the municipal biophysical environment in Figure 15.

Table 11: Relevant summary of Table 19 of the IDP.

Outcome	**Objective**
Environmental sustainability and resilience	*at least 20 000MW of renewable energy should be contracted by 2030*
Economic infrastructure	*the proportion of people with access to the electricity grid should rise to at least 90% by 2030, with non-grid options available for the*

	rest
Economy and employment	*Public employment programmes should reach 1 million by 2015 and 2 million people by 2030*
Transforming human settlements	*More people living closer to their places of work* and *More jobs in or close to dense, urban townships*

Biophysical context	
List of major river streams	Orange River
Main agricultural land uses within the Municipality	Livestock production (e.g. horse breeding), cultivation of maize and lucerne
(Possible) demand for development that will influence the transformation of land use	SKA, Renewable energy
Existing pressure from land use impacts on biodiversity	Renewable energy, livestock grazing management and veldt management

Figure 15. Excerpt of relevant biophysical information from Table 22 of the IDP.

Section 3.6.1. of the IDP entitled "*Social Summary*" states that "*the mobility of individuals is restricted by the absence of a public transport system and long distances between towns. This situation is a huge stumbling block in the development of human and social capital owing to limited access to information and opportunities".*

Section 3.7.1. of the IDP entitled *"Economic Summary"* states that *"the Northern Cape (and Limpopo) recorded the lowest real annual economic growth rate (of 2,2% each) of the nine provinces in South Africa in 2011".*

Section 3.8.2. of the IDP entitled *"Possible Opportunities"* includes Table 40 which identifies possible opportunities for the municipal area including *"allowing investment in renewable energy resource generation".*

3.10. of the IDP entitled "Sectoral Plans" identifies several sector plans that would be of relevance to developments within the municipal area and the project-specific scope including:

- Air Quality Management Plan – Completed awaiting council approval,
- Disaster Management Plan: Approved in 2008 – Under review,
- Integrated Waste Management Plan (IWMP),
- Integrated Environmental Management Plan; and
- Climate Change Vulnerability Assessment and Response Plan: November 2016: Still in draft.

Relevance to the Project: This project will assist in attaining several of the IDP objectives including; increased renewable generation within the district, albeit for private offtake

agreements, provision of employment, especially during the construction phase and provision of transport to and from the project site, in light of inadequate public transport.

Identified land use risks and pressures for the district includes those posed to agriculture, especially sheep production. The solar PV project is being developed in a manner to maintain the current agricultural potential of the property as far as possible, including maintaining the grazing capacity within the PV footprints.

Air dispersion potential over the Northern Cape is relatively good during the day considering the hot summer and mild winter daytime temperatures. At night in winter, the clear skies and cold temperatures are conducive to the formation of surface temperature inversions and stable conditions which inhibit dispersion. Long range atmospheric transport of air pollutants from the industrialised Highveld and biomass burning in southern and central Africa may influence ambient air quality over parts of the Northern Cape.

The main sources of air pollution in the Northern Cape are mining and biomass burning, followed by industry and motor vehicles. The total emission of all other pollutants in the Northern Cape is similarly small when compared with the national emission. Control of project related emissions will be important to maintain the relatively low rate of emissions characteristic of the province, especially rural environments. Effective dust control on especially access roads will help ensure the achievement of this objective and may even improve on current baseline values on unsurfaced district roads servicing the project, open to public access, as the third largest generator of PM10 from motor vehicles in the province.

Management of project-related Incidents and Emergencies, as per and defined in Section 30 & 30A of NEMA, need to be managed in alignment with the Disaster Management protocols of the IDP which aims:

- to promote an integrated coordinated approach to Disaster Management through all spheres of government.
- to identify key role – players and their responsibilities
- to develop, improve and maintain disaster preparedness and response capabilities

Development will need to align with relevant sector plans.

<u>Pixley ka Seme District Municipality Integrated Development Plan (IDP) (2022-2027)</u>

The following statement is made as an introduction to the IDP *"The municipality's commitment to be "A Sustainably Developed District for Future Generations" is a focal point of the 2022/2027 IDP".*

An overview of the latest iteration of the IDP is provided by the municipal manager, Mr. R.E. Pieterse, as a summation of the findings and focus of the IDP "*As we are moving toward a*

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developed and sustainable District for future generations, I am glad to announce that our vision is in line with the district one plan vision of placing the Pixley ka Seme district as the leading innovative region and ***global centre for renewable energy*** *and space science which drives knowledge industry, mining, tourism,* ***agriculture,*** *industrialization, and empowerment of communities using latest technology. Once this regional identity is realized then the sustainability of the district for future generations would be achieved."*

"Through our public participation programmes, the communities of Pixley ka Seme District Municipality have reaffirmed their needs, which include but not limited to the following: water, roads, employment, health and educational facilities, SMME empowerment and support, sports and recreational facilities and etc. Some of the identified needs do not fall within the functions of the District Municipality, but the communities tend not to differentiate between Local, District, Provincial and National Government functions. The IDP should be seen as a central tool for three spheres of Government in achieving the aim of accelerated service delivery to our communities."

The IDP further strives to achieve integrated governance *"in order to maximise the benefit of investments, strategic interventions and actions of all spheres of government, it is critical that there is Policy alignment between national, provincial, district and local government in order to collaboratively achieve development goals. Whilst the IDP is developed by local government it must represent an integrated inter-governmental plan based upon the involvement of all three spheres of government. This IDP was drafted, taking the various plans listed below into consideration, in order to ensure alignment, inclusivity and involvement by all spheres of government. These plans include:*

- *Sustainable Development Goals (SDGs);*
- *National Key Performance Areas (NKPAs);*
- *National Outcomes (NOs);*
- *Sector Plans*
- *Northern Cape Provincial Development Growth Development Strategy; and*
- *Local Municipalities' Integrated Development Plan."*

In Pixley ka Seme District Municipality the economic sectors that recorded the largest number of employment in 2018 were the community services sector with a total of 13 500 employed people or 29.8% of total employment in the district municipality. The agriculture sector with a total of 8 040 (17.7%) employs the second highest number of people relative to the rest of the sectors. The electricity sector with 310 (0.7%) is the sector that employs the least number of people in Pixley ka Seme District Municipality (Figure 16), followed by the manufacturing sector with 1 220 (2.7%) people employed (PKSDM IDP 2022-2027).

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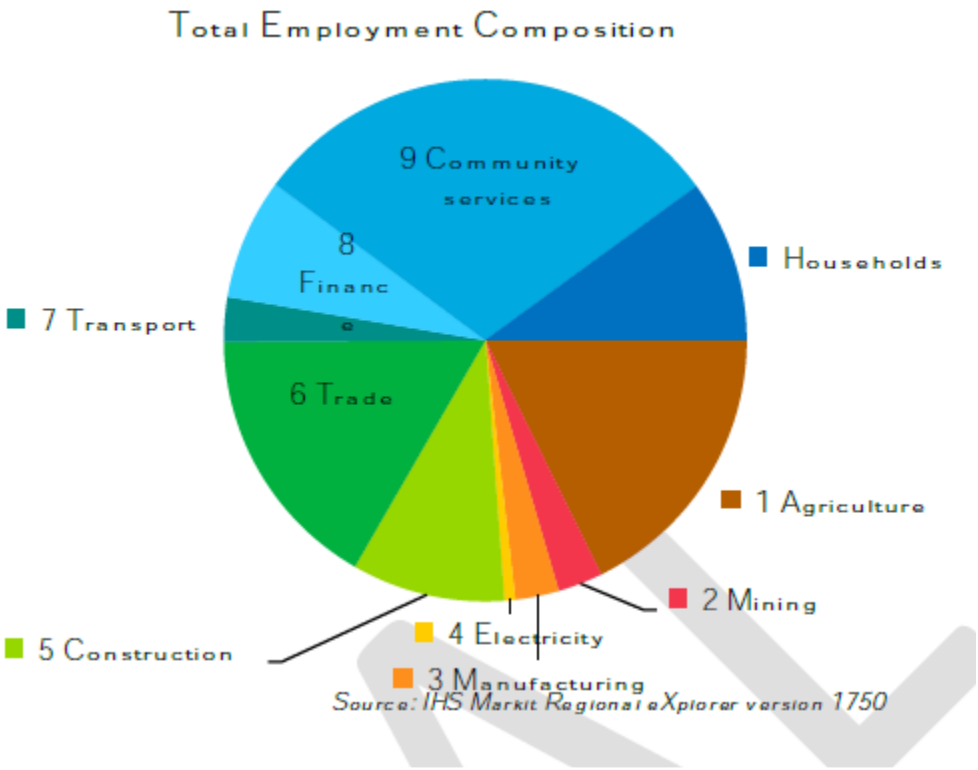

Figure 16. Figure derived from IDP which indicates industry specific employment composition, indicating electricity related activities currently contributes relatively insignificantly to employment in the district.

For 2018 Pixley ka Seme District Municipality has a very large comparative advantage in the agriculture sector as well as electricity sector (Figure 17). The PSKDM IDP identifies four economic sectors in the Northern Cape Province, and hence in the district that have comparative advantages in relation to broader South Africa and associated economic growth priorities (Figure 18). Additionally, the IDP identifies several areas/sectors for opportunities for growth relevant to the proposed project (Figure 19).

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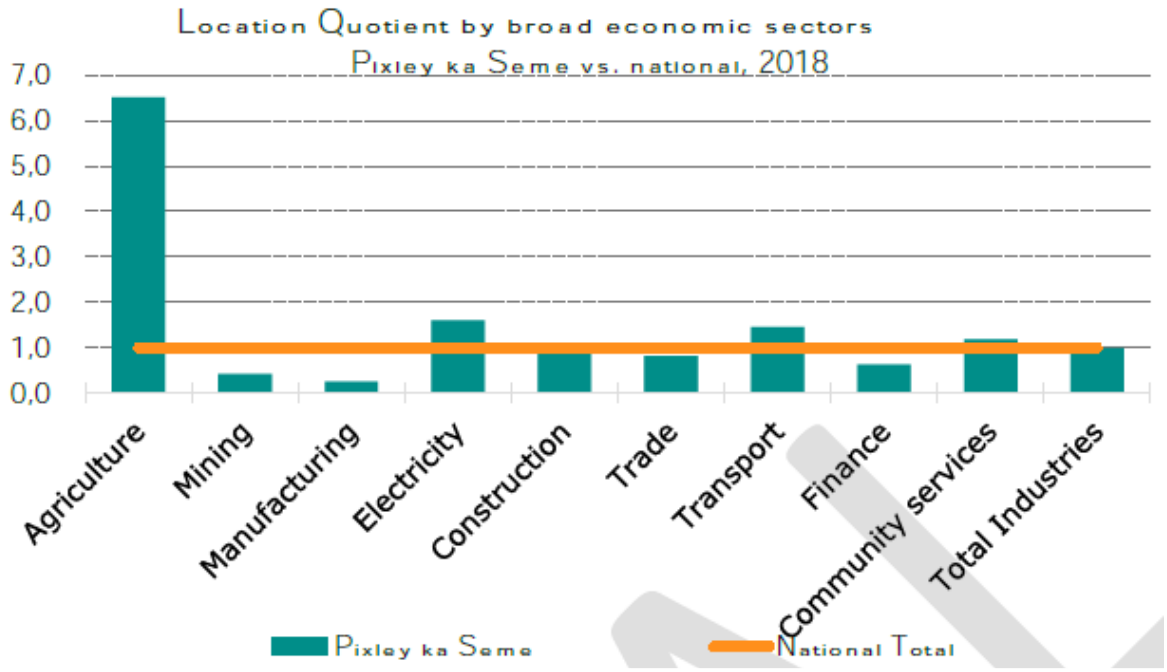

Figure 17. Pixley-Ka-Seme economic sectors relevant to national comparatives.

Description	Targeted Performance within Pixley Ka Seme District
Mining	High Priority
Agriculture	High Priority
Manufacturing	High Priority
Wholesale, retail and motor trade, catering and accommodation	High Priority

Figure 18. Table 16 of the PSKDM IDP which identified four economic sectors in the Northern Cape Province, and hence in the district that have comparative advantages in relation to broader South Africa and associated economic growth priorities.

Sector	Potential	Initiative	Competitive Advantage	Recommendations
Agriculture	▪ Agro processing ▪ Fishing and aquaculture opportunities ▪ Poultry farming ▪ Small scale vegetable farming ▪ Agricultural opportunities- Chicken farming, cattle, crop ▪ Feedlot ▪ Wine making	▪ Agro processing plant ▪ Meat packing plant ▪ Bee breeding initiative ▪ Formalise and organise local fisherman – Link to major retailers ▪ Establish young winemakers programme	Irrigation area, Water access - Two main rivers Two major dams on the border of district Land availability	Feasibility studies Fishing permits Training and educational programmes

Renewable energy	▪ Expansion of Solar energy - Wind Farms and Solar Energy ▪ Solar for households ▪ Establishment of solar parks	Expansion of Solar energy Energy efficient town	Land availability Wind, Sun	Business plans

Figure 19. Relevant summary of opportunities identified in the IDP.

Availability of water is identified as a key resource requirement and constraint within the district. Water security is central to economic growth and development, energy generation and food security. South Africa is currently classified as a 'water stressed' country due primarily to the country's climatic conditions and human settlement patterns. The country's relatively low annual rainfall and high evaporation rates result in only 8% of SA's rainfall being converted to runoff, which places pressure on the nation's water supply.

Relevance to the Project: The IDP has a strong emphasis on both agriculture and electricity generation (through renewable energy) as key economic drivers for the district. The proposed project can contribute to the sustained production (agriculture) and increased development (electricity generation) in these two key areas. Employment opportunities will also be provided throughout the construction and operational phases, as well as upskilling through formalised skills development programmes.

Geohydrology assessments and pump yield testing of existing boreholes, will ensure that water is not used beyond the sustainable yield of the affected boreholes and aquifers. This will ensure water security for the broader area and the directly affected landowner.

Pixley ka Seme District SDF & Land Development Plan (2013 – 2018)

The SDF for the Pixley Ka Seme District Municipality focuses on spatial planning guidelines in terms of regional context of the municipalities' rural and urban areas. The District Municipal SDF addresses several issues relevant to the proposed development including *inter alia*:

i. Contains strategies, policies and plans which:

- Delineate agricultural land with high potential,
- Indicate desired patters of land use within the municipality; and
- Provide strategic guidance in respect of the location and the nature of development in the municipalities.
- Set out basic guidelines of land use management systems in the municipality.
- Address sustainable bioregional planning.
- Identify programs and projects for the development of land within the municipality.
- Contain a strategic assessment of the environmental impact of the SDF.
- Provide a visual representation of the desired spatial form of the municipality in terms of:

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- Indicate where public and private land development and infrastructure investment should take place; and
- Indicate the desired and undesired utilisation of spaces in particular areas.

The District Municipality SDF needs to align with the Northern Cape Provincial Spatial Development Framework (2012) which includes principles which are integrated in the Pixley Ka Seme SDF in order to support the way forward towards sustainable development in the region in the following areas:

Social Sustainability:

a) Implement skills training and capacity enhancement for historically disadvantaged people.

Economic Sustainability:

a) Promote employment creation; and
b) Biophysical Sustainability: In the Northern Cape a premium will be placed on the conservation of natural resources, biodiversity and landscapes.

Biophysical Sustainability:

a) Minimise the use of the four generic resources, namely energy, water, land and materials,
b) Maximise the re-use and/or recycling of resources,
c) Use renewable resources in preference to non-renewable resources,
d) Minimise air, land and water pollution,
e) Create a healthy, non-toxic environment,
f) Maintain and restore the Earth's vitality and ecological diversity; and
g) Minimise damage to sensitive landscapes, including scenic, cultural, and historical aspects.

To assist with the standardizing of planning within the Northern Cape and the implementation of Spatial Planning Categories, or what is more commonly known as SPC's, are being prescribed for planning on all local levels. Six (6) main SPATIAL PLANNING CATEGORIES have been formulated in terms of the bioregional planning principles to be applied to the province captured in Figure 19. The SPC's then inform the desired land uses within them (Figure 20). Development corridors & nodes have been defined for the province (Figure 21). Table 12 provides a summary of the strategic focal points and priorities that were identified in the Northern Cape SDF and how the Pixley Ka Seme SDF aligns with them.

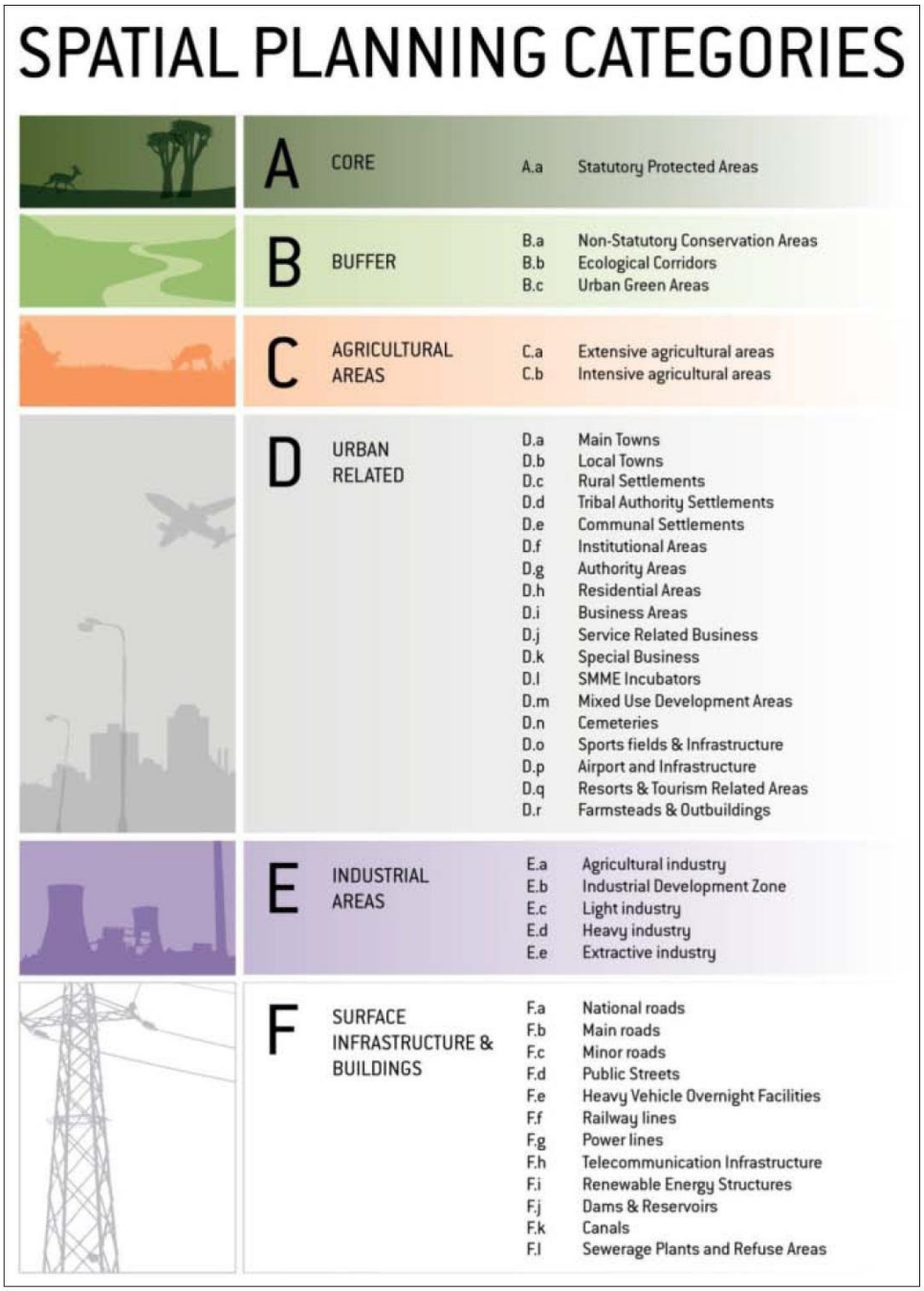


Figure C3: Spatial Planning Categories and Sub-categories to be applied in the Northern Cape.

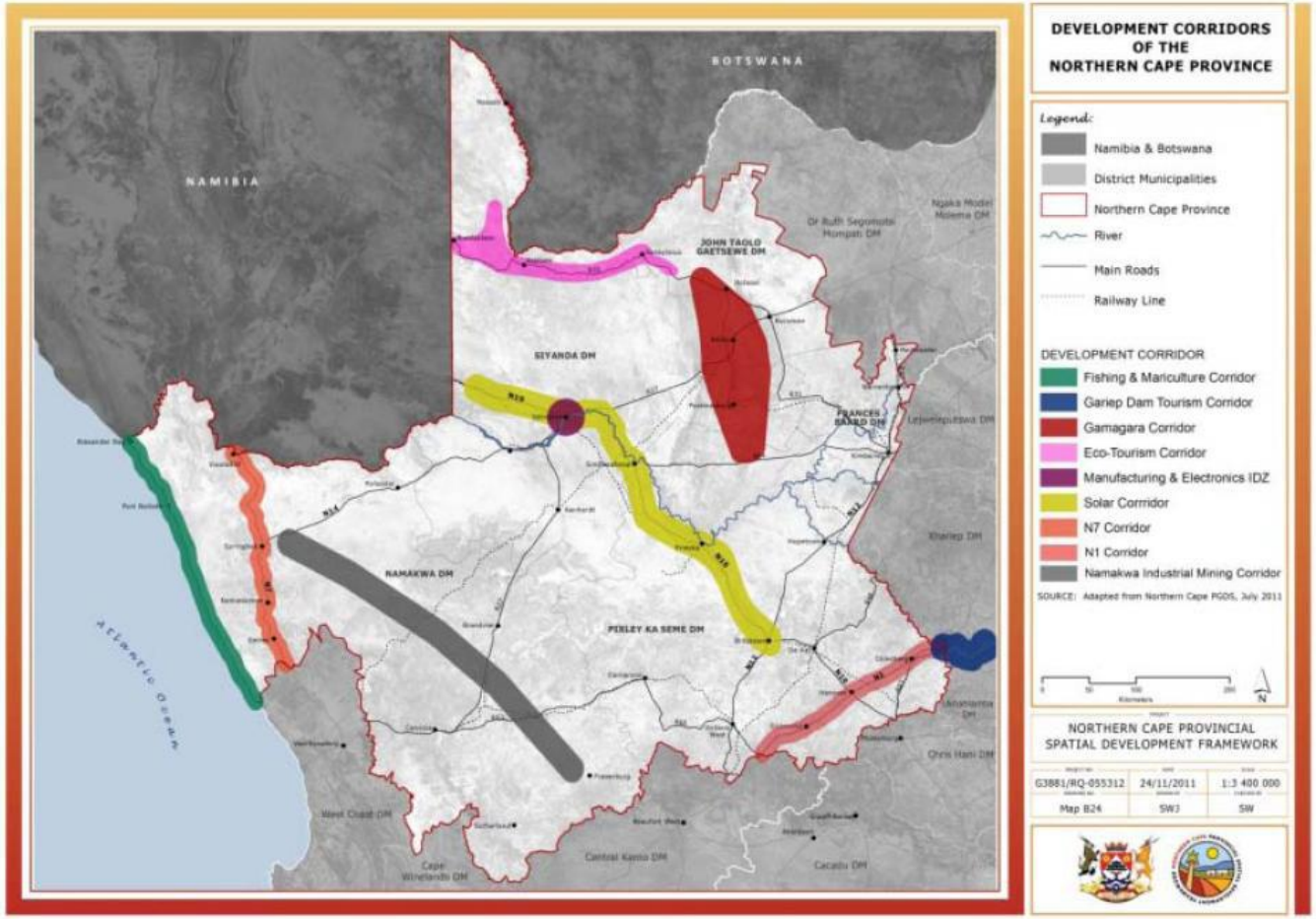
Figure 20. Spatial Planning Categories and sub-categories to be applied in the Northern Cape.

Figure 21 provides development guidelines according to the SPC's (Table C1 of the SDF).

Table C1: Development guidelines in accordance with the SPCs.

SPC	TYPE OF DEVELOPMENT	CONDITION
A	No development allowed.	
B	a) Resort development. b) Infrastructure required for research.	a) To be changed to SPC D, depending on the proposed type of development. b) Must be undertaken in accordance with site-specific design and planning guidelines (refer to Chapter C6).
C	a) Agricultural development and infrastructure required for extensive and intensive agricultural land-uses. b) Resort development on game farms. c) Agricultural industry.	a) To be changed to SPC D, depending on the proposed type of development. b) Must be undertaken in accordance with site-specific design and planning guidelines.
D	All urban-related developments.	Must be undertaken in accordance with site-specific design and planning guidelines.
E	Full spectrum of industrial developments required by the economic sectors.	a) Must be undertaken in accordance with site-specific design and planning guidelines. b) All industrial activities must be regulated and managed in accordance with sustainability standards (e.g. ISO 14001).
F	All surface infrastructure and buildings that are required for sustainable socio-economic development and resource use.	a) Must be undertaken in accordance with site-specific design and planning guidelines. b) All industrial activities must be regulated and managed in accordance with sustainability standards (e.g. ISO 14001).

Figure 21. Development guidelines according to the SPC's.



Map B24: Development regions and corridors of the Northern Cape (Source: PGDS, July 2011).

Figure 22. Development regions and corridors of the Northern Cape.

Figure 22 indicates the identified solar corridor which runs from Upington extending from Kakamas in the North to De Aar in the East. The project area lies south-west of the solar corridor between De Aar & Hanover.

Table 12 is extracted from Table 2 of the SDF and provides a summary of the strategic focal points and priorities that were identified in the Northern Cape SDF whereby these strategies also form part of the strategic directives in the Pixley Ka Seme SDF.

Table 12: Relevant summary of Table 19 of the IDP identifying strategic focal points of the province with which the municipality is aligning.

Northern Cape SDF Directives	**Description**	**Pixley Ka Seme**
Vision of Sustainable Society	Meeting the fundamental needs of people by effectively managing the limited ecological resources for future generations. Advancing efficient and effective integrated planning through national, regional and global collaboration.	Support sustainable development through a proactive strategy.
Support Bioregional planning	Provide a coherent and place-specific methodology for planning and management of the Northern Cape as a district and unique place and to facilitate its management in accordance with local and global best-practice.	Identify unique place specific elements.
Support and focus along Development corridors	Focus development and investment along identified development corridors that highlight the various existing unique characteristics in the regions. Corridors include: □ Solar Corridor. □ N1 Corridor. □ N12 Corridor. □ N10 Corridor. □ Industrial development	Include the development corridors in the Pixley SDF with development to focus around these identified corridors.

	along N1.	
Spatial planning according to Biosphere reserve zones	Implements spatial planning categories (SPC's) according to the biosphere areas	Identify different SPC's within Pixley Ka Seme.
Effective management of the natural environment	Identify and manage the natural environment according to the identified Spatial Planning Categories including: Core areas; Buffer areas, Agricultural areas, Urban areas, Industrial areas Surface infrastructure.	Each Municipal SDF to incorporate the Spatial Planning Categories (SPC's) within their local municipal areas.
Support a Rule-based decision making process	Decisions for development should be based on a thorough understanding of the environment and its process and functions. The desirability and scale of a development must be based on site specific environmental criteria, the broader environmental context and the potential cumulative impact of development as well as innovative town planning and urban design criteria.	Ensure that the development scale and design are determined by the carrying capacity of the environment.
Support a strategic approach to investment	New infrastructure should be prioritised in settlements with high economic growth potential. Fixed investment should be directed towards urban settlements with a high economic growth potential in the first instance and high human needs in the second instance.	Pixley Ka Seme towns with a high development potential: □ De Aar □ Colesberg □ Hanover □ Hopetown □ Orania □ Noupoort.
Support the development of efficient surface infrastructure.	Surface infrastructure including transport, water, energy, telecommunication	Identify priority infrastructure investment within the district.

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	and household services.	
Enabling the sustainable use of resources.	Ensure that use of resources unlocks meaningful and lasting benefits for the local people and the environment.	Pixley to take the sustainable development initiative approach.
Planning for responsible	Support tourism as an engine of	Identify tourism routes and

Section 3.2.1 of the SDF addresses climate change and what the municipality needs to do and adapt to, to ensure climate protection. These measures will not guarantee absolute protection, but will make damage controllable and provide a means of coping with climate related surprises.

It is predicted that the Karoo could experience more drought periods, coupled with increased evaporation and temperatures and this will negatively impact already restricted water supply. Regional predictions suggest a drying trend from west to east, a shift to more irregular rainfall of possibly greater intensity, and rising temperatures everywhere. It is likely that the greatest impacts will be on water supply (Midgley *et al*. 2005).

This highlights the importance of protecting water resources from over-abstraction, degradation and the spread of invasive alien plants (which uses more water than indigenous plants).

The increase in temperatures anticipated with climate change may result in increased fire frequencies.

One of the most effective ways to mitigate the impacts of climate change, at the local level, is to safeguard the Biodiversity of areas. Crucial management actions for the Municipal areas include:

- maintaining intact riparian (river bank) vegetation;
- restricting building to above the 1:100 year flood line;
- protecting major landscape corridors with biodiversity compatible land-uses;
- protecting water resources;
- appropriate fire management;
- removal of alien invasive plants; and
- restoring and maintaining biodiversity for carbon storage.

To ensure resilience against the impacts of climate change, landscape corridors need to be kept intact to function as large-scale ecological process areas. These corridors enable the

migration of plants, animals and birds, and thereby enhance their ability to persist despite changing climatic conditions.

Key Issues:

- Ridges and "koppies" are assets within the region and they must be handled with sensitivity;
- Visual vistas are another asset to be addressed;
- Fauna and flora forms complete the topography picture and must be handled with care;
- Rivers and river basins as lifelines to an arid region like Pixley have to be handled very great sensitivity.

Section 3.4.1 of the SDF deals with Water Resources and Groundwater Capacity which is an important facet of the project, as all water for the landowner and the solar project depend on groundwater resources in a highly water constrained environment.

Ground water and the sustainable capacity of good quality ground water in the area therefore play a very important part in the development of the region.

Aspects related to sanitation, waste disposal or other sources that may cause pollution and that should be taken into account when planning, developing or managing activities are:

- Rock type or geology, which plays an important role in the feasibility and design of specific sanitation systems for specific settlements that indirectly affects the costs of sanitation systems and if ignored, can affect the health and lifestyle of a community;
- Shallow rock or deep soils occurring within the confines of a development;
- Sandy or clayey soils resulting in excavations collapsing or remaining open and unstable;
- The soils and rocks are permeable and absorb water or are impervious so that no water penetrates them;
- A temporary or permanent shallow ground water table exists which serves as water supply for the population and may be easily polluted;
- Rock formations where the development is located contain zones of groundwater storage, which are of regional, national or local importance (aquifers). If the water in them is polluted and becomes unusable or requires treatment before it can be used it may result in acute water shortages and hold high cost implications;
- No development upstream of a water source should be planned without professional advice regarding the potential impact on the resource;
- National environmental legislation prescribes buffer zones close to any water source to be kept open as well as impact assessment procedures to be followed should development take place close to water sources.

The analysis did not identify any significant wetlands in the district. It is however known that many of the non-perennial tributaries and river beds function as wetlands and riparian zones, providing an important habitat in this mostly arid region.

The protection and maintenance of the water quality of the various water resources is of the utmost importance for future sustainable development in the region. The recycling of water as an additional source of water should be considered in areas with a Waste Water Treatment Plant and the installation of smaller recycling plants should be investigated and promoted as part of new developments to assist in water recycling.

Key Issues:

- Water is a scares resource in the largest part of the region and has to be managed accordingly;
- Most of the towns in the region depend on ground water as their only source of water for household and agricultural uses;
- Protect ground water sources from pollution and over extraction;
- Limited water resources limit potential industrial development in the region;
- Effective management of all water resources;
- Maintain the necessary buffers along rivers to limit the potential impact of urban and rural development on the water resources;
- Consider the recycling of waste water.

A Renewable Energy Hub is being proposed for the Northern Cape as per Figure 23, stretching from the west coast right up to the De Aar region. This Hub can accommodate special economic development within the zone as earmarked and entails a 100km wide zone. The levels of solar irradiation (Figure 24) naturally leads to the high density of solar PV projects indicated in the broader project area (Figure25).

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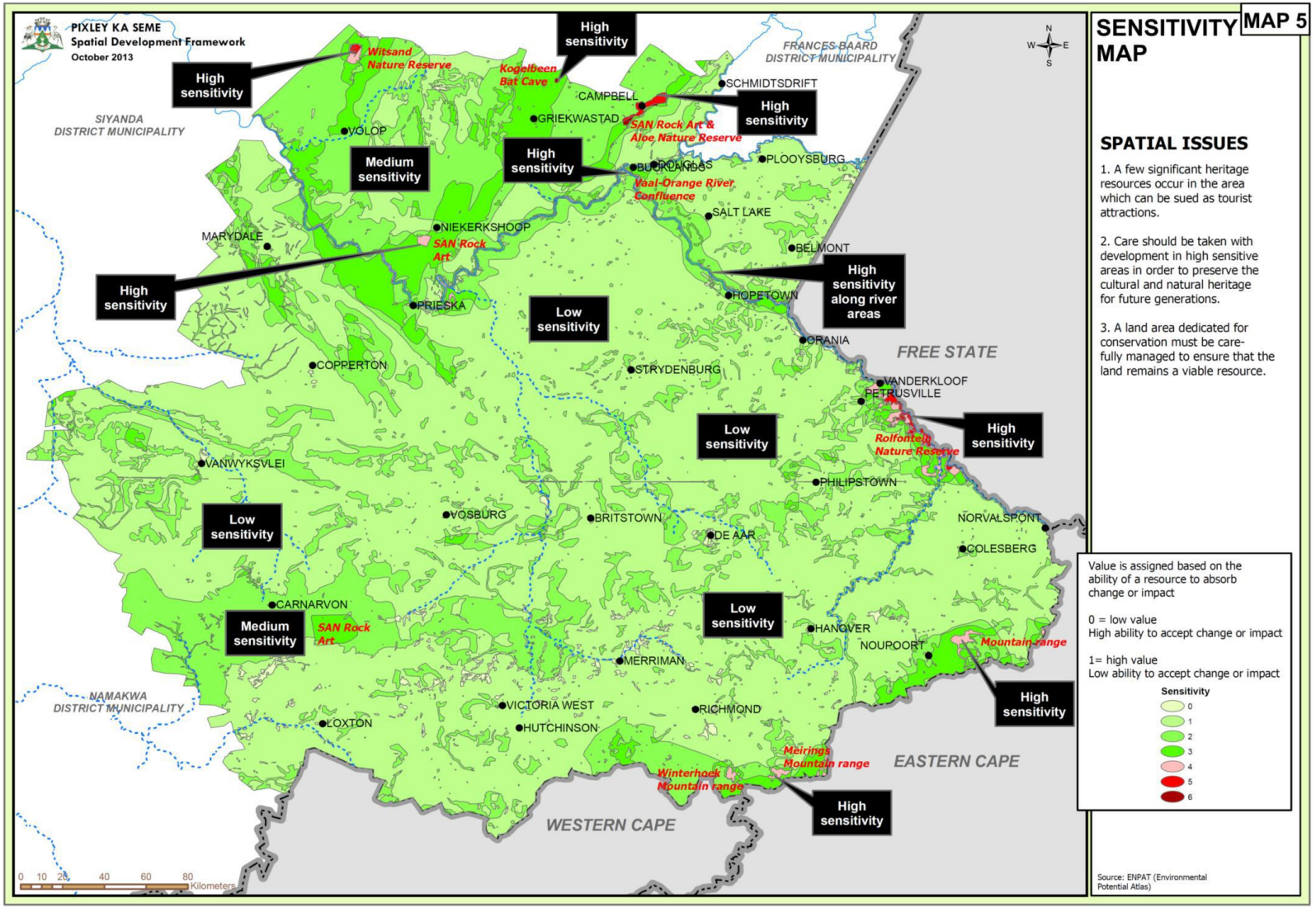

Figure 23. Sensitivity map of the Northern Cape, indicating the broad project area (between De Aar & Hanover having "low" sensitivity.

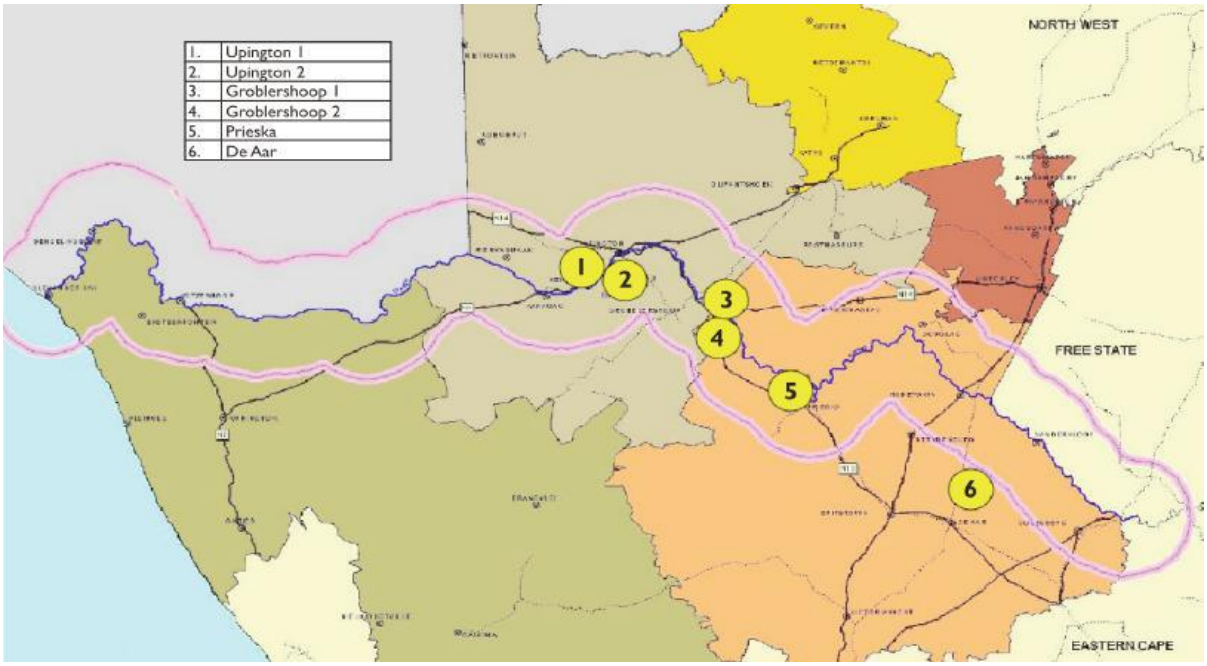

Figure 24. Renewable Energy Hub for Northern Cape. The project falls slightly south of the delineated 100km wide zone.

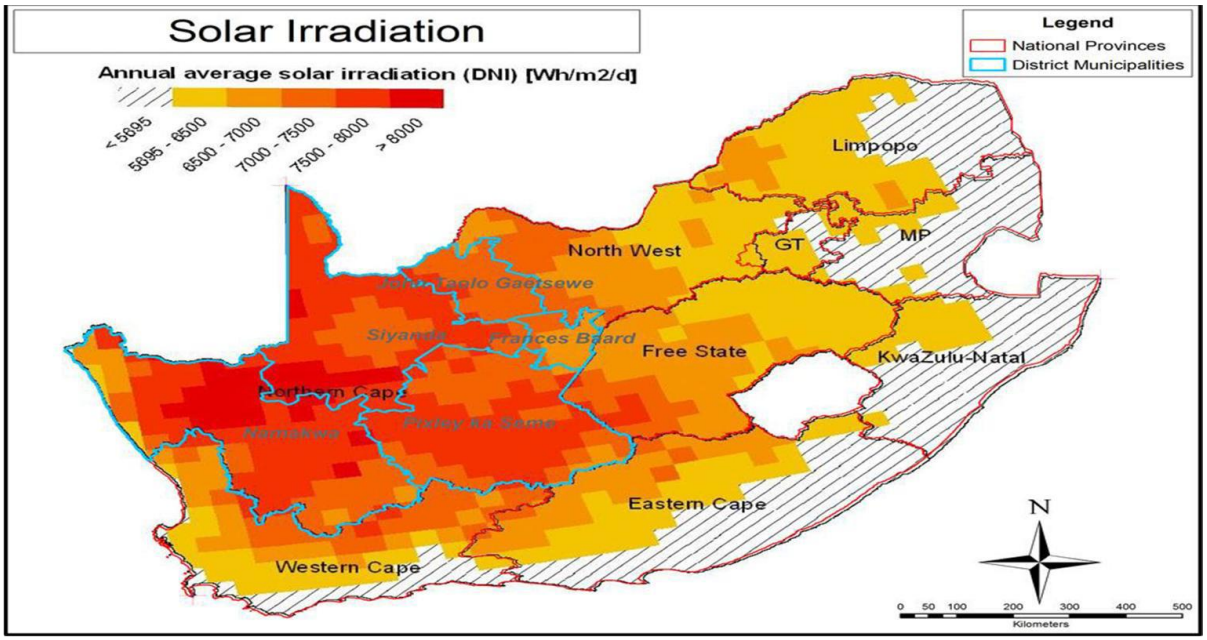

Figure 25. High solar irradiation levels indicated for the project area.

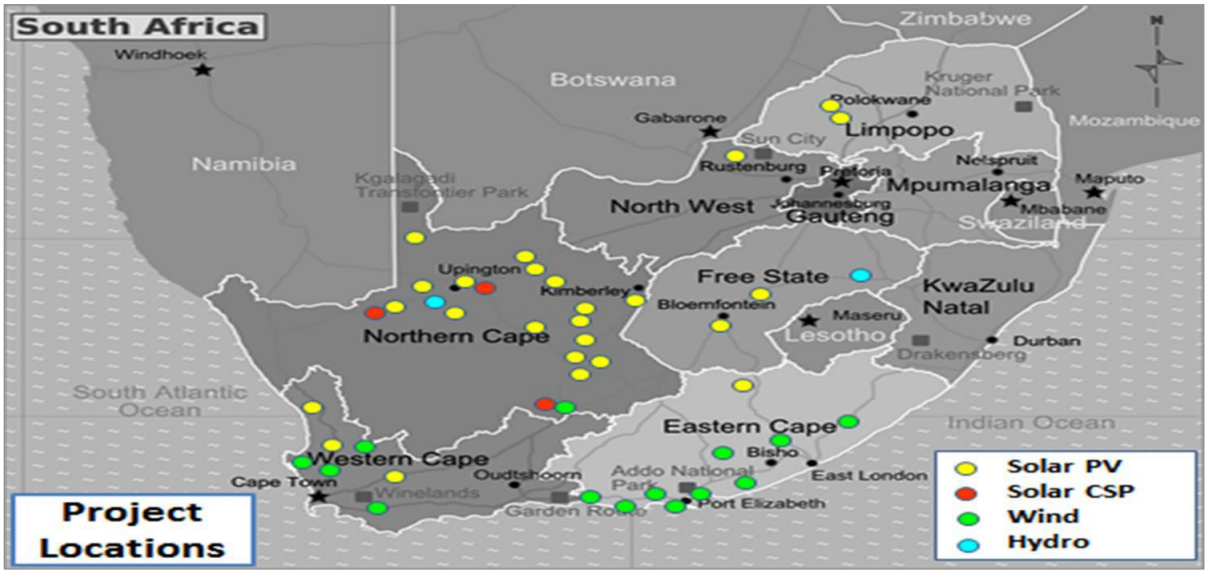

Figure 26. High numbers of solar PV projects operating in the broader project area.

Relevance to the Project: The project aligns with many aspects of the SDF in terms of spatial planning objectives, even though project site may not fall strictly within the identified solar PV corridor, it still contributes to the increased renewable energy objective for the municipal area and province, while maintain the agricultural potential of the affected landowner, mitigating climate change and not contributing to unsustainable land and water use practices.

<u>District Renewable Energy Hub (Draft Concept Document)</u>

The District Renewable Energy Hub Draft Conceptual Document (26 February 2010) drafted by the Local Economic Development Division of the Pixley ka Seme District Municipality has proposed the development of a Renewable Energy Hub along the N10 corridor and around the town of De Aar. The draft concept document outlines the proposed strategy, which is in line with both the National and Provincial policy with respect to renewable energy generation.

The Renewable Energy Hub is seen as a critical component to the revitalisation of both the broader District and the town of De Aar. The district is well positioned for renewable energy development (including solar, wind, biomass and hydro-electric) due to the ample availability of suitable land, the existence of adequate existing infrastructure.

It is envisaged that the Hub will:

- attract both local and foreign investors and research institutions;
- alleviate the increasing demand on electricity nationally;
- reduce South Africa's dependence on fossil fuel;
- create employment and downstream business opportunities for local entrepreneurs; and

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- utilise the high insolation rates and steady winds.

Relevance to the Project: The concept of the Renewable Energy Hub would require projects such as this proposed Solar PV plant located in the Hub to be developed and help reduce South Africa's reliance on fossil fuels.

Emthanjeni Local Municipality IDP (2021/2022)

The latest IDP represents a summary of the last review of Emthanjeni Municipality's IDP for the current five-year local government planning and implementation time frame, i.e. 2017 2022 and considers the 2021/2022 budget cycle.

Section 2.4.1 of the IDP states that *Emthanjeni has investment in the form of Renewable energy projects, Manufacturing projects and Warehouses Hub and is a potential industrial growth point with ample industrial sites, reasonable prices and tariffs, affordable labour and the necessary infrastructure.*

The Emthanjeni area is increasingly becoming the centre for supplying the whole country with the famous "Karoo" mutton with its unique flavour and quality. Emthanjeni has one big abattoir in De Aar: one solely for sheep with a capacity of 1000 carcasses per day, supplying meat to the other provinces and whole country, in addition to beef, supplies meat far beyond our region. Hanover is also well endowed with qualified construction industry artisans. Like the other towns in this region, wool is exported to Port Elizabeth without being processed. It is noted with great concern the opportunities for local people in relation to the second economy not being optimised, and the role the municipality needs to play to empower SMME's and co operatives. This should enable the second economy initiatives to become active contributors to the economy of Emthanjeni as well as the entire district. Agriculture forms the backbone of Emthanjeni economy and accounts for the largest labour/ employment contributor to date. The Municipality is convinced that the Renewable Energy projects, New District Hospital and possibility of new Warehouse Hub and Manufacturing project for further development planned for the area would grow the economy enormously.

The Emthanjeni Municipal Council has approved its sustainable Local Economic Development (LED) Strategy which must be aligned with the Spatial Development Framework and Provincial Growth and Development Strategy. The aim of Local Economic Development is to create employment opportunities for local residents, alleviate poverty, and redistribute resources and opportunities to the benefit of all local residents.

Relevance to the Project: Development of renewable energy project within the Local Municipality (LM) is seen as a key deliverable to the economic growth of the area. Development of renewable energy should not come at the expense of agriculture, and ensuring dual land-use systems, will ensure continued benefits to both sectors, rather than

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one prospering at the expense of the other. Accordingly, the proposed solar PV project is going to a lot of effort to ensure an optimised model for both sectors. Short, medium & long-term employment, coupled with skills development opportunities, will be provided by the project.

Electronic Communications Act (Act 36 of 2005)

Section 29 of the Act requires that any construction of inter alia power generation facilities must conform to the requirements of an electronics communication service licensee for the prevention of damage to any of its electronic communications network and facilities, including providing prior written notice of intention to commence with the activity. The notification must include a plan of the proposed works, manner and position of the intended works and any other information requested.

Relevance to the Project: There are no known electronic communications service providers with infrastructure on any of the affected properties, but all major service providers including Sentech will be notified of the project.

Sustainable Development Goals, 2030

All 189 Members States of the United Nations, including South Africa, adopted the United Nations Millennium Declaration in September 2000 (UN, 2000). The commitments made by the Millennium Declaration are known as the Millennium Development Goals (MDGs), and 2015 was targeted as the year to achieve these goals. The United Nations Open Working Group of the General Assembly identified seventeen sustainable development goals, built on the foundation of the MDGs as the next global development target (UN, 2014). The sustainable development goals include aspects such as ending poverty, addressing food security, promoting health, wellbeing and education, gender equality, water and sanitation, economic growth and employment creation, sustainable infrastructure, reducing inequality, creating sustainable cities and human settlements, and addressing challenges in the physical environment such as climate change and environmental resources (UN, 2014). These aspects are included in the NPD, and it can therefore be assumed that South Africa's development path is aligned with the international development agenda.

Relevance to the Project: Soventix can assist with contributing to achieving goals such as economic growth and employment creation, sustainable infrastructure and promoting health, wellbeing and education through their enterprise development and socio-economic development programmes.

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SECTION F: MOTIVATION FOR THE NEED AND DESIRABILITY FOR THE PROPOSED ACTIVITY

A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;

Legislative Background and Strategic Context

National Environmental Management Principles of NEMA, 1998, which guide the interpretation, administration and implementation of NEMA, 1998 (and the EIA Regulations, 2014) specifically *inter alia* require that environmental management must place people and their needs at the forefront of its concern (Section 2(2)). The latter refers to the broader societal / community needs and interests, and is put into effect through the EIA Regulations, 2014, which require environmental impact assessments to specifically consider 'need and desirability' in order to ensure that the 'best practicable environmental option' is pursued and that development more equitably serves broader societal needs now and in the future. Furthermore, it ensures that the proposed actions of individuals are measured against the long-term public interest.

What is needed and desired for a specific area must be strategically and democratically determined (DEA&DP (2010) Guideline on Need and Desirability). The strategic context for informing need and desirability is best addressed and determined during the formulation of the sustainable development vision, goals and objectives of Integrated Development Plans ('IDPs') and Spatial Development Frameworks ('SDFs') during which collaborative and participative processes play an integral part, and are given effect to, in the democratic processes at local government level (DEA&DP (2010) Guideline on Need and Desirability). The need and desirability must therefore be measured against the contents of the credible IDP, SDF and EMF for the area, and the sustainable development vision, goals and objectives formulated in, and the desired spatial form and pattern of land use reflected in, the area's IDP and SDF (DEA&DP (2010) Guideline on Need and Desirability). Integrated Development Planning (and the SDF process) effectively maps the desired route and destination, whilst the project-level EIA decision-making finds the alternative that will achieve the desired goal (DEA&DP (2010) Guideline on Need and Desirability). However, inadequate planning or the absence of a credible IDP and SDF means that the EIA has to address the broader need and desirability considerations. Consequently, 'need and desirability' is determined by considering the broader community's needs and interests as reflected in a credible IDP, SDF and EMF for the area, and as determined in the EIA decision-making process.

Furthermore, the Constitution calls for *justifiable* economic development. The specific needs of the broader community must therefore be considered together with the opportunity costs

and distributional consequences in order to determine whether or not the development is 'justified'.

The general meaning of need and desirability refers to time and place, respectively, i.e. is this the right time and is it the right place for locating the proposed activity. The need and desirability of this application was addressed separately and in detail by answering *inter alia* the following questions:

1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?

Due mainly to the prevailing unfavorable climatic conditions for arable agriculture, as well as the prevalence of soils with limited depth, the farm does not have a high agricultural potential. Furthermore, the proposed project plans to integrate with the current small livestock and game farming practices, increasing the profitability and optimising the opportunity costs of the property. While the solar PV farm will result in environmental impacts through disturbance to amongst others, in situ vegetation, in the medium to long-term, it is possible that due to the creation of microclimates created beneath the solar panel arrays, a higher net primary production may result, effectively increasing the grazing capacity of the land. This aspect will be quantitatively monitored through periodic Veld Condition Assessments.

1.1. How were the following ecological integrity considerations taken into account?

1.1.1. Threatened Ecosystems

The Phase 2 footprint does not occur within a National Threatened Ecosystem. The potential impacts and quantification of cumulative impacts were assessed by the following appointed specialists in relation to threatened ecosystems:

- Terrestrial Biodiversity Assessment, specifically the impacts on the existing wetlands condition and associated fauna and flora,
- Agricultural Impact Assessment - Grazing capacity determination and soil mapping,
- Wetland Assessment; and
- Bat (Chiropteran) Study.

1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure

The Brak River, to the South-East of the Phase 2 footprint, as a Critical Biodiversity Area, various drainage lines, and dolerite dykes, are the most sensitive environments in the area, all of which have largely been removed from the project footprint. An impact assessment that shows how all identified impacts can be effectively mitigated, indicating how the cumulative

impact effect will also be mitigated was undertaken. Additional impacts and quantification of cumulative impacts was also be assessed by the following appointed specialists:

- Terrestrial Biodiversity Assessment, specifically the impacts on the existing wetlands condition and associated fauna and flora,
- Grazing capacity determination and soil mapping,
- Wetland Assessment,
- Hydrological Assessment,
- Aquatic Biodiversity Assessment,
- Bat Study; and
- Hydrology.

1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs")

The proposed Phase 2 development footprint is outside of any CBA but does occur within an ESA (Figure 27).

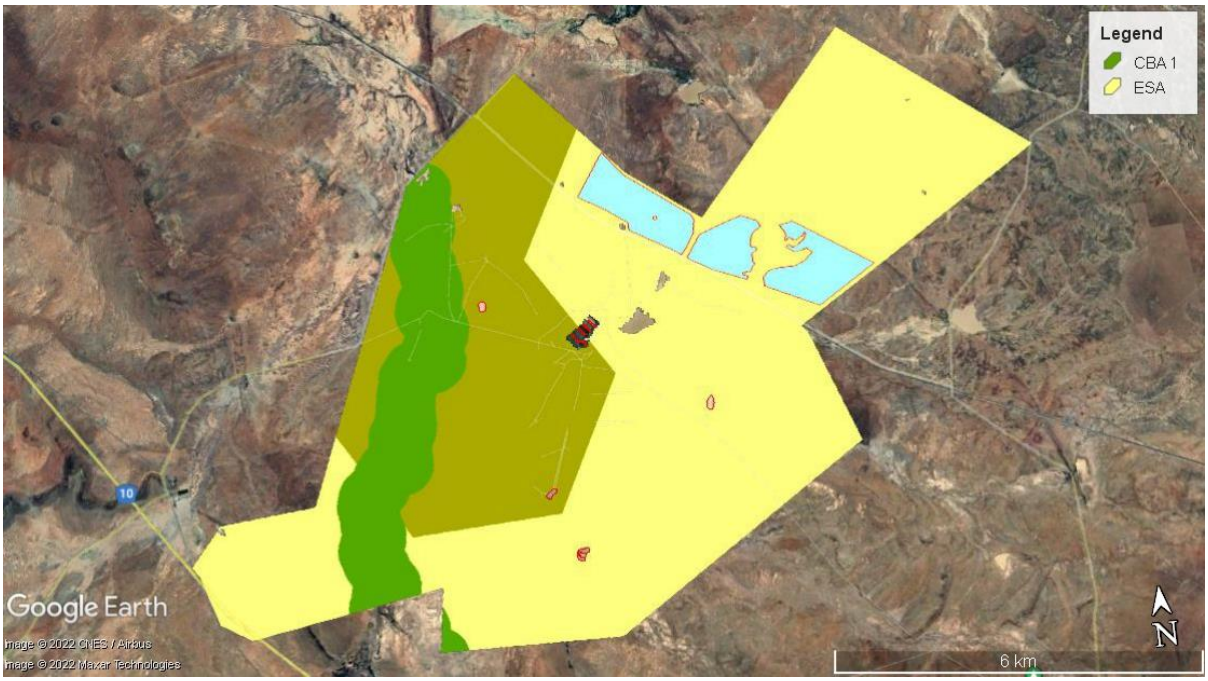

Figure 27. Phase 2 footprint (blue polygons) relative to Critical Biodiversity Areas 1 & 2 (CBA – green areas) and Ecological Support Area (ESA – yellow area).

1.1.4. Conservation targets

The project area falls within the Northern Upper Karoo (Mucina & Rutherford, 2006) which is classified "Least Concern". The conservation target is 21% with no areas conserved in statutory conservation areas. The project has been designed in order to reduce ecological impacts, especially vegetation clearance, including operational veld condition assessments to inform stocking densities of sheep within the fenced solar PV footprints.

The potential impacts and quantification of conservation targets have been assessed by the following appointed specialists:

- Terrestrial Biodiversity Assessment, specifically the impacts on the existing wetlands condition and associated fauna and flora,
- Grazing capacity determination and soil mapping,
- Wetland Assessment,
- Hydrological Assessment,
- Aquatic Biodiversity Assessment; and
- Bat Study.

1.1.5. Ecological drivers of the ecosystem

A terrestrial & aquatic biodiversity assessment was undertaken. The specialist reports identified important ecological drivers which must be protected to ensure ongoing function of the ecosystem. The abundance of fauna and flora species of conservation concern within the final development areas is low and impacts would be of a local nature only. Development of the road and associated infrastructure in these lower sensitivity areas would generate low impacts which are considered acceptable. The impact of the proposed access roads and associated infrastructure will be largely on degraded dwarf shrubveld along the road edges with very little connectivity to the larger area (AGES, 2023).

1.1.6. Environmental Management Framework

The Environmental Management Framework for the Pixley region provides the guidelines for development in these areas with these guidelines to be included in the rural guidelines for the Pixley Ka Seme District SDF. The veld types and vegetation in the Pixley Ka Seme District are most suitable for livestock and game farming. The vegetation types in the District are generally poorly conserved, except for the areas immediately around the Vanderkloof Dam. It is important that appropriate stocking densities be maintained to allow for sustainable use of the areas (SDF, 2012-2018).

Issues:

- Hardy vegetation types that are sensitive to poor management practices,
- Natural vegetation in the area is slow to rehabilitate once it has suffered degradation; and
- Adopt the appropriate management practices to allow for sustainable use of the natural areas for farming.

1.1.7. Spatial Development Framework

a. Geology

The geology in the Pixley Ka Seme District Municipal area is dominated by horizons of dolerite rocks. Dolerite covers approximately 36% of the area, followed by Tillite (12%) and the rock types Sand, Andesite, and Quartzite covering between 7% and 5% of the area. The remainder of the rock types cover less than 4%. (Pixley Ka Seme District SDF 2007). The geology and soil types have been delineated across the project footprint and development constrained to suitable soil types only from a technical and ecological perspective.

Key Issues:

- Although the soil potential is generally high in some areas, when considered together with the climate the land capability in the region is generally poor.
- Due to the poor land capability in the largest part of the region the land is prone to erosion and degradation if not properly managed in accordance with its capacity. The environment also rehabilitates very slowly once degraded.
- Veld management and land use policies for the rural areas are therefore crucial and must include the education of small and upcoming farmers.
- All soil types should be considered during the planning process.

Figure 28 provides a map of the geology of the province with the broader project area characterized by mudstone interspersed with dolerite dykes & sills.

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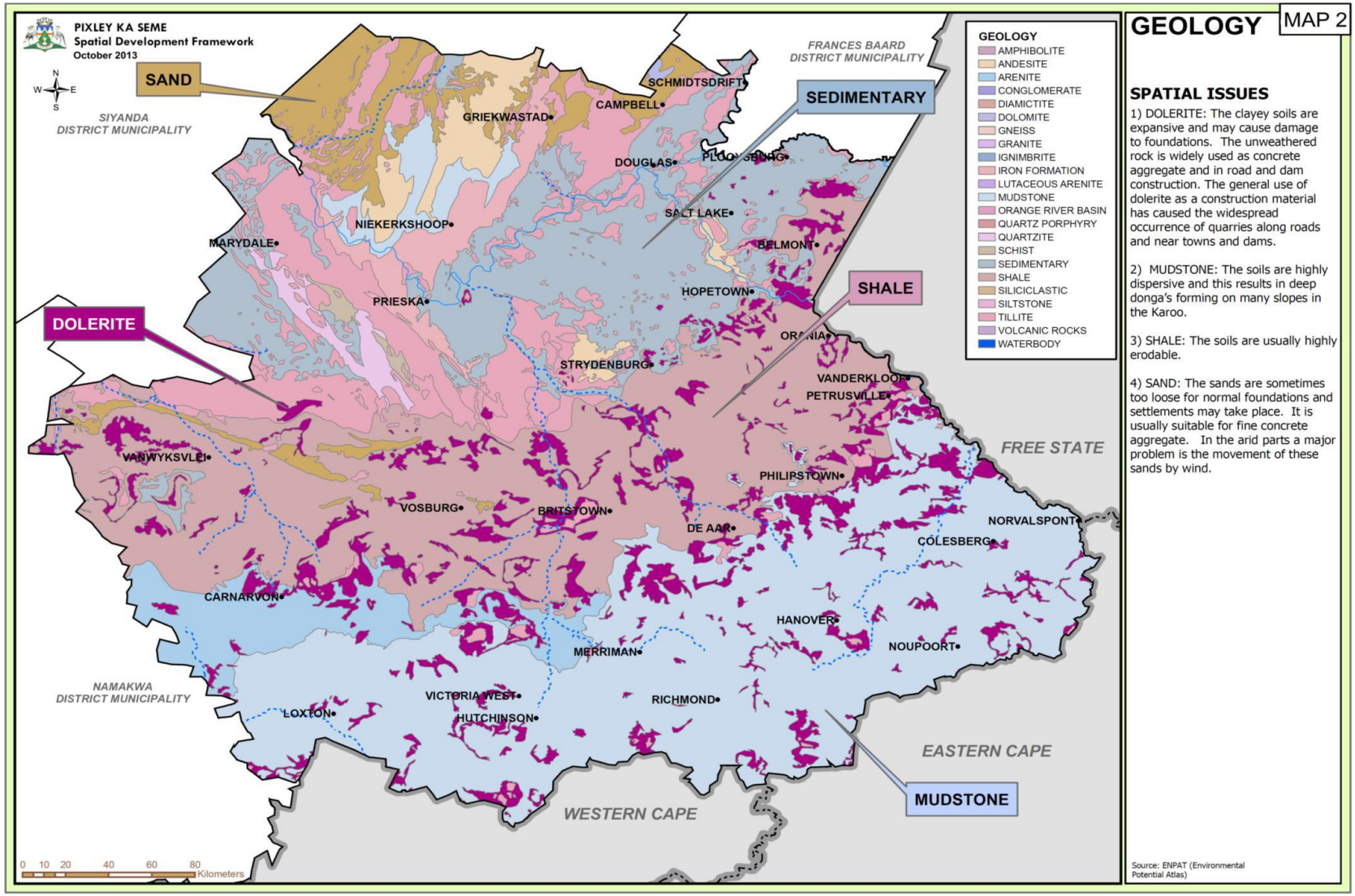

Figure 28. Geology map of the province.

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b. Climate

The Pixley Ka Seme District lies in the upper regions of the Karoo and experiences moderate to hot summers and cold dry winters. Being a very hot area the average annual maximum temperature is around 40°C, while the average annual minimum temperature is -10°C. The winters are cold and dry with moderate frost occurring during the night. The coldest months are during June and July.

The area is located in a summer rainfall region with very little rainfall. This region is very dry and most of the region receives less than 300mm of rain per annum with the areas in the east receiving generally more rain than the dryer areas in the west. Rain occurs predominantly in the form of summer thunderstorms and 60% of the average annual rainfall occurs between October and April. The mean annual rainfall ranges from 130mm - 300mm per year. Average annual evaporation ranges between 1600mm in the east and 2400mm in the west. The Pixley Ka Seme District is situated in part of the Orange and the Gamtoos River catchment areas. The Orange and Vaal Rivers are the two perennial rivers in the region.

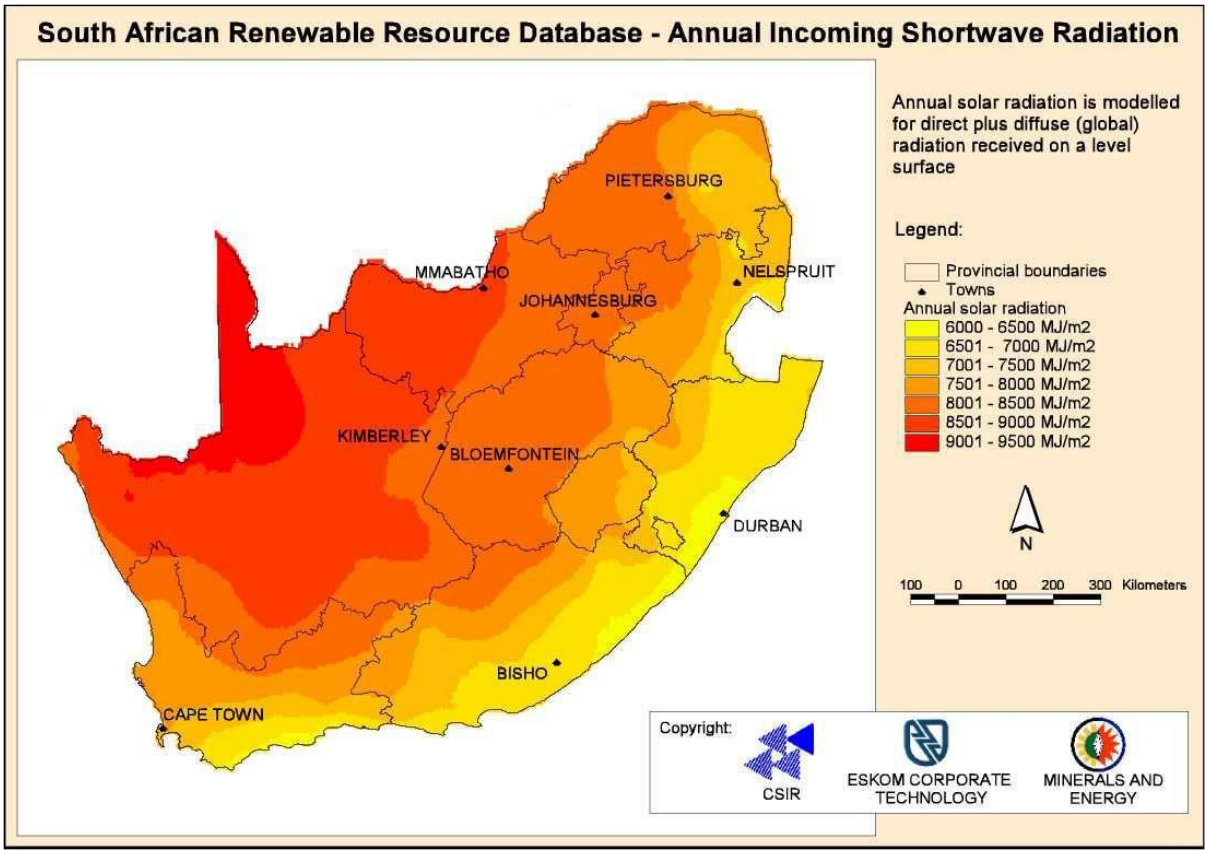

Figure 29. Solar index of South Africa.

The Pixley Ka Seme District area with its abundance of sunshine and vast tracts of available land has been attracting considerable interest from solar energy investors of late. The high

solar index of the area, as indicated by the Solar Index Diagram, provides many opportunities in terms of the development of renewable energy.

This was also acknowledged by the Northern Cape Government with the identification of the Renewable Energy Hub. The areas around the northern and eastern borders of the Pixley Ka Seme District Municipality, with a distance of 50 kilometres from the Orange River, forms part of this hub with the potential to stimulate special economic development zoned within the area that have the potential to stimulate industrial development.

The district is known for severe droughts and often experiences heavy rainfalls which leads to flooding and erosion. Due to the dry climate the area also experiences a lot of dust pollution that can be exacerbated by overgrazing and poor farming management systems.
The solar index for the area has been a key component in its selection for solar PV development (Figure 29).

1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)

The following narrative provides some historical context to the development of our current climate change framework and the contribution the proposed project can contribute to national and international objectives.

The 1985 Vienna Convention for the Protection of the Ozone Layer was initiated by the United Nations Environment Programme (UNEP) in response to scientific evidence that ozone depletion required international regulation. It is a framework convention, meaning that it spells out obligations in general terms leaving it for later negotiations to detail more precise obligations. Under this convention countries agree in general terms to reduce their respective outputs of ozone-depleting substances. This occurred subsequently with the adoption of the Montreal Protocol. South Africa ratified the Vienna Convention in January 1995.

The 1987 Montreal Protocol elaborates on the Vienna Convention by laying down specific control measures as well as a timetable for the reduction of ozone-depleting substances. Its three central features are:

1. The precautionary principle,
2. Co-operation between scientists and policy-makers; and
3. An agreement concerning the use of trade measures as incentives which bans trade of ozone-depleting substances between certain groups of countries.

It also establishes the Multilateral Fund to allow for the transfer of technology and funds from developed to developing countries. South Africa adopted the Montreal Protocol in 1990 as a developed country and has since phased out all agreed ozone-depleting substances. Later

South Africa was reclassified as a developing country giving it more flexibility regarding its ozone emissions.

The 1992 United Nations Framework Convention on Climate Change (FCCC) like the Vienna Convention, is also a framework convention, which was adopted at the 1992 Rio Summit. South Africa signed the FCCC in 1993 and ratified it in August 1997. South Africa subsequently convened a National Committee on Climate Change (NCCC), an advisory body to the then Department of Environmental Affairs & Tourism (DEAT). Global Climate Change is a natural phenomenon but, increasing scientific opinion indicates that it is exacerbated by human activities. It has major implications globally and issues of particular concern to South Africa include:

- The effect of changing rainfall patterns on water resources, crop production and livestock,
- Possible increases in insect-bearing diseases such as malaria; and
- Forestry plantations.

Similarly, change in oceanic conditions may have significant implications for fisheries resources as well as biodiversity.

The stated purpose of the FCCC is to "*achieve……stabilization of greenhouse gas concentrations in the atmosphere at a concentration level that would prevent dangerous anthropogenic interference with the climate system*", and to thereby prevent human-induced climate change by reducing the production of greenhouse gases (Glazewski, 2005). Gases which contribute to the so-called "greenhouse effect" are known to include carbon dioxide (CO_2), methane, water vapour, nitrous oxide, chloroflourocarbons (CFCs), halons, and peroxyacetylnitrate (PAN). All of these gases are transparent to the short-wave radiation incident upon the earth's surface, but trap outwardly radiated long-wave radiation. It is predicted that this action will lead to a global warming of the earth's lower atmosphere with major changes in global and regional climates (Fuggle & Rabie, 1994).

The FCCC is supplemented by an important protocol negotiated at the third Conference of the Parties (COP3) in Kyoto, Japan in December 1997. At Kyoto parties to annexure 1 of the Climate Change Convention (developed countries) agreed to reduce their overall emissions of six greenhouse gases by at least 5 percent below 1990 levels between 2008 and 2012. Developing countries, including South Africa, do not have to make any comparable cuts unless they choose to. The Protocol was open for signature until March 1999 and came into force in February 2005 after receipt of 55 ratifications, representing 55 percent of the world's emissions. South Africa acceded to the Protocol in July 2002 and henceforth commenced formulating the White Paper on a National Strategy for Climate Change. At the first COP of the FCCC in Berlin in 1995, the Parties initiated a process to develop a more specific and binding agreement on the reduction of greenhouse gas emissions.

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The principles and objectives of the above conventions has been captured in National Environmental Management: Air Quality Act (Act 39 of 2004). The stated objective of the Act is to protect the environment by providing measures for the enhancing of air quality, the prevention of air pollution and ecological degradation (Glazewski, 2005).

The development of renewable energy, as a technology alternative to the use of Fossil Fuels (e.g. coal-fired power stations), will have a significant positive improvement to air quality and contribute to global climate change objectives. Energy activity plays a major role in the production of greenhouse gases. It has been reported that fossil fuel burning accounts for about 75 percent of anthropogenic CO_2 release and 65-75 percent of nitrous oxide. (Fuggle & Rabie, 1994).

1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

Site and footprint suitability included an initial spatial analysis using GIS and desk top studies, followed by ground truthing with a site visit to determine the sensitive receptors and local infrastructure. The site was selected on the basis of high irradiation levels, buy-in from the landowner and proximity to the Eskom power lines and local substations. The site & footprint alternatives taken into account the avoidance of sensitive receptors including critical biodiversity areas, sensitive terrestrial habitats, wetlands and flood plains, significant heritage sites, and areas deemed geotechnically unsuitable (e.g. dolerite rocky outcrops).

The Scoping & Environmental Impact Assessment identified the potential positive and negative environmental (biophysical and social) impacts associated with the proposed establishment of a Solar PV Plant and associated infrastructure. A number of issues for consideration were identified by the EAP and appointed Specialists during the scoping process.

An impact assessment was undertaken to quantify the potential impacts and risks associated with the proposed footprint and associated development activities, and by way of implementing the mitigation hierarchy, almost all identified impacts & risks can be effectively mitigated, including cumulative effects. Additional impacts and quantification of cumulative impacts were assessed by the following appointed specialists:

- Terrestrial Biodiversity Assessment, specifically the impacts on the existing wetlands condition and associated fauna and flora,
- Grazing capacity determination and soil mapping,
- Riparian & Wetland Delineation & Assessment,
- Hydrology & Geohydrology Assessment,

- Aquatic Biodiversity Assessment; and
- Bat Study.

1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

Low emissions are expected from this development, but several sources are inevitable:

1. On site sanitations solutions have been selected which treat wastewater to high standards. Much of this treated effluent will be combined with raw water and soil binders, for dust suppression purposes, only small portion will be released to soak away sites.
2. Environmentally friendly soil binders will be included in dust suppression efforts to avoid the contamination of any terrestrial or aquatic resources or effect the grazing resources of the landowner or adjacent landowners.
3. Effective dust suppression will be implemented to reduce dust emissions and entrainment onto surrounding vegetation. Dust covered vegetation reduces productivity of the plants and reduces acceptability to livestock and wildlife.
4. On-site concrete batching may be required due to the shortage of ready-mix suppliers in the area. Dust controls will need to be applied for particulate matter emanating from *inter alia* cement silos.

An Impact Assessment was undertaken to address and tackle risks & impacts, measures that were explored to avoid, reduce and/or remedy these impacts.

1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?

Construction waste, general waste and disposal of the PV panels is going to be generated by this development. Measures that were explored to minimize, reuse and/or recycle the waste will be discussed in the Draft Environmental Management Programme. Specific waste streams & measures for the project will include:

- Effluent (wastewater) will be generated via package waste water treatment works (WWTW) including the Biorock™ and NewGen Containerized WWTW and Conservancy Tank/s for the storage of contaminated water from washing brushes and other tools as well as the dirty water from washing ready mix concrete trucks and/or a batching plant. The contractor shall contain contaminated water from washing brushes and other tools as well as the dirty water (possibly hazardous) from washing

the ready-mix concrete trucks, in a conservancy tank until sufficient volume warrants disposal by a registered hazardous waste management company.

- The contractor shall return used oil to the supplier or an oil recycling company.
- The developer will be required to establish and implement an Integrated Waste Management Strategy including avoidance, reduction, re-using, recycling and disposal, i.e. the production of hazardous waste can be avoided by providing drip trays, reduce waste by using the correct quantities, re-use concrete rubble as back fill or recycle steel off-cuts and dispose of non-hazardous solid waste at a registered municipal dump site.
- Adequate training on waste management must be undertaken including induction all labourers on the waste management strategy and enforce it through regular (at least weekly) toolbox talks.
- The project will need to designate a temporary waste storage area, enclose it in a fence that cannot be breached by fauna, and provide sufficient scavenger proof dust bins with black bags inside the construction camp.
- The burning, burying or illegal dumping of waste is prohibited and must be disposed of at a licensed facility.
- Adequate waste receptacles must be available, including those that track with the active work fronts, to ensure effective waste management.
- The contractor must keep accurate records of waste generated by type.
- The municipality has identified waste packaging as a high risk waste item as it is commonly harvested from municipal landfill sites to be used for informal housing purposes. The contractor(s), sub-contractors and their employees are prohibited from taking any project-specific waste for personal use, including but not necessarily limited to, the packaging used for the solar panels.
- Damaged or end-of-life solar panels pose a potential waste management issue. Should the Electronic Waste Association of South African (e-WASA) establish a more stringent protocol regarding the recycling and handling of solar panels, the developer needs to comply.

1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

The Visual & Heritage Impact Assessment that was undertaken, will address how this development will disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage. A Cultural Heritage Management Plan will be compiled which will govern how each heritage site is managed.

1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

This development will have a positive impact on non-renewable natural resources, specifically coal, in the sense that it will use renewable energy, reducing dependency on coal. This is the measure that is being explored to ensure responsible and equitable use of the resources. This development will decrease the level or rate of non-renewable natural resources depletion, such as coal, because as time goes on, there will be a national increased dependency on renewable energy.

Soil is a non-renewable resource. Its preservation is essential for food security and our sustainable future. oil is a finite resource, meaning its loss and degradation is not recoverable within a human lifespan. As a core component of land resources, agricultural development and ecological sustainability, it is the basis for food, feed, fuel and fibre production and for many critical ecosystem services. It is therefore a highly valuable natural resource, yet it is often overlooked. Soils need to be recognized and valued for their productive capacities as well as their contribution to food security and the maintenance of key ecosystem services (fao.org/soils-2015). Vegetation clearance on the project footprint will be limited as far as possible to help ensure the stability of the soils on the project area. Three existing borrow pits exist on the affected properties and these will be utilized if material is required for road upgrades and improvements.

1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?

Groundwater will be utilized on the project during both construction and operational phases. A geohydrology assessment has been undertaken on the two existing boreholes within the project area. The assessment stipulates sustainable yields at which water can be abstracted, these rates are below each borehole's natural recharge, so as to ensure the stability of the aquifer/s.

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The agricultural production and products currently associated with the affected properties, most notably livestock, will be moderately impacted by the proposed development. The intention of the proposed project is to maintain the current agricultural activities within the solar PV footprints, within the assessed grazing capacities. Operational grazing capacities will be undertaken periodically to ensure sustainable agricultural practices. The integration of renewable energy generation with livestock production helps maximise compatible land use practices.

Protection of plants of conservation concern, will include full terrestrial biodiversity assessments, to identify species presence and broad location, coupled with pre-construction search & rescue efforts, to translocate affected species outside the areas of impact.

1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)

Electricity for the construction camp as well as the Operations & Maintenance office will be obtained from Eskom via the existing supply to the landowner. The proposed project would strengthen the local electricity grid for the area and thus improve the available electrical services. In terms of water requirements, the proposed project will utilise groundwater from existing boreholes within the determined sustainable yield. All non-recyclable waste would be disposed of at the De Aar licensed landfill site. Installation of Bio-rock (Monorock & Multirock) and NewGen package plants to treat effluent to general limits will be used to treat sewage and wastewater from the office buildings, no there will be no need for the provision of any bulk services to the site. Utilisation of treated effluent combined with additional soil binders will reduce dependency on raw water supply for dust suppression.

1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources for this the proposed development alternative?)

The proposed project will be undertaken and implemented in conjunction with the pre-existing land use practices, the opportunity costs associated with the combined land uses are greatly improved. The potential impacts associated with the proposed project are nonetheless to be assessed by appointed specialists that will concentrate on appropriate environmental aspects related to the proposed activity. These will be on a bio-physical and socio-economic level to determine whether or not replacing the current land use or next best alternative will create an unacceptable loss in opportunity costs. The project design alternatives will be

selected in order to reduce any impact on the current land use of grazing including Solar PV arrays position allowing for livestock grazing to continue beneath. The project is predicated to provide a positive impact on the local area including electricity from a non-polluting renewable energy source, benefits to job creation and skills development. It is therefore anticipated that there will not be any unacceptable opportunity costs.

South Africa experiences some of the highest levels of solar radiation in the world and this renewable resource holds great potential for the country. The total area of high radiation in South Africa amounts to approximately 194 000 km^2, including the Northern Cape, which is one of the best solar resource areas in the world. Solar energy has the potential to contribute quite substantially to South Africa's future energy needs. This would, however, require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres. (Page 53 GG # 40445 - 25 November 2016).

1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?

The location factors are favourable for the development of a Solar PV plant including high and good quality solar irradiation, flat and gentle slopes and close proximity to existing Eskom infrastructure including powerlines to feed into the grid and the N10 for transport links.

Once the plant is operational, very few resources are required, as the dominant factor in the efficient operation of the plant is good solar irradiation. In South Africa's growing RE footprint, The Northern Cape, offers the most favourable solar radiation levels, has attracted the majority of the Solar PV projects and all of the CSP projects. The province, host to 48 of the 92 IPP projects in the country, is expected to contribute 3,566MW to the total procured RE capacity once construction is complete (Page 96 of the State of Renewable Energy in SA, 2015).

1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?

All specialist studies were undertaken in accordance with the generated screening report for the site and development footprint. Additional specialist studies were also undertaken based on experience from the Phase 1 environmental authorization application and comments received from competent and commenting authorities. These studies have assessed impacts and provided mitigations to these impacts and help determine the footprint with the least impact to the environment.

1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?

Several gaps, uncertainties & assumptions were identified in the preliminary impact assessment process including:

- Protected plants identified in the Terrestrial Biodiversity Assessment, that need to be searched prior to commencement of construction, will be visible at the time. Furthermore, considering the exact positions of protected flora is not known, the successful identification and positioning of affected species and specimens will be dependent on the competence and thoroughness of the appointed botanist at the time of clearing & grubbing.
- Sand for road improvements will be sourced from on-site borrow pits which do not require licensing as per section 106 of the MPRDA.
- It is assumed that grazing of livestock within the developed footprint can be implemented effectively as a vegetation management tool.
- The developer has agreed to implement the proposed project in synergy with the current landuse practices and not at the expense of them.
- There will be adequate disposal sites / facilities available for solar PV panels at the termination of the project and for damaged or malfunctioning panels during the operational phase. It is assumed that the amount of solar PV plants globally is likely to give rise to new sustainable disposal practices and technologies that will not necessitate disposal to landfill.
- The proposed development footprints have deliberately been located away from sensitive habitats such as watercourses and rocky ridges, to minimize conflict with local fauna and reduce impact on habitat.
- The fencing will need to provide adequate access control and security measures against human theft and trespassing and is unlikely to allow for larger mammal movement through the site, but may still provide for small mammals. Fauna are highly mobile organisms, which can flee from dangers posed by construction activities. With the exception of smaller tunnelling, burrowing or nesting fauna (in the ground or tree trunks), fauna will instinctively flee, upon an intrusion of their personal space, specifically the "flight" zone, until the animal has extended the distance to its "comfort" zone.
- Although bird mortality is a documented impact associated with solar PV facilities elsewhere, it is not yet well documented in South Africa and its full risk is still uncertain. Bird mortality has been shown to occur due to direct collisions with solar panels. Species affected include water birds, small raptors, doves, sparrows and warblers (Kagan et al., 2014). The reflective surfaces of PV panels may confuse approaching birds and in some cases act as an attractant, being mistaken for large water bodies, resulting in injuries and/or mortalities when birds attempt to land on the installations.
- Power lines pose a significant collision risk to birds, affecting a particular suite of collision prone species. These are mostly heavy-bodied birds such as bustards, cranes, storks, large eagles and various species of water birds that have limited

manoeuvrability in flight, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (Anderson, 2001; van Rooyen 2004a; Jenkins et al., 2010). Avian electrocutions occur when a bird perches or attempts to perch on an electrical structure and causes an electrical short circuit by physically bridging the gap between live components and/or live and earthed components (van Rooyen, 2004b; Lehman et al., 2007). Electrocution risk is strongly influenced by the power line voltage and the design of the pole structure and mainly affects larger, perching species such as vultures, eagles and storks that are capable of spanning the spaces between energised components.

- The change in the microclimate beneath the solar panels and between the solar panels may provide different ecological conditions which may encourage or provide suitable conditions for botanical diversity (Montag et al. 2016).
- Fire is not a significant ecosystem driver in this plant community and excluding fire from the development footprint will not contribute to ecosystem changes.

The Impact Assessment and Specialists Studies undertaken identified gaps, uncertainties and assumptions associated with the project.

1.8.2. What is the level of risk associated with the limits of current knowledge?

The residual risks are believed to be manageable and monitoring initiatives will be built into the EMPr to assist with addressing any shortcomings in mitigations. Additional risks were provided in the Specialist Studies.

1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?

Site selection and impact assessment process are undertaken in order to identify impacts & risks from the project and accordingly implement the mitigation hierarchy to minimize these impacts and risks as far as practicable (Figure 30). Identified mitigations from the these processes are included into a site specific Environmental Management Programme (EMPr) which will adopt a precautionary principle in order to adequately cover any limits and gaps in the knowledge or techniques used for the assessments, including minimizing residual risk.

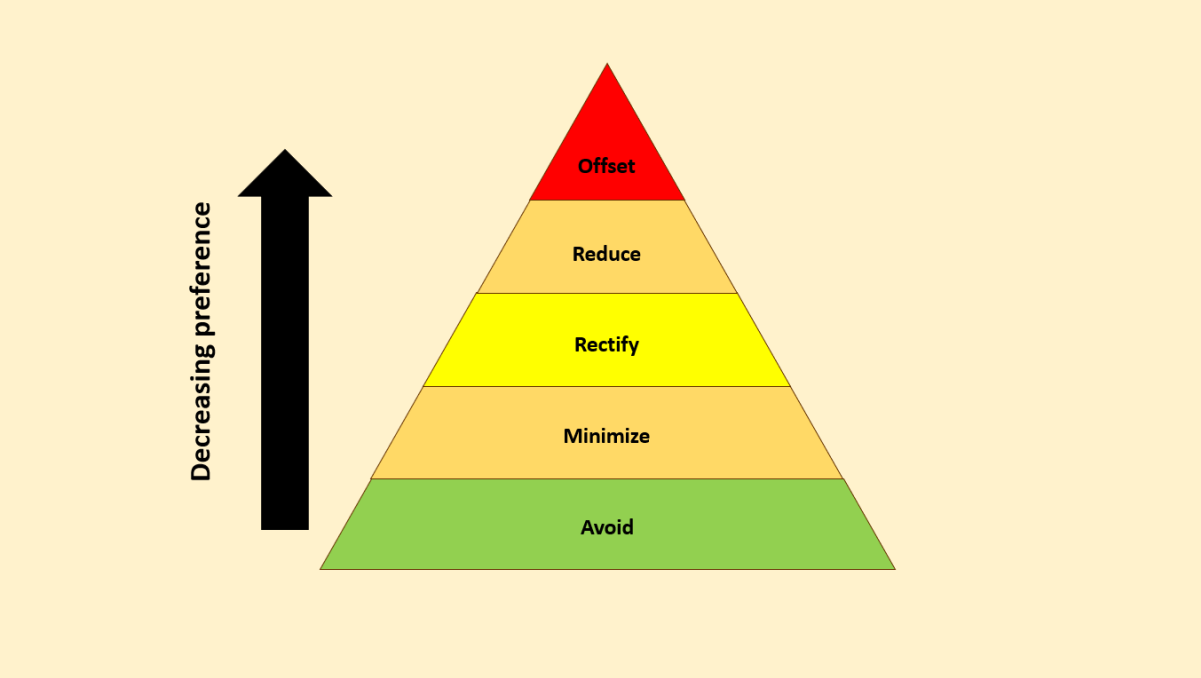

Figure 30. Graphical representation of the mitigation hierarchy typically used in Environmental Impact Assessment (https://eco-intelligent.com/2016/12/11/levels-of-mitigation-in-environmental-impact-assessment/).

1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms of the following:

1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?

All the above impacts and more were investigated by appointed specialists who identify the environment-specific aspects, impacts and risks and recommend mitigation measures to minimises the negative impacts and potential risks associated with the proposed activity. The mitigations may have an impact on the location, size, orientation etc. of the proposed development footprint, and many of the significant impacts can be avoided by correctly locating the development footprint, thereby selecting the least impactful location for development.

Based on preliminary findings and draft reports, the footprint has been adapted to reduce impact as far as possible, and subsequent impacts will be mitigated within the selected footprint. The landowner's property and receiving environment may not deteriorate as a consequence of the proposed development and associated activities, as this will not be deemed sustainable. The continued use of the land for current agricultural practices will be incorporated into the project design, including sound ecological management to ensure

continued and sustained agricultural production and ecological function, including but not limited to veld and water resource management.

1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?

- Creation of job opportunities (construction and operational phases).
- Economic benefits to the surrounding towns and communities through the implementation of various social and economic initiatives.
- Economic benefits to surrounding landowners, including the provision of hospitality services.
- Reduce dependence on fossil fuels and coal-fired powered stations, and in so doing indirectly contribute to improved air quality, climate change mitigation, etc.
- The project outcomes also align with the national, local, and regional planning objectives in terms of economic development and sustainability.
- The proposed project will be undertaken and implemented in conjunction with the pre-existing land use practices, the opportunity costs associated with the combined land uses are greatly improved. But the potential impacts associated with the proposed project are nonetheless to be assessed by appointed specialists that will concentrate on appropriate environmental aspects related to the proposed activity. These will be on a bio-physical and socio-economic level to determine whether or not replacing the current land use or next best alternative will create an unacceptable loss in opportunity costs. The project design alternatives will be selected in order to reduce any impact on the current land use of grazing including Solar PV arrays to allow for livestock grazing to continue below. The project is predicated to provide a positive impact on the local area including electricity from a non-polluting renewable energy source, benefits to job creation and skills development. It is therefore anticipated that there will not be any unacceptable opportunity costs.
- South Africa experiences some of the highest levels of solar radiation in the world and this renewable resource holds great potential for the country. The total area of high radiation in South Africa amounts to approximately 194 000 km^2, including the Northern Cape, which is one of the best solar resource areas in the world. With electricity production per square kilometre of mirror surface in a solar thermal power station being 30.2 MW, and just 1% of the high radiation area in the country being made available for solar power generation, the generation potential is approximately 64 GW. Solar energy has the potential to contribute quite substantially to South Africa's future energy needs. This would, however, require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres.

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1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?

The predominant ecosystem service being provided in the socio-economic context, is the proviison of natural resources for the raising of livestock by the current landowner. The project has been designed to limit the impact of ongoing farming activities as far as possible. The solar PV footprint will retain livestock access, within the determined grazing capacity, to ensure the continued agricultural output of the property and *inter alia* act as a vegetation management tool with the solar PV footprint. All heritage sites will be managed in accordance with a heritage management plan, whereby heritage sites are avoided as far as possible, including adjusting the development footprint, to limit impacts on these areas.

The Social Impact Assessment Report concluded as follows:

- Mitigation about safety and security must be implemented as soon as construction commences. The process must involve local security groups and landowners.
- A community liaison officer that is trusted by the community and has the necessary skills must be appointed before construction commences.
- Protocols on farm access, compensation, communication, and road maintenance must be agreed upon and be in place before construction commences.
- The social plans for the facility must be generated with input from the local municipality and other key stakeholders.
- A grievance mechanism and claims procedure must be in place and shared with all the stakeholders before the construction commences; and
- Economic benefits must be enhanced, and local labour and procurement should be prioritised.

None of the social impacts identified are so severe that the project should not continue. Based on the findings of the report, it is recommended that the project continues, on the conditions that the mitigation measures are implemented.

1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?

The project footprint has deliberately been located outside of any threatened ecosystem, critical biodiversity area, protected area (or protected area expansion strategy area) and falls within an Ecological Support Area (ESA) in terms of the Northern Cape Biodiversity Conservation Plan.

Critical Biodiversity Areas are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological

Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services.

The primary purpose of a map of Critical Biodiversity Areas and Ecological Support Areas is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity (http://biodiversityadvisor.sanbi.org/industry-and-conservation/biodiversity-in-the-urban-economy/understand/definitions-related-to-urban-land-use-planning/critical-biodiversity-areas-and-ecological-support-areas/).

As per Figure 31 below CBA 1 & 2 have endorsed compatible land uses of "Open space, Low impact ecotourism or recreation" while ESAs have a desired state to "Maintain in at least semi-natural ecological condition" with compatible land uses of "*Low impact ecotourism or recreation. Sustainably managed rangelands. Certain forms of low-density housing and Intensive agriculture".*

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CBA Map category	Description	Desired state	Examples of compatible land uses
Protected area	Areas that are formally protected in terms of the Protected Areas Act. Each protected area has a management plan.	As per each protected area's management plan.	Conservation-related land uses.
Critical Biodiversity Area 1 (CBA 1)	Areas that are irreplaceable for meeting biodiversity targets. There are no other options for conserving the ecosystems, species or ecological processes in these areas.	Maintain in natural or near natural ecological condition.	Open space, Low impact ecotourism or recreation
Critical Biodiversity Area 2 (CBA 2)	Areas that are the best option for meeting biodiversity targets, in the smallest area, while avoiding conflict with other land uses.		
Ecological Support Area 1 (ESA 1)	Areas that support the ecological functioning of protected areas or CBAs or provide important ecological infrastructure.	Maintain in at least semi-natural ecological condition.	Low impact ecotourism or recreation. Sustainably managed rangelands. Certain forms of low-density housing
Ecological Support Area 2 (ESA 2)		No further intensification of land use.	Intensive agriculture
Other natural area (ONA)	Natural or semi-natural areas that are not required to meet biodiversity targets or support natural ecological processes.	Best determined through multi-sectoral planning processes.	From a biodiversity perspective, these areas can be used for a range of intensive land uses
No natural remaining (NNR)	Areas in which no natural habitat remains.		

Figure 31. Overview of CBA categories, desired state and examples of compatible land uses drawn from the SANBI Land Use Scheme guidelines (Macfarlane, D.M *et al.* 2019).

Several specialist studies were undertaken including a Fauna & Flora (terrestrial biodiversity assessment) study was undertaken, which identified further conservation targets considerations of the site and development footprint, which need to be factored in.

1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?

Several potential locations were considered in a previous environmental authorisation application for which the environmental authorisation has subsequently been issued (EA ref. no.: 14/12/16/3/3/2/998) which is now referred to as Phase 1. The solar PV development

footprint currently under consideration (referred to as Phase 2) was included in the Phase 1 application but for technical reasons, whereby the nearby 132Kv overhead Eskom transmission lines had no additional capacity to receive additional renewable energy inputs, eliminated it as the preferred option at that time.

The approved phase 1 solar PV project includes a Main Transmission Sub-station (MTS) to allow for loop-in, loop-out of the existing 400Kv Eskom overhead transmission lines, which is a crucial technical element, as the Hydra MTS, located approximately 36km south-east of De Aar, has no additional capacity to receive energy from renewable energy projects. Accordingly, the phase 2 footprint will link up to the Phase 1 MTS by way of overhead distribution lines, and in order to reduce risk and development costs, must be within a reasonable distance of the MTS.

The development footprint investigation included an initial spatial analysis using GIS and desk top study, followed by ground truthing with a site visit to determine the sensitive receptors and local infrastructure. The site selection of the preferred location also took into account the proximity of the N10 and other provincial roads. The preferred property and site alternative within that property has taken into account the avoidance of rocky outcrops and natural drainage channels including wetlands and watercourses.

Initially the general area for the proposed Solar PV plant was determined by the fact that the area of the Northern Cape around De Aar is one of the regions with the highest solar irradiation intensity in South Africa. The proposed site for the solar arrays was then based on the following technical and topography criteria:

- Quality of solar irradiation;
- Horizons;
- Gradient;
- Slope orientation;
- Accessibility;
- Existing infrastructure (e.g. roads, power lines, substations); and

The project property site was chosen due to the fact that it achieves all the criteria highlighted above to accomplish a successful Solar PV plant combined with the footprint's relatively low environmental sensitivity. The full range of alternatives are investigated in Section H of this report, for greater detail.

1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?

The EIA will identify and investigate the potential cumulative effects of the proposed development taking into consideration the types and characteristics of aggregate effects.

Planning to address cumulative effects involves delineating spatial and temporal boundaries, determining future development and determining the significance of cumulative impacts. The selected method to identify and assess cumulative effects for this EIA was primarily based on Geographic Information Systems (GIS). GIS allows for the mapping of spatial information for capturing, displaying and analysing digital data. Map overlays have been used to identify areas where effects are likely to be greatest. Cumulative impact maps are produced by overlying all specialists GIS shapefiles or Google Earth. kml files using the sensitive receptor information to form a consolidated map from a geographical, physical, biological, social, economic, heritage and cultural aspects.

The GIS exercise uses the method of bio-geographical analysis, including landscape analysis looking at patterns, structure and ecological process within a spatial unit, including the consideration and removal of impacts to identified geographic areas, such as critical biodiversity areas, watercourses, wetlands, high significance heritage sites, which may require an alteration to the footprint boundary.

The additional method to identify the potential cumulative impacts included the checklist technique in which potential cumulative impacts can be identified by using a list of common or likely effects. This was undertaken within the development footprint selection matrix and the completion of the impact assessment.

According to DFFE, cumulative impacts must be considered for all solar PV projects, within a 30km radius of the project area. This pathway within cumulative impacts of a proposed development could be the compounding effect from one or more processes. The method of interactive matrices involves analysis of the additive and interactive effects of various configurations of multiple similar projects in the same geographic area. Due to the large number of developments in the broader area, there is potential for cumulative impact to generate additional impacts on broad-scale ecological processes and the countries‘ ability to meet conservation targets. A map of all the DFFE registered solar PV renewable energy developments in the area will help contextualise and quantify the broader-scale impacts.

Cumulative impacts are a concern in the area and their impact on fauna is highlighted as a greater concern than that on flora. The vegetation in the area, especially on the plains, is Northern Upper Karoo which is one of the most extensive vegetation types in the country and has a low overall abundance of species of conservation concern. In terms of fauna, smaller fauna such as rodents will experience some habitat loss due to transformation within the footprint of the current and other PV facilities. Medium and larger fauna are however likely to be more vulnerable to the cumulative impacts of development as they would be affected by habitat loss, difficulty in passing security fencing as well as noise and disturbance. In context of the current project, the plains around the site are still largely undeveloped, which would facilitate movement of fauna across the site as there will still be large intact corridors

present. In addition, the Brak River is likely to be an important movement corridor in the region and, as this will not be directly affected by the development, the overall impact on landscape connectivity is likely to be low, especially given the largely intact nature of the surrounding landscape.

2.1 What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?

2.1.1 The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area

- PKSDM IDP 2021 – 2022 (Draft): Table 19 has the Summary of objectives for the Municipality on Page 34. It shows that at least 20 000MW of renewable energy should be contracted by 2030. To fulfil the Environmental sustainability and resilience outcome.
- Under the topic of diversified energy mix, concerning Solar, the following points are stated:
  (1) Solar should play a much more significant role in the electricity generation mix than it has done historically, and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. The contribution of solar in the energy mix comprises both CSP and solar PV. Solar PV includes large scale installations for power generation which supply to the grid and individual, off-grid solar home systems and rooftop panels.
  (2) Several interventions which could enhance the future solar energy landscape are recommended as follows:
    - Large scale CSP projects with proven thermal storage technologies and hybridisation/industrial steam application projects should be incentivised in the short to medium term. In the long term the existing incentives could be extended to promote locally developed CSP technology storage solutions and large scale solar fuel projects.
    - A thorough solar resource assessment for South Africa should continue to be undertaken in the Northern Cape Province and extended to other provinces deemed to have high solar radiation levels.
    - Investments should be made to upgrade the grid in order to accommodate increasing solar and other renewable energy contributions (Page 165 & 166 of the GG # 40445 - 25 November 2016).

2.1.2 Spatial priorities and desired spatial patterns (e.g. need for integrated or segregated communities, need to upgrade informal settlements, need for densification, etc.)

- The proposed project would contribute to the economic stability of the area by establishing a sustainable industry on a property that has low agricultural potential. (Page 41, FEIR by CCA Environmental (Pty) Ltd for Business Venture Investments 1421 (Pty) Ltd, August 2022).
- At a provincial level, the Northern Cape Provincial Spatial Development Framework (PSDF, 2012) notes that the Northern Cape Province's major energy challenges include securing energy supply to meet growing demand, providing everybody with access to energy services and tackling the causes and impacts of climate change. In this regard, the development of large-scale renewable energy supply schemes is strategically important for increasing the diversity of domestic energy supplies for the Northern Cape Province and avoiding energy imports while minimising the environmental impacts. The PSDF further notes that renewable energy has been identified as a mechanism to diversify the economy and thereby promoting a green economy in the province (Page 41, FEIR by CCA Environmental (Pty) Ltd for Business Venture Investments 1421 (Pty) Ltd, August 2022).

2.1.3 Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)

- In the Northern Cape Province, exceptionally high radiation levels make the province particularly suited for power generation from solar energy. Besides solar, the province also has potential for Wind, Hydro and Biomass power generation.
- The Northern Cape Provincial Spatial Development Framework (2012) specifically recognises the potential for solar development in the province, identified with the introduction of a solar corridor stretching between ZF Mgcawu and the Pixley ka Seme regions and the solar-themed special economic zone (SEZ) in Khara Hais Municipality.
- The current land uses of the property owner, in terms of livestock production, will be retained, with the solar PV facility forming a complementary land use.

2.1.4 Municipal Economic Development Strategy ("LED Strategy")

The aim of Local Economic Development is to create employment opportunities for local residents, alleviate poverty, and redistribute resources and opportunities to the benefit of all local residents. Section 3.10.7 of the Pixley-ka-Seme IDP (2021-2022) states the following objectives of the LED:

LED is about communities continually improving their investment climate and business enabling environment to enhance their competitiveness, retain jobs and improve incomes.

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Local communities respond to their LED needs in many ways, and a variety of approaches can be taken that include:

- Ensuring that the local investment climate is functional for local businesses;
- Supporting small and medium sized enterprises;
- Encouraging the formation of new enterprises;
- Attracting external investment (nationally and internationally);
- Investing in physical (hard) infrastructure;
- Investing in soft infrastructure (educational and workforce development, institutional support systems and regulatory issues);
- Supporting the growth of particular clusters of businesses;
- Targeting particular parts of the city/town/region for regeneration or growth (areas based initiatives);
- Supporting informal and newly emerging businesses;
- Targeting certain disadvantaged groups.

The proposed project will assist in several of the above-stated objectives including attracting external investment, supporting small and medium-sized enterprises (who will be appointed as various service providers) and investment in hard infrastructure (the solar PV park and upgraded Main Transmission Sub-station).

2.2 Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?

A Social Impact Study was undertaken and the following impacts were identified:

- Expectations about community benefits
- Uncertainty amongst land owners
- Change of land use/livelihoods
- Traffic and roads
- Damage to farm infrastructure
- Safety and security concerns due to more people in the area
- Social disturbance and community safety
- Economic opportunities
- Sense of place
- Generation of renewable energy

The project outcomes align with the national, local and regional planning objectives in terms of economic development and sustainability. The project will use a natural, renewable resource and assist with decreasing the country's reliance on coal as a source of energy. The project will not affect the environmental rights of any of the affected stakeholder groups and no-one's livelihoods will be affected in a negative manner. The project will contribute to

livelihood strategies of stakeholders in the area – directly through job creation and secondary economic opportunities, and indirectly through enterprise and socio-economic development by means of a community trust. Should the mitigation measures be implemented as recommended, the contribution to long-term sustainable outcomes will be significant. The project will complement the socio-economic benefits in the area. Given the rural setting of the site there will be a need to transport goods and people over a distance, but the negative impact of this aspect can be mitigated by the secondary economic opportunities that the need for transport service providers will create. There are vulnerable people that will be affected by the project. The vulnerable groups include the poor and unemployed people in the urban areas, and the farm workers in the rural areas. The project offers opportunities for semi- and unskilled labourers, which will ensure that the vulnerable groups are not excluded from economic opportunities. Mitigation measures on how to enhance these opportunities are suggested in the report. The mitigation measures include aspects such as gender equality. The project will not result in any unfair discrimination or affect the social and environmental rights of any of the stakeholder groups, should the mitigation measures be implemented as suggested. From a social perspective the positive impact that the project will have on the affected environment outweighs the negative impacts by far, and where there are negative impacts, it can be mitigated (Social Impact Assessment Report by Equispectives Research & Consulting Services, March 2017).

2.2.1 Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?

The projects approval and success will help create job opportunities for the surrounding community, hence strengthening the economic state of the municipality. A project-specific Social, Labour & Skills Development Plan will be developed to ensure effective and representative employment policies are implemented and that marketable skills are transferred as part of a project exit strategy which will facilitate sustainable employment opportunities once an individual's contract is complete.

2.3 How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?

The proposed development is in a rural area and the closest communities are in Hanover and De Aar. There are farmers and farm workers in closer proximity. Recommendations made in Sections 8 and 11 of the report refers to this aspect (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

Any new or proposed project, creates community expectations especially around employment and other income generating opportunities. There are currently seven approved, operational or applications for solar projects in a 30km radius of the project sites. There are also some wind farms. These projects resulted in certain economic benefits and opportunities for the affected communities. There is an expectation from the affected communities and

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municipalities that the Soventix project will result in similar benefits and opportunities. Although this is not an entirely unrealistic expectation, given the previous experiences, it is important that the expectations about the magnitude of the positive impacts must be kept realistic. If Soventix does not manage stakeholder expectations from the beginning of the project, it can result in reputational damage for the company, bad stakeholder relationships and in the worst-case scenario violent protests. Community relations go hand in hand with expectations. The better the relationship with the project impacted communities, the better the social license to operate from Soventix will be. Community relations will remain important throughout the project, but the basis for future relations is established in the beginning phases of a project (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.4 Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?

The life of the project is estimated to be 20 years. The most severe impacts will be in the construction phase, and more positive impacts will continue through the life of the project. Given the nature of the development and the potential long term positive social impacts it can be seen as a sustainable project (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.5 In terms of location, describe how the placement of the proposed development will:

2.5.1 result in the creation of residential and employment opportunities in close proximity to or integrated with each other

The project will create residential and employment opportunities in the closest towns. During the construction phase the hospitality industry will be a particular beneficiary. There will be limited long term residential and employment opportunities (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.5.2 reduce the need for transport of people and goods

Given that the site is far from town, the project will not reduce the need for transport of people and goods (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022) but rather increase the need for these services.

2.5.3 result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport)

The N10 has been identified as a central part of the energy hub; however the proposed project will not result in densification and the achievement of thresholds in terms public transport. Given the rural nature of the site there will be no impact on public transport (Social

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Impact Assessment Report by Equispectives Research & Consulting Services, August 2022), and bulk transport will need to be provided by the developer and appointed contractors.

2.5.4 compliment other uses in the area

There are other similar developments in the area, and it can be operated parallel to the farming activities (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022). The proposed Solar PV Plant is to ensure continual energy supply, even in the inconveniencing times of loadshedding and will therefore compliment other energy generation technologies in the area.

2.5.5 be in line with the planning for the area

- Energy is essential to many human activities and is critical to the social and economic development of a country. One of the key objectives of the Department of Energy (DoE) is to ensure energy security which, in essence, is about ensuring the availability of energy resources, and access to energy services in an affordable and sustainable manner, while minimising the associated adverse environmental impacts. Many factors pose potential threats to energy security including scarce and depleting energy resources, geopolitical instability, inadequate energy infrastructure and, more recently, natural disasters. To ensure continued security of energy supply, it is essential that a co-ordinated and integrated approach to energy planning, which takes into account these complex issues, is undertaken (Page 11 & 12 of GG # 40445 - 25 November 2016).
- South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. From the myriad of factors which had to be considered and addressed during the Integrated Energy Planning process, eight key objectives were identified:
  - Objective 1: Ensure security of supply;
  - Objective 2: Minimise the cost of energy;
  - Objective 3: Promote the creation of jobs and localisation;
  - Objective 4: Minimise negative environmental impacts from the energy sector;
  - Objective 5: Promote the conservation of water;
  - Objective 6: Diversify supply sources and primary sources of energy;
  - Objective 7: Promote energy efficiency in the economy; and
  - Objective 8: Increase access to modern energy (Page 26 & 27 of GG # 40445 - 25 November 2016).

2.5.6 for urban related development, make use of underutilized land available with the urban edge

- This project is a rural-based and not urban-based development due to several magnitude and location requirements for a project of this size including:
- The location factors are favourable for the development of a Solar PV plant including high and good quality solar irradiation, flat and gentle slopes and close proximity to existing Eskom infrastructure including powerlines to feed into the grid and the N10 for transport links.
- In South Africa's growing RE footprint, The Northern Cape, offers the most favourable solar radiation levels, has attracted the majority of the Solar PV projects and all of the CSP projects. The province, host to 48 of the 92 IPP projects in the country, is expected to contribute 3,566MW to the total procured RE capacity once construction is complete (Page 96 of the State of Renewable Energy in SA, 2015).

2.5.7 optimize the use of existing resources and infrastructure

Electricity will be obtained from Eskom via the existing supply to the site. The proposed project would strengthen the local electricity grid for the area and thus improve the available electrical services. In terms of water requirements, the proposed project will utilize groundwater from existing boreholes on the property within the sustainable yield determined by way of a geohydrology assessment and pump yield tests. All non-recyclable waste would be disposed of at the De Aar licensed landfill site. Installation of Bio-rock, Mono rock and NewGen package plants/systems to treatment effluent to general wastewater limits will be used to treat sewage and wastewater from the office buildings.

2.5.8 opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement)

The District Municipality has proactively diversified its economy away from mining and agriculture through innovative local economic development initiatives, declaring themselves as a Renewable Energy Hub, seeking to attract foreign direct investment into solar, wind, hydro and biomass projects.

The proposed site is situated in a rural area on a sheep farm. The site is currently used for grazing purposes. The construction of a solar electricity generating facility and its associated infrastructure will lead to a change of land use, and this change of land use can potentially impact negatively on the livelihood of the affected farmer, which is sheep farming. Although it will be a hybrid agrivoltaic system, meaning that sheep could continue to graze amongst the solar panels, the areas available for grazing will be less if the project is implemented, and this could mean that the farmer would need to cut down on his production rates, which would impact negatively on his livelihood. It is possible for sheep to graze in between the solar panels, but to achieve that the farmer would need more labour than he is currently using. The

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reason for this is that he would need to divide his flocks and have them graze in separate areas. This entails the movement of the flock between camps and managing of the flock in the solar area. During the construction phase all livestock would need to be moved to different parts of the farm as the construction activities may be distressing for the animals. This is also the case with game, but it is not that easy to move game around on the farms. Farmers indicated that they would not be able to introduce new game on their properties during the construction phase due to the sensitivity of game to environmental factors such as noise and constant movement. Construction traffic may impact on the movement of the livestock around the farm. Farmers are also concerned about the impact of the quality of the roads on their quality of life and ability to transport their goods (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022). The passive income derived from the solar PV facility, will offset the additional farming costs, and provide the landowner with a diversified income base.

2.5.9 discourage "urban sprawl" and contribute to compaction/densification

The location factors are favourable for the development of a Solar PV plant including high and good quality solar irradiation, flat and gentle slopes and close proximity to existing Eskom infrastructure including powerlines to feed into the grid and the N10 for transport links. The development will not limit nor contribute to urban sprawl, and the majority of the labour force, particularly during the construction phase, will be sourced from the local towns and be brought in by predominantly busses. Development may take place on surrounding farms with regards to the provision of accommodation facilities, but is likely to be limited in extent.

2.5.10 contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs

The project area is currently dominated by livestock production-based agriculture. Housing is provided for both landowners and land occupiers, and this arrangement is unlikely to change. Additional accommodation may be provided on site by the landowner on a commercial basis.

2.5.11 encourage environmentally sustainable land development practices and processes

The project will provide renewable energy and it will be designed in such a way that the farmer can still utilise the land around the infrastructure if needed (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).
The proposed project plans to integrate with the current small livestock and game farming practices, increasing the profitability and optimises the opportunity costs of the property. While the solar PV farm will result in environmental impacts through disturbance to in situ vegetation, in the medium to long-term, it is possible that due to the creation of microclimates created beneath the solar panel arrays, a higher nett primary production may

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result, effectively increasing the grazing capacity of the land. This aspect will be quantitatively monitored through an ecological management plan.

Electricity will be obtained from Eskom via the existing supply to the site. The proposed project would strengthen the local electricity grid for the area and thus improve the available electrical services. In terms of water requirements, the proposed project will utilise groundwater from existing boreholes on the property or if needed surface water accumulating in a disused stone quarry. All non-recyclable waste would be disposed of at the De Aar licensed landfill site. Installation of bio-rock, mono rock and NewGen package plants/systems to treatment effluent to special limits will be used to treat sewage and wastewater from the office buildings.

2.5.12 take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.)

- The location factors are favourable for the development of a Solar PV plant including high and good quality solar irradiation, flat and gentle slopes and close proximity to existing Eskom infrastructure including powerlines to feed into the grid and the N10 for transport links.
- In South Africa's growing RE footprint, The Northern Cape, offers the most favourable solar radiation levels, has attracted the majority of the Solar PV projects and all of the CSP projects. The province, host to 48 of the 92 IPP projects in the country, is expected to contribute 3,566MW to the total procured RE capacity once construction is complete (Page 96 of the State of Renewable Energy in SA, 2015).
- The site for the proposed development has been chosen due to the potential to feed into existing power supply lines, and due to the suitability of the area for solar farming (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.5.13 the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential)

- The proposed project will ensure both temporary and permanent job and income for the people in the area.
- The investment will bring significant social development and economic opportunities to the area, and will diversify the economy. This will decrease the areas vulnerability to external shocks with economic implications (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).
- The continued use of the solar PV footprints for livestock production coupled with a passive income derived from generation of electricity will increase the income base to the landowner and ensure a maximised use of the land in a complementary manner.

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2.5.14 impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area

The Social Impact Assessment that was undertaken, concluded as follows:

There is a strong sense and spirit of place associated with the Karoo landscape. The surrounding farms are used for sheep farming, game farming and hunting. The current residents and farm owners have a strong sense of place associated with the farms. Many things can impact on a person's perception of sense of place. Farms are generally noisy places if one considers animal-sounds and farming activities. From the receptors' perspective, this kind of noise is acceptable and even attractive, because this is what living on a farm is all about. Noises such as alarms and reverse hooters are not "normal" and disturb the sense of place and the value that people place on the auditory environment. Although lights are used as a security measure on farms, one of the things people value is the absence of bright lights and that they can see the stars. Lights for any other use than lightening up their direct environment is seen as invasive and disturbs the sense of place. Visual aspects are an important consideration in the experience of sense of place. If people are used to unspoiled vistas, or seeing open fields, the establishment of any buildings or infrastructure that they feel do not belong there can alter their sense of place.

The construction phase will see a total transformation from the current setting and landscape of the proposed site. It is inevitable that the visual impact during the construction phase will be affected by dust, increase in vehicle traffic and other construction activities. Potential visual impacts caused by construction activities will include the visual changes brought about by clearance of vegetation for the solar arrays, ancillary buildings, and laydown areas; visual disturbance caused by construction of roads, buildings, energy collectors, power lines, increased traffic (and number of large vehicles), worker presence and activity, and dust emissions. Other visual disturbances may include soil stockpiles (from excavation for building foundations and other structures), soil scars, as well as potential for invasive plant species to develop on disturbed soils and soil stockpiles, which may contrast with existing vegetation.

During the operational phase, visual impacts such as glare from the solar panels, buildings, power lines, lack of vegetation and light at night will also impact on the sense and spirit of place and will be an impact as long as the plant is operational. Modern solar modules are designed to absorb the solar radiation and hence are not susceptible to reflection or glinting. Nonetheless, the contrast between the solar arrays and surrounding vegetation will exist, in colour, form, line and texture. The impact of lights in a dark rural area known for its beautiful night sky is a special concern of land owners. Although the preferred site may not influence the sense of and spirit of place of the Karoo as such, it will have a significant impact on the sense and spirit of place of the direct neighbours.

There are various actions related to decommissioning of the facility that have an impact on sensitive visual receptors. Immediate visual impacts during decommissioning will be like those caused during construction of the facility, but of a much shorter duration. Impacts may include road redevelopment, removal of aboveground structures and equipment, movement and activities of workers, increased traffic, dust emissions and presence of dismantled equipment. Rehabilitation of the decommissioned site could entail grading, scarifying, seeding, and planting. Disturbed and rehabilitated areas may take a long time to recover to pre-project conditions, and contrast between existing and newly planted vegetation may persist many seasons.

Decommissioning and removal of the facilities will include all the structures for PV and buildings and related concrete foundations. Reversibility of the visual impact is therefore moderate to high, keeping in mind that it may take several years for the vegetation to fully recover. The effect of decommissioning the plant could have a positive permanent improvement to the visual resources.

Heritage Impact Assessments were undertaken in 2017 & 2021 (Pelser, A. 2021. Background research indicates that there are some cultural heritage (archaeological & historical) sites and features in the larger geographical area within which the study area fall, with a number recorded and identified during the 2017 assessment. A total of 36 sites were identified and recorded during the February 2017 assessment. Most of these are open-air Stone Age surface scatters of varying density and significance, while some historical sites, feature and cultural material most likely associated with the Anglo-Boer War (1899-1902) and farming history of the area was also identified. Some of the sites are located close to and within the areas where the Solar PV facilities and associated substations are planned, and mitigation measures will have to be implemented, while others are located in the general area of study. The February 2021 assessment furthermore identified a number of sites, features or material of cultural heritage (archaeological and/or historical) significance in the study area. A total of 12 sites were identified during the 2021 assessment of the PV Solar Array area. They included rock engravings, a number of open-air Stone Age surface sites (with varying degrees of density) and a possible pastoralist site (stone-walled enclosure). No Grade I or II sites (National or Provincial Heritage Sites) have been identified in close proximity to the proposed development area as yet.

2.5.15 <u>in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?</u>

The project is unlikely to have a substantive impact on settlement dynamics, save to say that the construction labour force will be largely sourced from local towns, providing an income base to help improve overall quality of life and the ability to afford suitable accommodation.

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2.6 How were a risk-averse and cautious approach applied in terms of socio-economic impacts?

A Social Impact Assessment was undertaken, although with the following limitations:

1. Not every individual in the community could be interviewed therefore only key people in the community were approached for discussion. Additional information was obtained using existing data.
2. The social environment constantly changes and adapts to change, and external factors outside the scope of the project can offset social changes, for example changes in local political leadership, droughts or economic conditions. It is therefore difficult to predict all impacts to a high level of accuracy, although care has been taken to identify and address the most likely impacts in the most appropriate way for the current local context within the limitations. In addition, it is also important to manage social impacts for the life of the project, especially in the light of the changing social environment.
3. Social impacts can be felt on an actual or perceptual level, and therefore it is not always straightforward to measure the impacts in a quantitative manner.
4. Social impacts commence when the project enters the public domain. Some of these impacts will occur irrespective of whether the project continues or not, and other impacts have already started. These impacts are difficult to mitigate and some would require immediate action to minimise the risk.
5. There are different groups with different interests in the community, and what one group may experience as a positive social impact, another group may experience as a negative impact. This duality will be pointed out in the impact assessment section of the report.
6. Social impacts are not site-specific, but take place in the communities surrounding the proposed development.

2.6.1 What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?

Aquatic Biodiversity Assessment (Deacon, A. 2022):

- Whilst the author has made every effort to verify that information provided in this report is reliable, accurate and relevant, this report is based on information that could reasonably have been sourced within the time period allocated to the report and is dependent on the information provided by management and/or its representatives.
- Project proponents will always strive to avoid and mitigate potentially negative project related impacts on the environment, with impact avoidance being considered the most successful approach, followed by mitigation. It further assumes that the project proponents will seek to enhance potential positive impacts on the environment.

- Due to the fact that detailed mitigation procedures have been presented, it is trusted that the construction team management with the help of the ECO will ensure that these mitigatory measures be implemented where applicable.

By implementing all the mitigation measures and managing the system on a continuous basis as prescribed by the Risk Assessment, all the impacts will be addressed to a satisfactory level.

Chiropteran Specialist Assessment (Cory-Toussaint, D. 2017 & 2022):

It is assumed that since the proposed development footprint falls outside of the low-lying areas that the bats appear to favour, bat activity will not necessarily be negatively impacted.
The impact assessment suggests that the proposed development footprint is a preferred development site for the proposed Soventix Solar Farm, in terms of overall bat activity and is a significant distance away from a potential roosting site. However, there are limitations incurred from the short time frame in which the data was collected.

Terrestrial Biodiversity Assessment (Todd, S. 2017 & 2022):

The current study is based on a four-day site visit in March 2017, two-days in March 2022 as well as a desktop analysis of the available literature and databases. The timing of the site visit in 2017 was near-optimal and followed extensive rainfall in the region with the result that the vegetation was in an excellent condition for sampling with the majority of species present in flower or seed. In addition, faunal activity was high and most of the common species of the area were observed at the site. As a result, there are few resulting limitations in terms of the field assessment and the results of the site visit are considered reliable and comprehensive. The lists of fauna and flora derived for the site are based on those observed at the site as well as those derived from the literature and databases from a significantly larger area that the study area to ensure a conservative approach in this regard as many areas have not been well-sampled in the past. This represents a sufficiently conservative and cautious approach which takes the study limitations into account.
The current assessment is contingent on the developer avoiding the placement of PV panels and other major infrastructure within the areas demarcated as High Impact and No-Go areas. Significant impact to these areas would be considered a fatal flaw and compromise the viability of the project.

Avifauna Specialist Assessment (Todd, S. 2017 & 2022 and AGES, 2023):

The specialist made the assumption that the sources of information used in the compilation of this report are reliable. However, it must be noted that there are limiting factors and these could detract from the accuracy of the predicted results:

- There is a scarcity of published, scientifically vetted information regarding the avifaunal impacts at existing SEFs. Recent studies at SEFs (all using different solar

technologies) in southern California have revealed that a wide range of bird species are susceptible to morbidity and mortality at SEFs, regardless of the type of technology employed. It must however be noted, that facility related factors could influence impacts and mortality rates and as such, each SEF must be assessed individually, taking all variables into account.

- Assessment of the impacts associated with bird-SEF interactions is problematic due to: (i) limitations on the quality of information available describing the composition, abundance and movements of the local avifauna, and (ii) the complete absence of any local, empirical data describing the known impacts of existing SEFs on birds (Jenkins, 2011).
- Limited time in the field and limited seasonal spread means that important components of the local avifauna (i.e. nest sites or localised areas of key habitats for rare or threatened species) could have been missed. However, the development area does not contain many large trees, so it is highly unlikely that there are any significant nesting sites of larger species present within the affected area that would not have been observed.

The site visit as well as personal experience of the avifauna of the area and of similar species in different parts of South Africa, through the specialist's experience working across the country, goes some way to remedying any knowledge deficiencies.

Geohydrology (GCS, 2022):

A limitation of the water balance calculation used in the geohydrology assessment, is that it does not consider transboundary aquifer systems, which may be present in the study area. These systems will often add more water to the system, as water is transferred across HRUs, via the fractures / intergranular preferential flow paths. This phenomenon is difficult to determine and required aerial magnetic or gravity survey data, pup test data of all known boreholes within a given area and drilling logs. Hence, transboundary aquifer flow is not included in this static water balance calculation.

Traffic Impact Assessment (Element, 2017 & Sturgeon, 2022):

For consistency and to simplify the calculations, the following assumptions were made:

- Each facility will be constructed at a rate of 100MW per year;
- Each facility will generate the same trips per 100MW as the study facility;
- Regardless of the size of the facility, only 100MW of the facility are constructed at a time;
- Facilities less than 100MW will be assigned the same trips as the 100MW facilities.

Additional gaps, limitations and assumptions were identified in the Impact Assessment.

2.6.2 What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?

One of the ways in which social risk can be managed is by conducting a social impact assessment (SIA). Such an assessment can assist with identifying possible social impacts and risks. Disregarding social impacts can alter the cost-benefit equation of development and in some cases even undermine the overall viability of a project. A proper social impact assessment can have many benefits for a proposed development (UNEP, 2002) such as:

- Reduced impacts on communities of individuals;
- Enhanced benefits to those affected;
- Avoiding delays and obstruction – helps to gain development approval (social license);
- Lowered costs;
- Better community and stakeholder relations; and
- Improved proposals.

Ecoleges Environmental Consultants was appointed to manage the Environmental Impact Assessment for the project, and they appointed Equispectives Research and Consulting Services to perform a social impact assessment for the proposed project with suggested mitigations and management measures to be included in the EMPr for implementation.
Additionally, any comments received from I&APs, will be assessed, where relevant, in the Impact Assessment process, and mitigated accordingly.

2.6.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?

The activities associated with the project will be identified and their impacts & risks predicted. Safety nets will be considered to capture the elements that were unidentified. Finally, mitigations will be sought and tailored to counteract the project-specific impacts and achieve particular goals and objectives in line with environmental best practices. Finally, an Environmental Management Programme (EMPr) will be formulated to help minimise and/or avoid any risks that might occur.

2.7 How will the socio-economic impacts be resulting from this development impact on people's environmental right in terms following:

2.7.1 Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?

The information used in the SIA is based on the official data received from the municipalities and StatsSA. Given that municipalities are subject to public consultation processes, the assumption is made that the data is correct. A conservative approach was taken to the

identification of impacts in the scoping phase. In the impact assessment phase of the project the impacts presented in the scoping reports were triangulated through a participation process to ensure that the assumptions were correct, and to close any gaps in the data. Given the nature of the project, no critical social resources should be affected, and once commissioned, there is a relatively low risk for social disruption. Communities were consulted about the social mitigation measures during the impact assessment phase to ensure that the measures suggested are acceptable to the communities affected by the project. (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

In a 2004 study it was found that in De Aar, 120 out of every 1 000 (12%) children starting school showed some sign of being touched by Foetal Alcohol Syndrome Disorder (FASD). This is the highest rate in South Africa (Urban et al, 2008). South Africa has the highest FASD in the world. Many of the children also showed signs of malnutrition (Olivier et al, 2016). FASD may lead to primary disabilities such as intellectual disability, learning difficulties, poor impulse control, problems with attention, memory loss, social perception, reasoning and using judgement, cognitive processing, mathematics and language deficits, and developmental lags. Some secondary disabilities also associated with FASD include mental health problems, disrupted school experience, trouble with the law, custody, inappropriate sexual behaviour, and alcohol/drug problems (Streissguth et al, 2004). This means that a significant part of the population of De Aar can be seen as a vulnerable group susceptible to negative influences in society.

Safety concerns mentioned by people from Hanover and De Aar include social ills such as prostitution, relationships with minors, alcohol and drug abuse, gambling and fighting due to the presence of people from outside the area.

Many of the people in town are poor and depend on social grants to survive, and the project will introduce people who have more money available. While there are definite benefits, which will be discussed under the economic impacts, there are also potential threats and social disturbance. It must be noted that there are some people in the urban areas that keep livestock for subsistence purposes, and it has been reported that they are especially vulnerable to theft during times when there are more people moving around the area.

The municipality indicated that people coming from outside the area to work in the existing solar projects had a definite impact on the community. Different value systems lead to changes in behaviour, such as taverns being open on Sundays, sexual assaults, and an increase in the HIV rates. This may be a perception, as these aspects has been present in the community for a long time, but it must be acknowledged that these social ills are typically associated with an influx of people because of development. A massive influx of people is not expected, since there should be some skilled labour in the area as a result of the other solar projects that have been established in the last few years. However, if the number of

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solar developments in a 30km radius of the proposed development are all constructed at the same time, there may be cumulative impacts (See Section X). A significant impact on basic services such as schools, health care, sanitation, and other municipal services are not expected due to the fact that a small number of temporary workers will enter the area for a limited period. The municipality indicated that there is a shortage of housing at the moment.

Measures to be taken:

Mitigation for this impact is similar to mitigation for the impact on safety and security due to more people in the area. Soventix and its contractors must develop an induction programme that includes a Code of Conduct for all workers (including sub-contractors). The induction programme must include HIV/AIDS awareness, substance abuse programmes and education about alcohol abuse and gender-based violence. Any person that works on site must sign the Code of Conduct and presented with a copy. The Code of Conduct must include the following aspects:

- Respect for local residents, their customs and property.
- Respect for farm infrastructure and agricultural activities.
- No hunting or un-authorised taking of products or livestock.
- Zero tolerance of illegal activities by construction personnel including: relationships with minors; prostitution; illegal sale or purchase of alcohol; sale, purchase, or consumption of drugs; illegal gambling or fighting.
- Compliance with the Traffic Management Plan and all road regulations; and
- Description of disciplinary measures for violation of the Code of Conduct and company rules.

If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the beginning of their contract, they will face disciplinary procedures that could result in dismissal. Stock theft should be noted as a dismissible offence. Soventix must also establish a grievance mechanism and appoint a community liaison officer that the community can access easily. The grievance mechanism must be communicated to the affected communities. It is imperative for Soventix and the municipality to have a good relationship, since the parties will need each other to ensure that societal impacts can be mitigated (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.7.2 Positive impacts. What measures were taken to enhance positive impacts?

The proposed project will create positive economic impacts in the area. The most direct impact on a community level is job creation. Soventix assume that there will be 650 construction staff during peak construction and 55 staff during operation. (*pers.comm* JP De Villiers, Managing Director, Soventix). The three phases will be built sequentially. There may be some overlap. Once civil works on Phase 1 are complete the civils' team would move

onto Phase 2. Furthermore, each phase would be built sequentially, e.g., Phase 3 will be built in 4 x 100 MW blocks. Construction of each 100 MW block typically takes 12 to 15 months from start to finish (pers.comm JP De Villiers, Managing Director, Soventix).. Although the construction phase jobs are temporary and will not contribute to the unemployment levels in the long term, it would have a significant positive impact on the short term. The increase in disposable income (via the project workers) will result in increased demand for goods and services, and greater spending within the local community. Local businesses confirmed that during the construction of previous renewable energy facilities there was a definite positive economic impact in the town. Some of the positive impacts remained present, as a business owner reported a 40% increase of business, despite the recession. However, with an increase in economic activity from a boom-bust cycle created by construction events there are inherent risks. A local businessman explained that during the construction phase for another renewable energy facility there was an increase in eateries opening in De Aar. Lots of people applied for restaurant licences, but most places have subsequently closed down. The sustainability of businesses created during boom periods must be ensured and prospective first time business owners must be educated about the potential risks with opening a business.

It can be anticipated that there are semi-skilled and unskilled labour present in the area that has experience of construction work during the establishment of the existing solar farms in the area. The municipality noted that they feel that the skills transfer from renewable energy companies up to now has been limited, and they would like to see more skills transfer programmes on a local level.

Apart from the direct employment opportunities, there will also be significant indirect economic opportunities for local entrepreneurs. Opportunities include transport, fencing, road maintenance, accommodation, meals, and laundry services. Several people reported that they established businesses that provide services to the renewable sector and has benefitted from the presence of these facilities in the area. The highly skilled technical people will need accommodation and other hospitality services while they reside in the area during the construction period. Some of the adjacent farms offer accommodation, which may be a viable option for some of the workers. Whilst some of the technical jobs need highly skilled people that are not available locally, service providers must make use of the secondary opportunities that are available locally.

The operational phase will have less direct economic opportunities in the form of job creation. It will create 55permanent positions, of which the number of semi-skilled and unskilled is not known. This will have a permanent positive impact on the people that will be employed. In addition, there may be limited secondary economic opportunities. It is estimated that the lifespan of the solar electricity generation plant is 20 years, however, this lifespan can be increased through on-going maintenance and refurbishment.

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The Department of Energy (DoE), through the RFP document, requires that all renewable energy bidders must illustrate how the Project will benefit the local community. At present, the DoE is stipulating that one percent of revenue generated by the project must be contributed towards socio-economic development. In accordance with the relevant BBBEE legislation and guidelines, up to four percent of profit after tax could be used for community development over and above that associated with expenditure in the area. The BBBEE Scorecard specifies the following contributions (totalling four percent):

- Enterprise development – maximum of 15 points awarded for the contribution of three percent of profit after tax, or more; and
- Socio-economic development – maximum of five points awarded for the contribution of one percent of profit after tax, or more.

If these contributions are realised, the project has the opportunity to make a real difference in the local community. Between NGOs that serve the interest of the community as a whole and the municipality Soventix can be assisted with identifying worthwhile projects that will be sustainable and lead to direct local benefits in the communities that will be affected by the project.

During the decommissioning phase opportunities similar to those created in the construction phase will be created (Equispectives, 2022).

2.8 Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?

It is not anticipated that the social impacts resulting from the proposed project will have significant ecological impacts. (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.9 What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?

The information provided in the SIA were fed into the other specialist studies and used to ensure that the best practical environmental option was chosen, whilst the social aspects were also considered (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.10 What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons

(who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?

Given the proximity of the project from communities, the adverse environmental impacts do not have social or environmental justice implications. Renewable energy is a clean form of energy and benefits the greater society. The DoE requires that local communities must benefit from these kinds of development. If the recommendations in Section 9 of the report is implemented, there can be a positive socio-economic impact far greater than the footprint of the project (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.11 What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?

The environmental resources affected by the proposed development where not used by local communities. The project aims to provide clean energy to South Africa, therefore it assists with protecting ecosystem services. Any economic opportunities will be shared in an equitable manner (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.12 What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?

The scope of the relevant Listed Activities are related to development activities only, as this phase is deemed to have the largest potential impact on the receiving environment, and has accordingly been mitigated in the EMPr. Subsequent phases fall outside the scope of the Environmental Authorisation. Specialist studies and impact assessment were undertaken and mitigated in the Environmental Management Programme.

2.13 What measures were taken to:

2.13.1 ensure the participation of all interested and affected parties

- A Notification/Background Information Document (BID) was distributed to all potential Interested and Affecter Parties (I&APs) on the 18th of February 2022.
- A newspaper advert was published on the Volksblad and Noordkaap Bulletin Newspapers on the 18th and 24th of February 2022, respectively.
- Three Site Notices were erected around the site on the 18th of February 2022.

- The 30 day-Registration of I&APs period ran from 18th February 2022 to 22 April 2022.
- The above information is captured in a consolidated PPP Report.

2.13.2 provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation

- A Notification/Background Information Document (BID) was distributed to all potential Interested and Affecter Parties (I&APs) on the 18th of February 2022.
- A newspaper advert was published on the Volksblad and Noordkaap Bulletin Newspapers on the 18th and 24th of February 2022, respectively.
- Three Site Notices were erected around the site on the 18th of February 2022.
- The 30 day-Registration of I&APs period ran from 18th February 2022 to 22 April 2022.
- Notifications were provided in Afrikaans and English, including notifications to adjacent land owners and occupiers.

2.13.3 ensure participation by vulnerable and disadvantaged persons

The SIA did additional consultation to the S&EIA public consultation. The one-on-one interviews ensured that there was time to explain the project in a non-threatening environment. People were interviewed in the language of their choice. Through the process vulnerable groups were identified, and additional measures have been developed to make sure that they can participate effectively. Woman and youth were specifically included in the consultation to ensure that their voices are heard.

2.13.4 promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means

The SIA did additional consultation to the S&EIA public consultation. The one-on-one interviews ensured that there was time to explain the project in a non-threatening environment. People were interviewed in the language of their choice. Woman and youth were specifically included in the consultation to ensure that their voices are heard.

2.13.5 ensure openness and transparency, and access to information in terms of the process

Openness and transparency are maintained through the PPP, and specifically the distribution of reports for comment. All comments and issues raised are captured in the Comments & Response Register and entered, where relevant, into the Impact Assessment in order to ascertain significance of impact/s in light of the mitigation hierarchy.

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2.13.6 ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge

The actual PPP ensures that the interests, needs and values of all interested and affected parties are taken into account, and that adequate recognition is given to all forms of knowledge, including traditional and ordinary knowledge, by allowing for a 30-day commenting period above the 30-day registration period where the I&APs are given the opportunity to pose questions and request clarity on the information given.

2.13.7 ensure that the vital role of women and youth in environmental management and development were recognized and their full participation therein were be promoted?

The SIA did additional consultation to the S&EIA public consultation. The one-on-one interviews ensured that there was time to explain the project in a non-threatening environment. People were interviewed in the language of their choice. Woman and youth were specifically included in the consultation to ensure that their voices are heard.

The PPP process included various aspects to ensure the information was effectively disseminated:

- A Notification/Background Information Document (BID) was distributed to all potential Interested and Affecter Parties (I&APs) on the 18th of February 2022.
- A newspaper advert was published on the Volksblad and Noordkaap Bulletin Newspapers on the 18th and 24th of February 2022, respectively.
- Three Site Notices were erected around the site on the 18th of February 2022.
- The 30 day-Registration of I&APs period ran from 18th February 2022 to 22 April 2022.

Moreover, that the draft Reports will be distributed to all registered Interested and Affected Parties (I&APs), for their review and comments, which will form part of the Final Reports that will be submitted to the Department for decision-making. The Public Participation Process knows no gender, age and/or race, the process is open to ALL Interested parties.

2.14 Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?

A discussion with the local municipality conducted as part of the SIA confirmed that the development is in line with the local priorities (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.15 What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?

Will form part of the Soventix operational procedures in line with South African legislation (including Occupational Health & Safety) (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.16 Describe how the development will impact on job creation in terms of, amongst other aspects:

2.16.1 the number of temporary versus permanent jobs that will be created

Each 100MW unit will create approximately 124 jobs, of which 22 will be semi-skilled, 67 unskilled and the rest skilled. The operational phase will have less direct economic opportunities in the form of job creation. It will create 42 permanent positions, of which 24 will be semi-skilled and six unskilled. This will have a permanent positive impact on the people that will be employed. In addition, there may be limited secondary economic opportunities. It is estimated that the lifespan of the solar electricity generation plant is 20 years, however, this lifespan can be increased through on-going maintenance and refurbishment (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.16.2 whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area)

It can be anticipated that there are semi-skilled and unskilled labour present in the area that has experience of construction work during the establishment of the existing solar farms in the area. The municipality noted that they feel that the skills transfer from renewable energy companies up to now has been limited, and they would like to see more skills transfer programmes on a local level (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.16.3 the distance from where labourer's will have to travel

Transport will be provided, as the site will not be serviced by public transport.

2.16.4 the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits)

Apart from the direct employment opportunities, there will also be significant indirect economic opportunities for local entrepreneurs. Opportunities include transport, fencing, road maintenance, accommodation, meals, and laundry services. Several people reported that they

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established businesses that provide services to the renewable sector and has benefitted from the presence of these facilities in the area.

The highly skilled technical people will need accommodation and other hospitality services while they reside in the area during the construction period. Some of the adjacent farms offer accommodation, which may be a viable option for some of the workers. Whilst some of the technical jobs need highly skilled people that are not available locally, service providers must make use of the secondary opportunities that are available locally. (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.16.5 the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.)

The Department of Energy (DoE), through the RFP document, requires that all renewable energy bidders must illustrate how the Project will benefit the local community. At present, the DoE is stipulating that one percent of revenue generated by the project must be contributed towards socio-economic development. In accordance with the relevant BBBEE legislation and guidelines, up to four percent of profit after tax could be used for community development over and above that associated with expenditure in the area. The BBBEE Scorecard specifies the following contributions (totalling four percent):

- Enterprise development – maximum of 15 points awarded for the contribution of three percent of profit after tax, or more; and
- Socio-economic development – maximum of five points awarded for the contribution of one percent of profit after tax, or more.

If these contributions are realised, the project has the opportunity to make a real difference in the local community. Between NGOs that serve the interest of the community as a whole and the municipality Soventix can be assisted with identifying worthwhile projects that will be sustainable and lead to direct local benefits in the communities that will be affected by the project (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.17 What measures were taken to ensure:

2.17.1 that there were intergovernmental coordination and harmonization of policies, legislation and actions relating to the environment

No specific intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment took place as a result of this specific project (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022) but all relevant competent and commenting authorities were included in the PPP, and all relevant legislation and processes considered in the planning processes.

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2.17.2 that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?

No conflicts of interests have arisen as a result of this project (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022), distinct departments have jurisdiction over the various authorization applications, and no integrated processes were followed.

2.18 What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?

An impact assessment was undertaken to show that almost all identified impacts can be effectively mitigated, and many avoided by implementing the mitigation hierarchy, most significantly by choice and layout of the development footprint. Consideration of all three proposed Solar PV developments and others within a 30km radius of the project sites, indicates that the cumulative impact effect will also be mitigated. Additional impacts and quantification of cumulative impacts were assessed by the following appointed specialists:

- Terrestrial Ecology, specifically the impacts on the existing wetlands condition and associated fauna and flora,
- Agricultural Study including grazing capacity determination and soil mapping,
- Geotechnical Study,
- Riparian & Wetland Assessment & delineation,
- Social Impact Assessment,
- Heritage and Palaeontology Assessments,
- Hydrology & Geohydrology Assessments,
- Aquatic Assessment,
- Visual Assessment,
- Bat Study; and
- Traffic Study.

2.19 Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?

The mitigation measures proposed are realistic, ensured proper rehabilitation will leave limited negative environmental legacy and a manageable burden to the landowner, besides the loss of jobs to those that will have secured long-term employment. The life of the project is 20 years, and there will be no or very little residual impacts if an effective exit strategy is implemented.

2.20 What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing,

controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?

The applicant is responsible for implementing the Environmental Management Programme. The EMPr has multiple role players assigned to ensure effective implementation of the conditions of all relevant authorisations. The EMPr will also include an Emergency Preparedness Plan and Incident Management Plan.

2.21 Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?

Initial high-level sensitivity sreening, coupled with site sensitivity verification, including areas identified by specialists as sensitive, molded the development footprint boundaries. This assisted with selecting the best practicable environmental option (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

2.22 Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?

The social impacts do not occur on the sites, but in the communities around the sites and in the towns closest to the sites. The operational renewable projects in the area resulted in certain economic benefits and opportunities for the affected communities. The current energy crisis means that some of the projects may be expedited, which will also accelerate the impacts. The impacts created by the Soventix project will be cumulative to the existing positive economic impacts, and extent the live of some of the positive social impacts. It can change some of the residents lives permanently in a positive manner.

However, there are also negative impacts as a result of these projects and unless the social impact management plan is implemented as recommended, these negative cumulative social impacts could affect the communities of Hanover and De Aar. The communities are vulnerable considering the high number of children born with Foetal Alcohol Spectrum Disorders, the high unemployment levels, and absence of opportunities.

The municipality indicated that people coming from outside the area to work in the existing solar projects had a definite impact on the community. Different value systems lead to changes in behaviour, such as taverns being open on Sundays, sexual assaults, and an increase in the HIV rates. This may be a perception, as these aspects probably has been present in the community for a long time, but it must be acknowledged that these social ills are typically associated with an influx of people because of development. Since the proposed

development may contribute to the influx of people into the environment, it can be anticipated that the current negative social impacts may continue (Social Impact Assessment Report by Equispectives Research & Consulting Services, August 2022).

SECTION G: A MOTIVATION FOR THE PREFERRED FOOTPRINT WITHIN THE APPROVED SITE

The various environmental attributes associated with the preferred development footprint were assessed and effective mitigations developed in accordance with the mitigation hierarchy. Accordingly, the majority of the sensitive receptors associated with the footprint could be avoided by adjusting the development footprint area and alignment. Some of the associated assessments and motivations for the respective specialist inputs are listed below.

Agriculture: The impact of the Solar PV activity in the footprint on agriculture before the implementation of mitigations is significant since the project area that is zoned as agricultural land use. The impact is non-significant when there is implementation of mitigations that ensure less impacts on agriculture.

Animal species: The impact of the Solar PV activity in the footprint on animal species is significant when there is no implementation of mitigations because the project footprint has a high animal species sensitivity rating and there is going to be habitat loss and erosion which would be a primary risk factor for amphibians, as this would impact water quality and amphibian habitat (Henning, 2023). But it is non-significant when there is implementation of mitigations which will ensure the risks are reduced to an acceptable level.

Aquatic: The impact of the Solar PV activity in the footprint on aquatic is significant because without the implementation of mitigations the proposed Solar PV development will have an impact on the water quality of aquatic habitat by causing erosion and sedimentation that is going to lead to increased turbidity and siltation of aquatic habitats and there is also going to be chemical pollution of the water resources (Deacon, 2022). With the implementation of mitigations, the impacts imposed by the Solar PV activity can be reduced which can lead to a non-significant impact.

Archaeology & Cultural Heritage: The impact of the Solar PV activity in the footprint on Archaeology & Cultural Heritage is significant because the specialist studies conducted by A.J. Pelser in 2017 and 2021 indicated that the there was fairly large number of sites that were identified in the study dating the Stone Age, proto-historical and later historical, therefore this means this will be directly & negatively impacted by the proposed development actions (Pelser A. J., 2022).The impact of the proposed development can be reduced with the implementation of the correct mitigations.

Avian: The Solar PV activity in the footprint is going to have a significant impact on Avifauna since the sensitivity rating of avifauna on the area is high and this is because the

proposed development site is located within the Platberg Karoo Conservancy Important Bird Area (Henning, 2023), this means that the area is characterised by different kinds of avifauna species, and some are of conservation concern. The proposed development will lead to displacement of the avifauna species due to habitat loss and disturbance associated with construction and maintenance activities. There is also going to be an impact related to avian collisions with solar panels and power line infrastructure (Henning, 2023). Mitigation need to be implemented to minimise the disturbance of the proposed development on to the species (Herrmann, 2017).

Bat: The impact of the Solar PV facility on Bat species is significant since there is going to be removal of vegetation for the installation and operation of solar power plants and degradation of habitat which will result in the disturbance of important areas of bat activity (Toussaint, 2017). The impact of the Solar PV facility will be low or non-significant with the implementation of the recommended mitigations.

RFI: The overall impact of the Solar PV activity in the footprint on RFI is non-significant since the proposed solar farm development is not close to the airport, and this means there is hardly going to be any interference with radar from the solar farm (Night, 2023).

Civil aviation: The overall impact of the Solar PV activity in the footprint on civil aviation is non-significant since the proposed solar farm development is not close to the airport (Night, 2023). Even though the impact is non-significant, the applicant will still be obliged to obtain an obstacle permit from CAA.

Defence: The overall impact of the Solar PV activity in the footprint on defence is non-significant this is because there is a low environmental theme sensitivity for Defence in the footprint.

Landscape (Visual): The project footprint will be highly visible from within the site itself, as well as all immediately adjacent areas within a radius of 3.1 km this means visual impact will also be high within a radius of between 3.1 km and 6.2 km (Henwood, 2017). The solar facility will be visible from to the railway running to the south of it. This will be visually impacted on for a range of about 0 km to 10 km (in the west) (Henwood, 2017), this means that the landscape (visual) of the Solar PV will be significant if mitigation are not implemented, but will be non-significant with the implementation of mitigations.

Palaeontology: If development in the footprint occurs without the implementation of mitigation measures, then there is going to be a medium impact significant on palaeontological features in the area (Almond, 2017).

Plant Species: The Solar PV development will have a significant impact on plant species in the footprint, such as habitat destruction and fragmentation as well as alien species invasion (Henning, 2023). The implementation of recommended mitigation will reduce the impact of the Solar PV development on plant species.

Terrestrial biodiversity: The overall impact of the Solar PV development on terrestrial biodiversity is significant without the implementation of mitigations. If the mitigation measures stipulated in the terrestrial biodiversity compliance report are taken into consideration, the impact of the proposed development on the vegetation and fauna habitats can be considered as low and non-significant (Henning, 2023).

SECTION H: DESCRIPTION OF PROCESS TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE

(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including—
(i) details of the development footprint alternatives considered.

(I) DETAILS OF ALL THE ALTERNATIVES CONSIDERED

Legislative background

The very consideration of a development in terms of EIA is about the consideration of alternatives related to the development. The NEMA prescribes that all environmental impact assessments, which are to be utilised in informing an application for environmental authorisation, must identify and investigate the alternatives to the activity on the environment and include a description and comparative assessment of the advantages and disadvantages that the proposed activity and feasible and reasonable alternatives will have on the environment and on the community that may be affected by the activity. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives exist, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not implementing the proposed project, is required during the assessment phase. In this instance, the EAP managing the application must provide the competent authority with detailed, written proof of the investigation(s) undertaken and motivation indicating that no reasonable or feasible alternatives, other than the preferred alternative and the no-go option, exist.

Definition of Alternatives

"Alternatives", in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include the following types of alternatives:

- The property on which, or location where, it is proposed to undertake the activity;
  - Refers to both alternative properties (locations) as well as alternative sites on the same property.
- The type of activity to be undertaken;
  - Provision of public transport rather than increasing the capacity of roads.

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- The design or layout of the activity;
  - Different architectural and or engineering designs.
  - Consideration of different spatial configurations of an activity on a particular site (Site Layout).
- The technology to be used in the activity;
  - Option of achieving the same goal by using a different method or process.
- The operational aspects of the activity;
- Demand;
  - When a demand for a certain product or service can be met by some alternative means, i.e. the demand for electricity/storm water controls could be met by supplying more energy or using energy more efficiently by managing demand.
- Input;
  - Input alternatives for projects that may use different raw materials or energy sources in their processes.
- Routing;
  - Alternative routes generally apply to linear developments (pipeline routes).
- Scheduling and Timing;
  - Where a number of measures might play a part in an overall programme, but the order in which they are scheduled will contribute to the overall effectiveness of the end result.
- Scale and Magnitude;
  - Activities that can be broken down into smaller units and can be undertaken on different scales, i.e. for a housing development there could be the option 10, 15 or 20 housing units.
- The option of not implementing the activity (no-go option).
  - The no-go option is taken to be the existing rights on the property and this includes all the duty of care and other legal responsibilities that apply to the owner of the property. All the applicable permits must be in place for a land use to be an existing right.

The key criteria when identifying and investigating alternatives are that they should be "feasible" and "reasonable". The "feasibility" and "reasonability" of and the need for alternatives must be determined by considering, *inter alia*, (a) the general purpose and requirements of the activity, (b) need and desirability, (c) opportunity costs, (d) the need to avoid negative impact altogether, (e) the need to minimise unavoidable negative impacts, (f) the need to maximise benefits, and (g) the need for equitable distributional consequences. The (development) alternatives must be socially, environmentally and economically sustainable. They must also aim to address the key significant impacts of the proposed development by maximising benefits and avoiding or minimising the negative impacts.

Given the aforementioned definition and description of alternatives, alternatives for investigation in this assessment were first identified by considering whether the different types of alternatives could meet the general purposes and requirements of a solar electricity generating facility, and subsequently constitute a comparable activity. Thereafter, the need for an alternative was assessed to determine whether it warranted further investigation. Given the core business of the project proponent (Solar PV Systems) other technology alternatives could not be considered as legitimate alternatives for comparable assessment. Consequently, only alternatives that address site-specific impacts were considered throughout the assessment process, and mitigation(s) proposed.

Purpose and requirements of the solar PV plant

The investment in renewable energy and energy efficiency is considered important to reduce the negative economic, social and environmental impacts of energy production and consumption in South Africa (Winkler, 2006). Many renewable energy projects are particularly well suited to off-grid applications and, certainly in South Africa, could improve the flexibility of the grid by distributing generation across the country, closer to some key loads (Winkler, 2006).

Locally, the establishment of the proposed project would strengthen the existing electricity grid for the area, providing power in a short space of time (potentially less than two years to commissioning). Should the proposed project be approved it would result in long-term benefits for the De Aar area, e.g. creation of employment and business opportunities.
The requirement for the successful establishment of a Solar PV plant does include, inter alia, proximity to existing Eskom infrastructure in order to feed electricity into the grid. Access to Eskom transmission infrastructure will allow the electricity to be "wheeled" to private consumers, any point in the country.

Identification and investigation of alternatives including motivations

Alternative Type No. 1: Site and Location

- Purpose and Requirements

The proposed solar electricity generating facility intends to accommodate a photovoltaic (PV) component and associated infrastructure. The solar panels arranged in units generating capacity of 300 MW to be constructed as three separate but integrated facilities of 100 MW each. An on-site switching sub substation (Dx sub-station) will be necessary to distribute the electricity to the Main Transmission Sub-station (MTS) and allow the electricity to be fed into the existing Eskom 400 kV transmission lines by way of loop-in loop-out.

The solar PV facilities combined have a maximum export capacity (MEC) of 300MW (three 100 MW facilities are proposed). Several potential locations have been considered by the proponent, but the current location under review has been identified as preferred. The current

footprint within the property location (site) has been identified in consultation with the EAP, Client and Landowner and assessed to ensure it does not result in unacceptable social & biodiversity impacts.

The current land use is sheep farming and incidental game occurrence, which will continue within the solar PV plants to ensure minimal reduction on agricultural potential of the land as well as a management tool to control vegetation growth.

- Methodology

The project proponent (Soventix SA) has undertaken an extensive feasibility study throughout the Northern Cape to identify the best locations to develop Solar PV systems. The area chosen has included landowner consultation and proximity of appropriate Eskom infrastructure. The reason for the study area being concentrated within the Northern Cape is due to the high quality of solar irradiation of the region.

The proposed placement of the solar arrays was initially based on the following technical and topography criteria:

- Horizons,
- Gradient,
- Slope orientation,
- Accessibility; and
- Existing infrastructure (e.g. roads, power lines, substations).

The project site is located approximately 36km south-east of De Aar, and in close proximity to Hydra MTS.

The investigation included an initial spatial analysis using GIS and desk top study, followed by ground truthing with a site visit to determine the sensitive receptors and local infrastructure. The site selection of the preferred location also took into account the proximity of the N10 and other provincial roads and the important tie into the Eskom 400 kV power lines and their capacity to receive the additional electricity generation. The location alternative within that property has taken into account the avoidance of rocky outcrops (dolerite dykes), natural drainage channels including wetlands and watercourses, sensitive flora and fauna (including breeding and nesting sites of birds of conservation concern), cultural heritage sites and visual sensitive receptors.

The highest tier of the mitigation hierarchy is “avoidance”. Accurately and exhaustively identifying sensitive receptors helps ensure that significant impacts are avoided allowing for the balance of the hierarchy (including minimise, reduce & rehabilitate etc.) to be implemented on the development footprint for associated activities, in order to manage the remaining and residual impacts & risks.

- Criteria used to investigate and assess alternatives

Initially the general area for the proposed Solar PV plant was determined by the fact that the area of the Northern Cape around De Aar is one of the regions with the highest solar irradiation intensity in South Africa. The proposed site for the solar arrays was then based on the following criteria:

- Topography, including gradients & slope, soil depth & drainage (including areas of high stormwater accumulation and runoff,
- Sensitive receptors, including flora and fauna of conservation concern, cultural heritage & palaeontology, watercourses & wetlands and associated aquatic biodiversity, soil suitability (presence of dispersive soils and risk of erosion) and visual impacts,
- Biodiversity impacts, both terrestrial & aquatic at local and ecosystem level,
- Existing infrastructure (e.g. roads, power lines, substations),
- Socio-economic implications; and
- Land use compatibility considering the current land use of livestock production.

- Reasoned explanation why an alternative was or was not found to be reasonable or feasible

The project property site was chosen due to the fact that it achieves all the criteria highlighted above to accomplish a successful Solar PV plant. Due to the existing Eskom electrical infrastructure surrounding the project site, a number of grid connection options are feasible, including a 400kV overhead line loop-in loop-out of one of the existing 400Kv overhead lines between Hydra MTS and Poseidon MTS.

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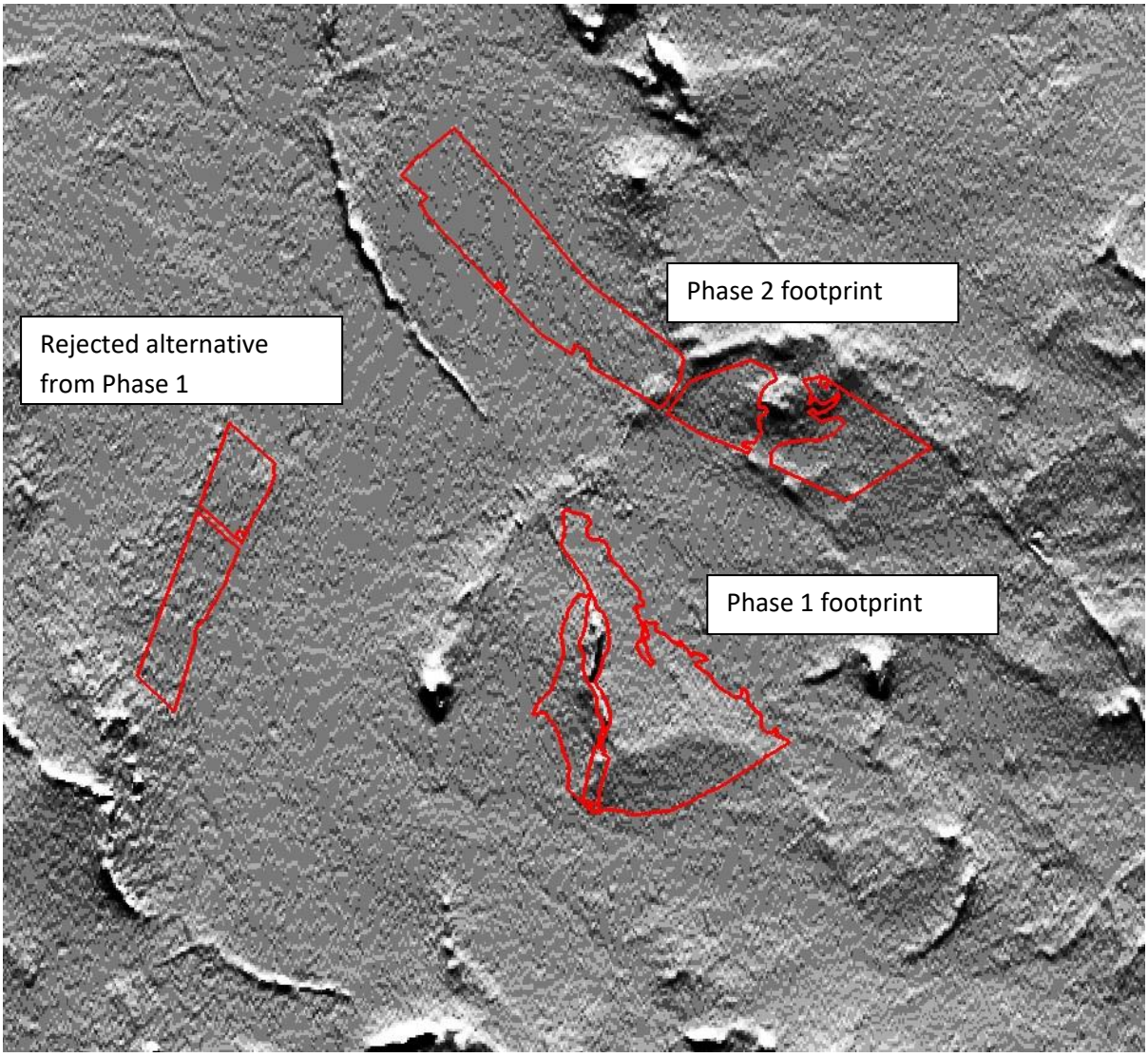

Figure 32. Hillslope images indicating the exclusion of outcrops from the development footprint and retention of flat areas.

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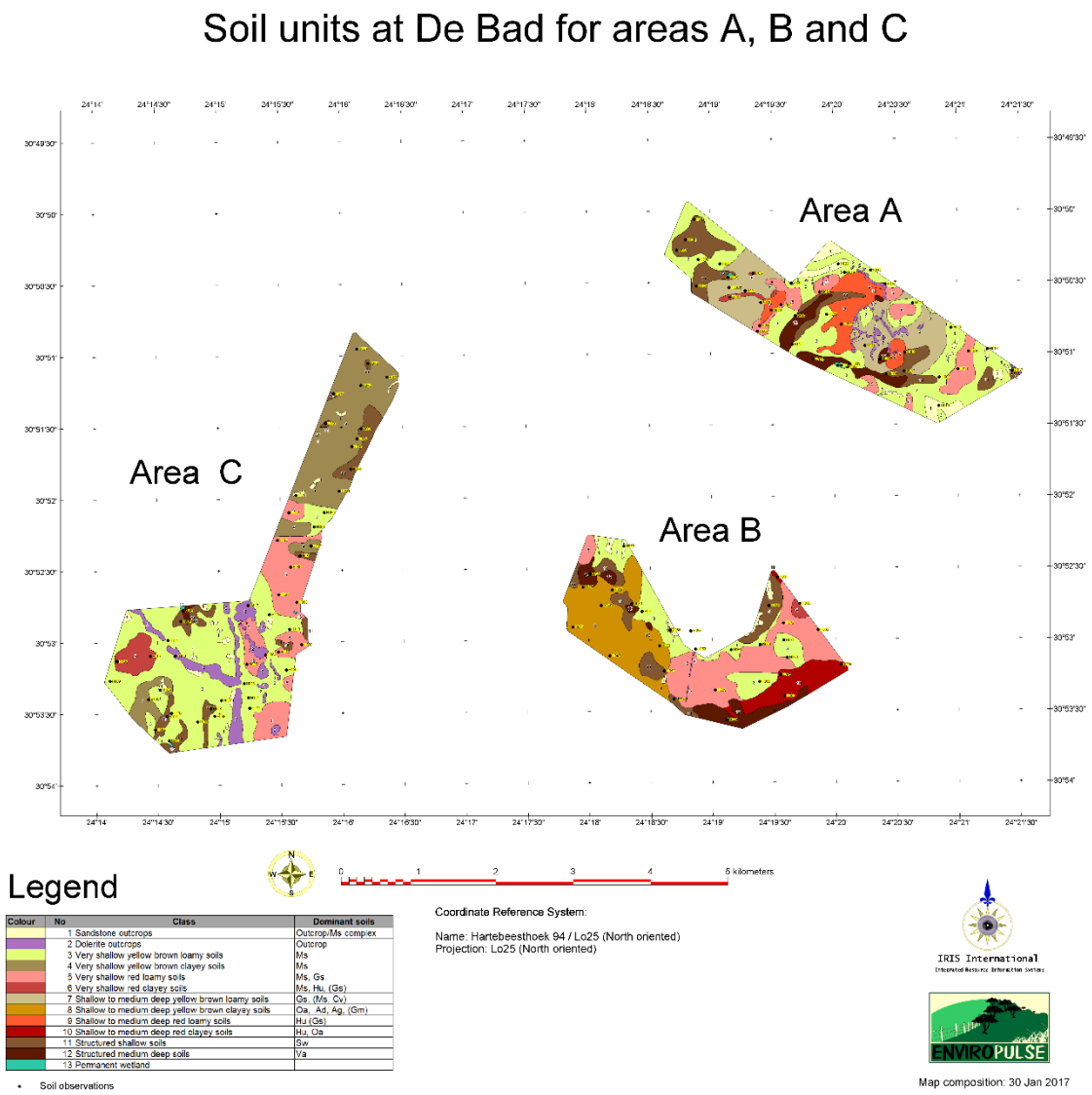
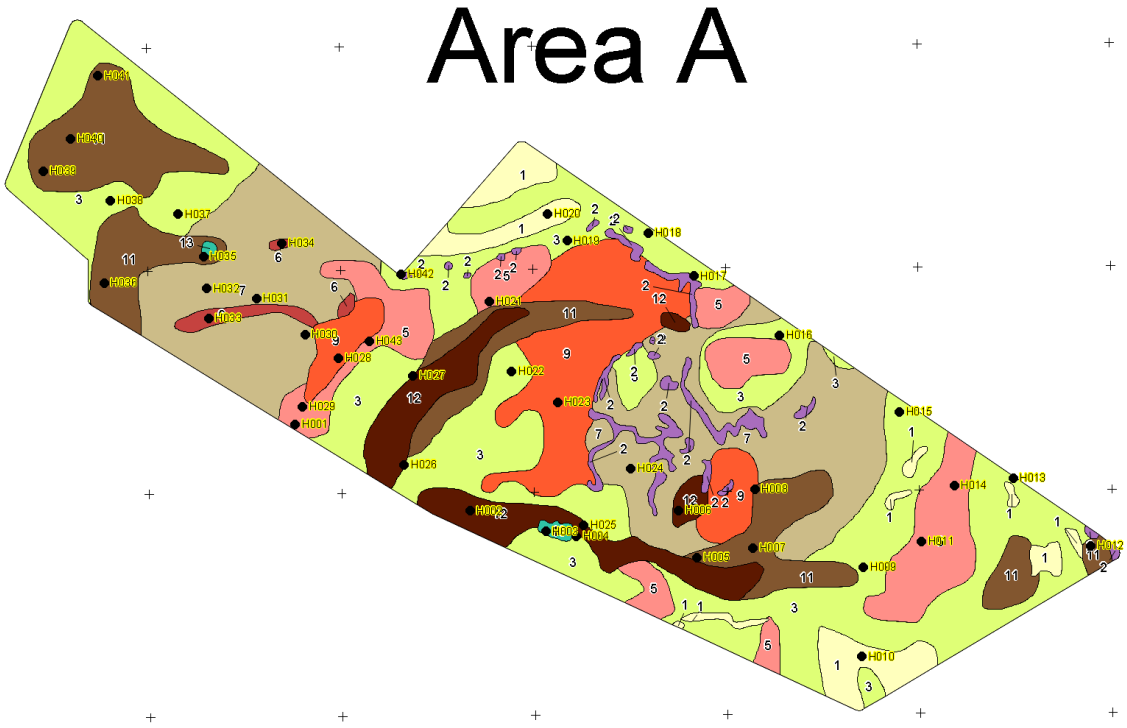


Figure 33. Soil types (forms) associated with the affected properties. Areas A & B (Phase 1 footprints) and Area C (Phase 2).



Colour	No	Class	Dominant soils
	1	Sandstone outcrops	Outcrop/Ms complex
	2	Dolerite outcrops	Outcrop
	3	Very shallow yellow brown loamy soils	Ms
	4	Very shallow yellow brown clayey soils	Ms
	5	Very shallow red loamy soils	Ms, Gs
	6	Very shallow red clayey soils	Ms, Hu, (Gs)
	7	Shallow to medium deep yellow brown loamy soils	Gs, (Ms, Cv)
	8	Shallow to medium deep yellow brown clayey soils	Oa, Ad, Ag, (Gm)
	9	Shallow to medium deep red loamy soils	Hu, (Gs)
	10	Shallow to medium deep red clayey soils	Hu, Oa, Et, Ky,
	11	Structured shallow soils	Sw
	12	Structured medium deep soils	Va
	13	Permanent wetland - artificial	
	14	Seasonal wetland	Va, Tu
	15	Water	

Figure 34. Soil types (forms) associated with the development footprint including legend.

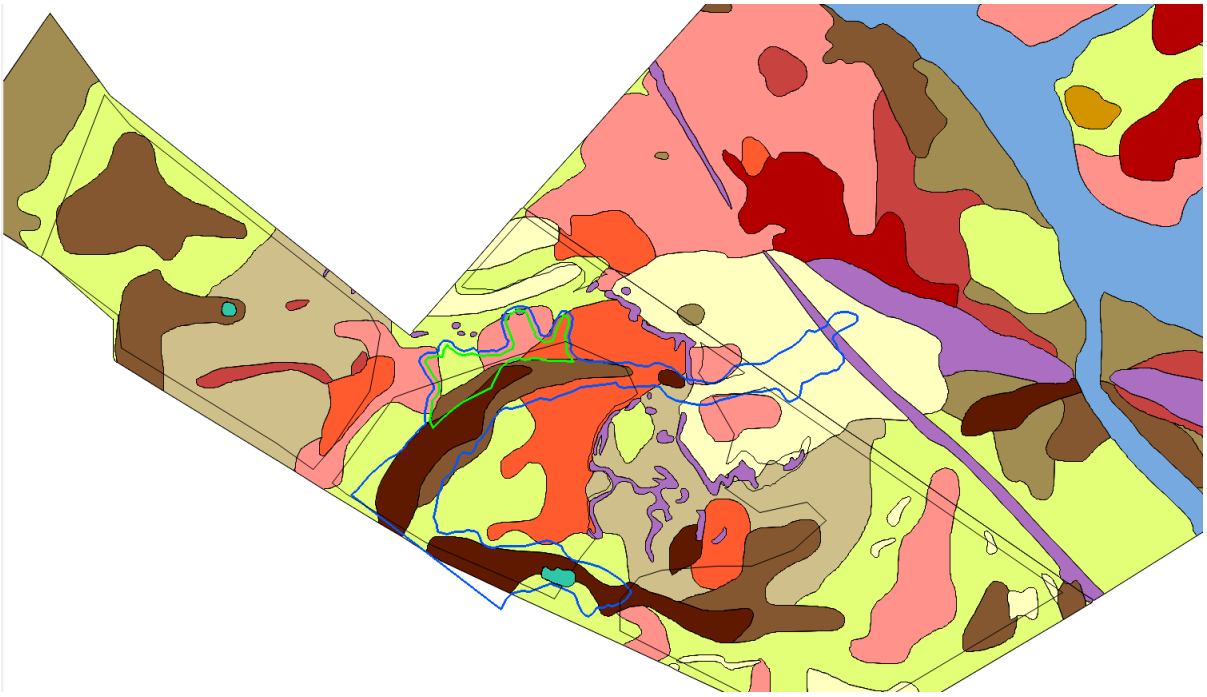


Figure 35. Soil map overlaid on areas of high rainfall stormwater runoff (green polygon) and associated buffer zone (blue polygon) in which low risk activities must take place.

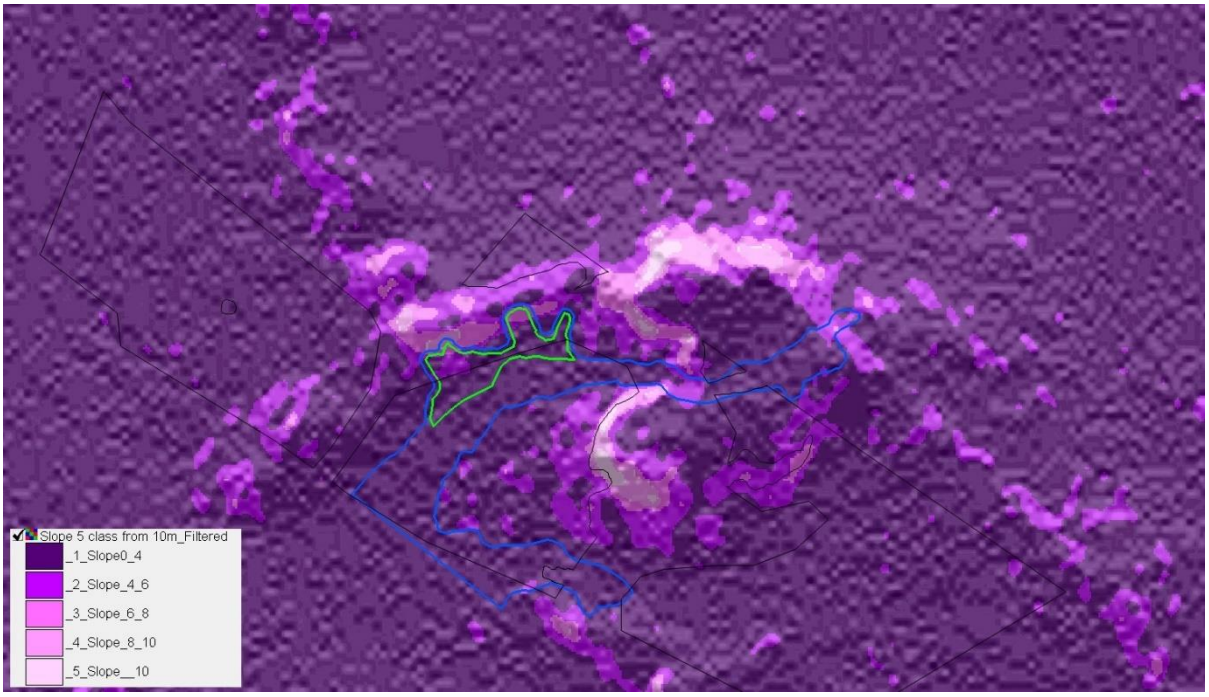


Figure 36. Area of high stormwater runoff (green polygon) and associated buffer zone (blue polygon) with associated slope gradients.

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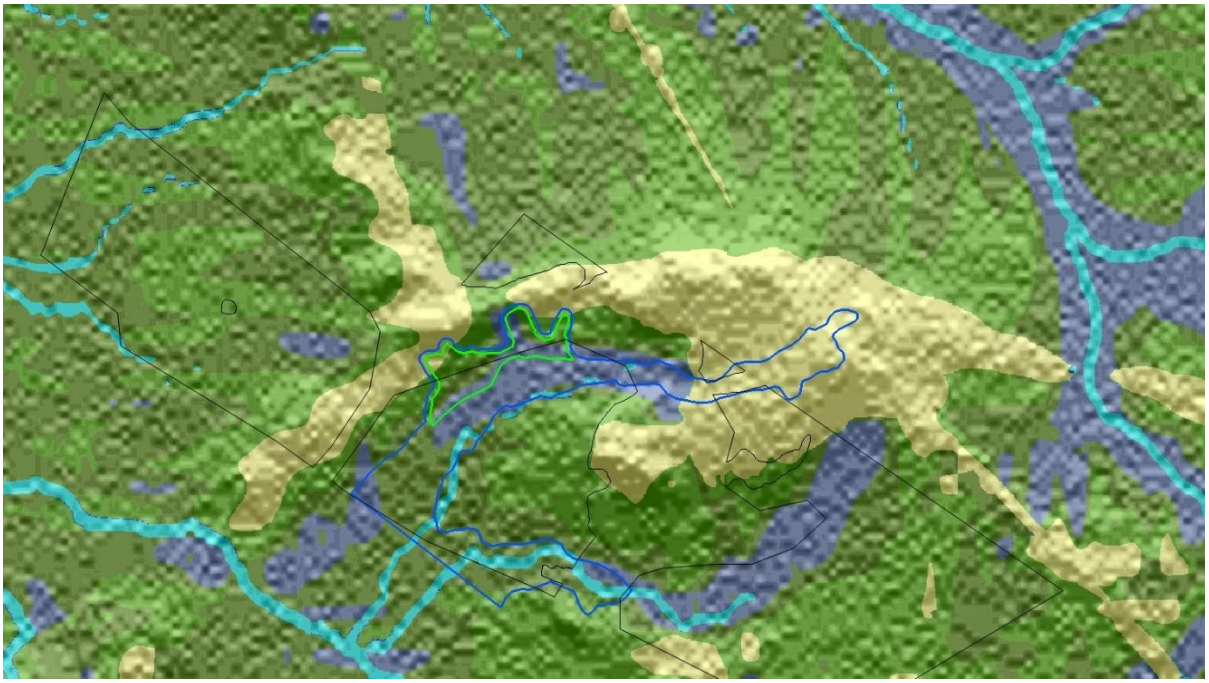

Colour	No	Class
	1	Crest
	2	Midslope convex
	3	Midslope concave
	4	Footslope
	5	Valley bottom
	6	Water

Figure 37. Area of high stormwater runoff (green polygon) and associated buffer zone (blue polygon) with associated terrain units.

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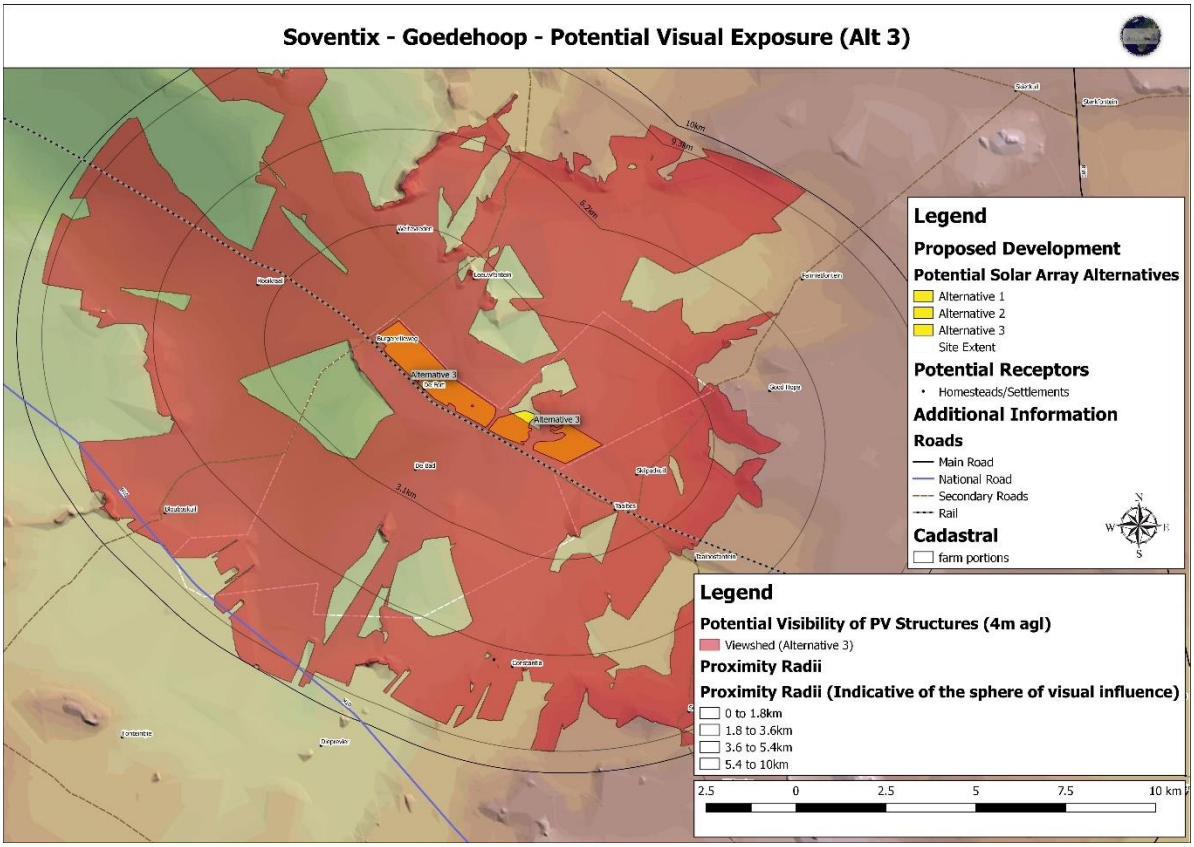

Figure 38. Viewshed analysis of the development footprint indicating sporadic impact up to 10 kms away from the footprint.

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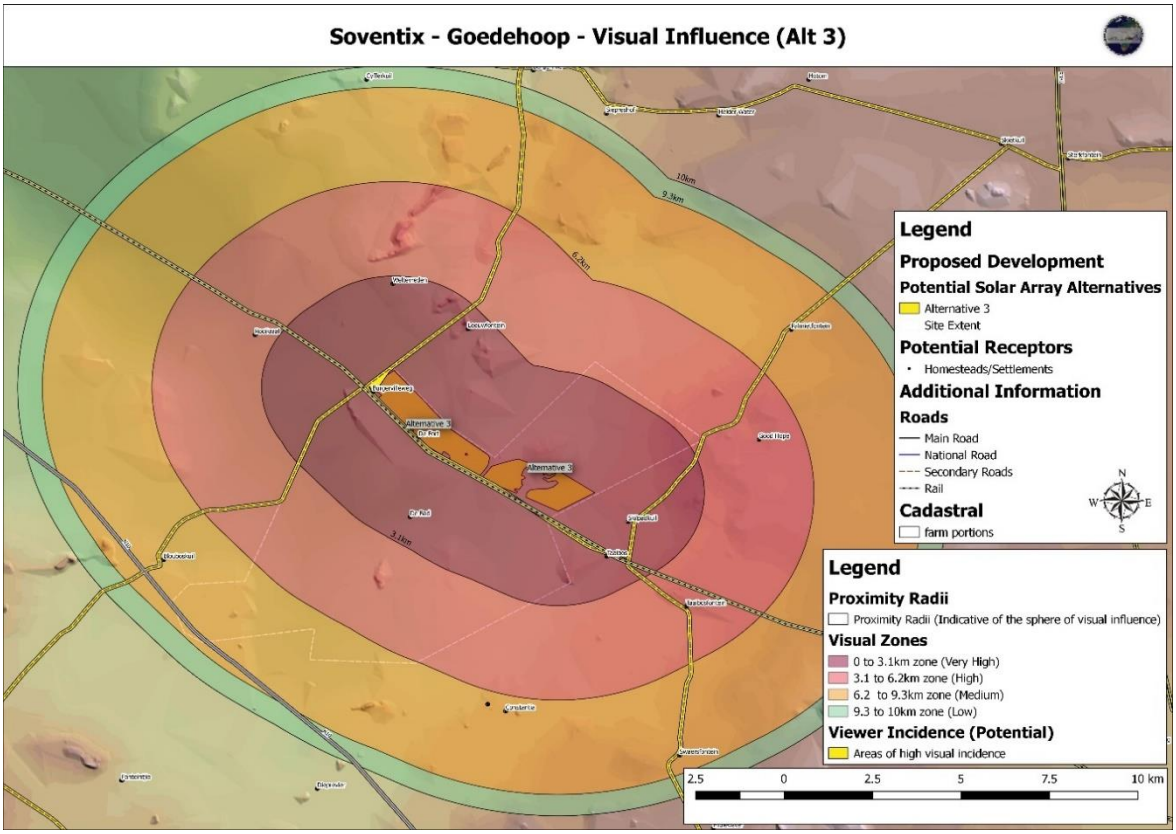

Figure 39. Visual zone of influence shows very low levels at 9 – 10 kms away from the footprint.

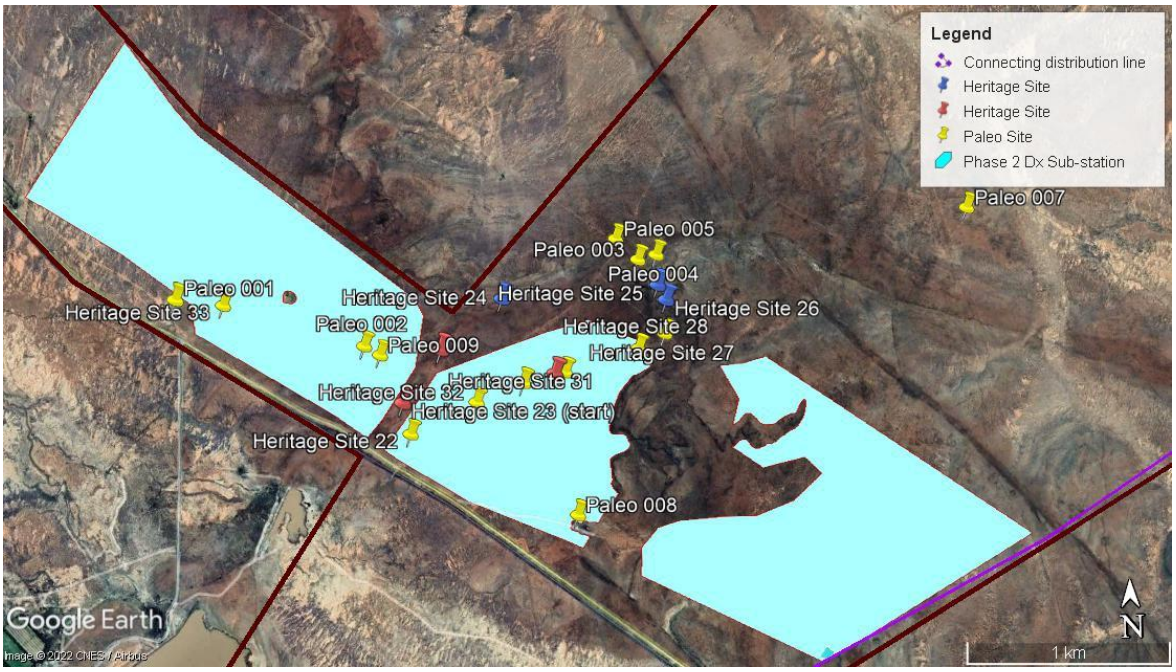

Figure 40. Heritage & Palaeontology sites associated with the Phase 2 footprint. Sites with a yellow marker indicate "low" significance, markers with a blue marker indicate "medium" significance, and markers with a "red" marker indicate "high" significance.

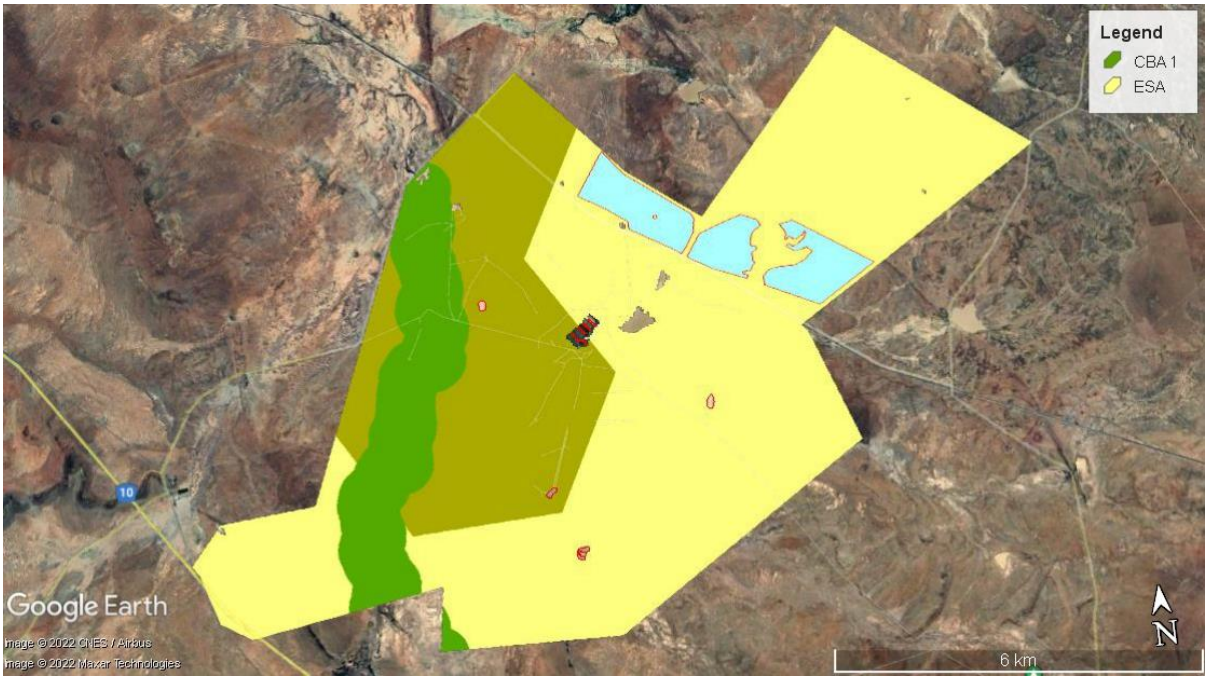

Figure 41. Location of proposed Phase 2 solar PV development relative to Critical Biodiversity Areas (CBA - green polygons) and Ecological Support Areas (ESA – yellow polygon).

Alternative Type No. 2: Type of Activity

- Purpose and Requirements

The purpose of the proposed Solar PV system, is to provide renewable energy into the grid to be wheeled to private off-takers. Additionally, the area around De Aar has been identified as a Renewable Energy Hub, which can be achieved by providing different renewable energy options.

- Methodology

Several feasibility studies have been completed by various role players that have identified solar as a preferred technology for South Africa and more specifically the Northern Cape. The annual 24-hour solar radiation average for South Africa is 220 W/m2, compared with 150 W/m2 for parts of the USA and about 100 W/m2 for Europe. Almost the whole of the interior of the country has an average insolation in excess of 5 000 Wh/m2/day. Some parts of the Northern Cape have an average insolation of over 6 000 Wh/m2/day (Winkler, 2006). The Pixley ka Seme District Municipality as entrenched in their IDP, have declared themselves as a Renewable Energy Hub due to the suitability of *inter alia* solar technologies. Indicative of the suitability of the area for solar can be seen in the awarding of 19 of the 28 preferred bidders in the 2011 REIPPP bid award within the Pixley ka Seme District Municipality.

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Investments in solar projects bring socio-economic relief to distressed communities via job creation during construction and operation. These developments help to nurture the local economy and create enterprise opportunities and social programmes.

- Criteria used to investigate and assess alternatives

Numerous reports, guideline documents and government gazettes were reviewed in order to assess the feasibility of solar PV technology as a sustainable energy generation option.

- Reasoned explanation why an alternative was or was not found to be reasonable or feasible

The suite of above-mentioned documents have already independently identified the area as a suitable solar PV development area, as well as wind energy, with several wind developments already in existence, and more proposed on the high lying areas; this leaves the flat low lying areas suitable for solar PV development.

Alternative Type No. 3: Design and Layout

Layout is informed by the requirements of various role players, most importantly the layout of the facility by Soventix SA to ensure the desired electricity generation capacity can be achieved and distributed effectively to the main transmission sub-station. Eskom also provide inputs into the design, especially with regards to the switching yard sub-stations, their capacities and associated distribution powerlines.

Alternatives in relation to layout and design will be considered in terms of environmentally sensitive areas especially which are to be avoided or mitigated by the proposed development, such as avoiding water courses and wetlands, flat and open areas away from rocky outcrops, facing north and reduced visual impact. Much of this information is provided through specialist assessment and reports. Layout constraints have specifically been informed by the presence of rocky outcrops and water courses including wetlands, which have purposely been excluded from the proposed layout. These areas were identified by several specialist as being important areas to be avoided to conserve biodiversity and minimise ecological disruptions.

The design would include mounting panels at their lowest point 0.6 m high, to allow sheep grazing to continue, which helps control the build-up of phytomass and reduces the need to manually control vegetation growth.

Alternative Type No. 4: Technology

The preferred technology for the proposed PV panels makes use of the thin film PV panels. The thin film solar panels have lower losses or in other words perform better in hot climates and higher temperatures, low radiation conditions such as in the early morning or during sunset and cloudy conditions.

Alternative mounting systems are also being investigated. There are many ground mounted structures available based on either piled or ballast systems. Piled systems utilise a metal pile that is driven into the soil on which the main structural beam is mounted. This system is utilised extensively in Europe where soils are generally deep. An advantage of this system is the mechanisation of the process, lowering the construction costs in Europe where labour is expensive. Ballast foundations utilise a concrete or other material foundation with sufficient mass to offset wind loads. This system requires no penetration of the soil and is suitable for hard rocky soils.

Polar trackers are also being considered. This system is suitable for use with standard crystalline and thin-film modules. The tracker is oriented on a north-south axis and tracks in two dimensions only (also called a 'single-axis' tracker). This system increases the performance of modules by approximately 20% over a fixed configuration. This improvement is mainly experienced early and late in the day and covers more of the morning and evening electricity usage peaks.

Alternative Type No. 5: Operational Aspects

- Purpose and Requirements

The operational phase falls outside the scope of the environmental authorisation. From an information perspective some operational aspects have been discussed. The expected operational duration of the proposed solar PV facility is 20 years. At the end of the 20-year period, two fundamental outcomes exist 1. Decommissioning of the facility and return of the footprint to agricultural land uses only and 2. Possible extension of the operational phase, with the facility even remaining a near permanent renewable energy generation facility. The feasibility of an extended life of the facility beyond 20 years, with however, depend on several factors, including but no limited landowner appetite and permission and ongoing private or public offtakes.

- Methodology

Operational aspects fall outside the authorised scope of the project and consequently do not need to be assessed. Any operational impacts & risks identified, including those by specialists, may be included as best practice but do not form part of the compliance requirements of the project. Operational components included within the gazetted Generic EMPrs for the sub-station and distribution infrastructure may require operational compliance.

- Criteria used to investigate and assess alternatives

Operational aspects have been excluded from the EMPrs associated with proposed solar Pv project, and associated electricity generation, distribution and transmission, as the Listed and Specified Activities only include "development" activities. The sub-station and distribution powerline development will fall under the gazetted Generic EMPr (Appendix 1 of GG No.

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42323, 22 March 2019). This EMPR is based on the fact that the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended (EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including but not limited to the applicant and the competent authority (CA).

The objective of the generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.
The scope of the generic EMPr applies to the development or expansion of substation infrastructure for the transmission and distribution of electricity requiring EA in terms of NEMA (DFFE, 2019).

- Reasoned explanation why an alternative was or was not found to be reasonable or feasible

Alternative operational aspects will not be investigated, as "associated operations" falls outside the scope of the Listed and Specified Activities being authorised. On-site operational activities will nonetheless be guided by international Environmental, Social, and Governance (ESG) principles. Investors are increasingly applying these non-financial factors as part of their analysis process to identify material risks and growth opportunities. Additionally, existing legislation and Corporate Social Investment (CSI) commitments of the project will clearly be guided by best labour practices in relation to optimal use of local labour, provision of a good standard workplace environment and facilities without undue or avoidable impacts on the environment. Existing standards and governing supporting authorisations (e.g. water use authorisation) will help ensure good management practice for potable water, wastewater and solid waste, taking into account operational procedures related to disposal.

Alternative No. 6: Demand

- Purpose and Requirements

Investment in renewable energy and energy efficiency is considered important to reduce the negative economic, social and environmental impacts of energy production and consumption

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in South Africa (Winkler, 2006). Many renewable energy projects are particularly well suited to off-grid applications and, certainly in South Africa, could improve the flexibility of the grid by distributing generation across the country, closer to some key loads (Winkler, 2006). The proposed development aims to utilise *inter alia* Eskom infrastructure to "wheel" the electricity to various private customers, around the country, who desire to utilise renewable energy sources.

South Africa's power generation capacity being reliant on Fossil Fuel (FF) are highly aligned with the spatial distribution of these resources. Wheeling of electricity allows for the consumption of electricity geographically dissociated from its location of generation. Renewable energy, is also dependent on the spatial distribution of the associated natural resource, but arguably less so than FF based generation (Ogier, 2020).

Methodology

This S&EIA forms part of the requisite authorisations necessary to enable the electricity generated from this renewable energy facility to be able to feed the electricity into the grid to be consumed by third parties.

Independent Power Producers (IPP) that rely on renewable resources for this generation, are subject to a number of factors that will influence generation efficiency. These factors include those within the operators control including PV characteristics, tracking, and those external to operator influence including temperature and cloud cover conditions.

Renewable IPPs are required to ensure there is sufficient power to meet generation commitments made to the client and will need to augment a capacity deficit with alterative generation capacity (Ogier, 2020).

Criteria used to investigate and assess alternatives

The energy sector is the largest contributor with 79.5% or 429 907 Gg CO2e of the total gross emissions for South Africa. This sector is broken down further into energy generation industries (60.4%), Transport (12.6%), Other sectors (11.4%), and Manufacturing industries and construction (8.6%). Since 2000 this sector has increased by 25% with the majority of the increase coming in the energy generation industry specifically. This recent increase highlights the need for IPPs to produce renewable energy to mitigate the Green House Gas (GHG) emissions from the growing needs of the country while endeavouring to meet the UNFCCC GHG commitments (Ogier, 2020).

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

Solar PV generation has been independently identified as a suitable renewable energy technology for the area which can help meet the energy demands of the country, and more specifically, private consumers, wanting to invest in and consume renewable energy.

Alternative No. 7: Input

- Purpose and Requirements

Large financial investment is required to realise the establishment of this project. Once the project has been developed, the largest (renewable) resource input would be sunshine. This component of the project provides a sustainable energy generation supply, to augment the current energy mix within the country.

Methodology

Several feasibility studies have been completed by various role players that have identified solar as a preferred technology for South Africa and more specifically the Northern Cape. The annual 24-hour solar radiation average for South Africa is 220 W/m2, compared with 150 W/m2 for parts of the USA and about 100 W/m2 for Europe. Almost the whole of the interior of the country has an average insolation in excess of 5 000 Wh/m2/day. Some parts of the Northern Cape have an average insolation of over 6 000 Wh/m2/day (Winkler, 2006). The total budgetary requirements for this project have as yet not been disclosed.

Criteria used to investigate and assess alternatives

Relevant literature.

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

Although a different type of renewable energy technology can achieve the same purpose, there is an existing Solar PV network and the long-term environmental implications of operating and maintaining the various renewable energy systems, particularly on the receiving environment, are not known for this site.

-Alternative No. 9: Scheduling and Timing

The anticipated timeframes associated with the environmental authorisation (EA) process are captured in Table 13 below. Upon receipt of the EA, water use authorisation, town planning approvals and other relevant permission, construction is expected to commence within 12 months.

Table 13: Programme associated with the environmental authorisation process.

No.	**Project Name & Type**	**Soventix De Aar Phase 2**			
	Phase	**Start date**	**End date**	**Days**	**Responsibility**
1	Project Inception and signing of contract:	19-Oct-21	08-Feb-22	112	JB
2	Site Sensitivity Verification inspection	15-Feb-22	17-Feb-22	2	JB, SM, SF
3	SSV Report	18-Feb-22	08-Jun-22	110	JB
4	Pre-application consultation with CA	26-May-22	03-Jun-22	8	JB, HM, SM, SF
5	Compile register of I&APs	09-Feb-22	15-Feb-22	6	HM, SM
6	Compile PPP documents	09-Feb-22	15-Feb-22	6	HM
7	Distribute BID, Notification Letter, Advert & Site Notices	16-Feb-22	24-Feb-22	8	JB, HM, SM, SF
8	Registration of I&APs (minimum of 30-days to register)	25-Feb-22	28-Mar-22	31	HM
9	Specialist ToR and quotes	14-Oct-21	25-Jan-22	103	JB
10	Specialist appointments	21-Feb-22	22-Feb-22	1	JB
11	Specialist studies	23-Feb-22	31-Oct-22	250	Specialists
11.1	*Traffic*	23-Feb-22	31-Oct-22	250	Sturgeon
11.2	*Aquatic*	23-Feb-22	31-Oct-22	250	Andrew Deacon
11.3	*Agriculture*	23-Feb-22	31-Oct-22	250	Iris International
11.4	*Social*	23-Feb-22	31-Oct-22	250	Equispectives
11.5	*Heritage*	23-Feb-22	31-Oct-22	250	Anton Pelser
11.6	*Paleontology*	23-Feb-22	31-Oct-22	250	John Almond
11.7	*Bats*	23-Feb-22	31-Oct-22	250	Dawn Cory Toussaint
11.8	*Terrestrial*	23-Feb-22	31-Oct-22	250	Simon Todd & AGES
11.9	*Geotechnical*	23-Feb-22	31-Oct-22	250	CGS
11.10	*Hydrology*	23-Feb-22	31-Oct-22	250	GCS
11.11	*Visual*	23-Feb-22	31-Oct-22	250	Steve Henwood & VRM Africa
11.12	*Hydrogeology*	23-Feb-22	31-Oct-22	159	GCS
12	Compile Application	29-Mar-22	18-Apr-22	20	HM, JB
13	Proponent to sign Application	19-Apr-22	03-May-22	14	Soventix
14	Preparation of Draft Scoping Report (SR)	09-Mar-22	04-Dec-22	270	JB, HM
14.1	*(a) - (d) General*	09-Mar-22	07-Jul-22	120	JB

14.2	*(e) Legislation*	09-Mar-22	07-Jul-22	120	JB
14.3	*(f) Need and Desirability*	09-Mar-22	27-Jul-22	140	HM
14.4	*(g) PPP Report*	09-Mar-22	22-Jul-22	135	HM
14.5	*(g) Preferred Alt & Impact Assess*	09-Mar-22	05-Oct-22	210	JB
14.6	*(h) Plan of Study*	09-Mar-22	14-Nov-22	250	JB
14.7	*(i) - (k) and (m) General*	09-Mar-22	04-Dec-22	270	JB
15	*Submit Application for EA*	05-Dec-22	14-Dec-22	9	HM
16	Acknowledge receipt of application by DEA (within 10 days)	15-Dec-22	15-Jan-23	32	DFFE
17	Print DSR				
18	Distribute Draft SR to CA and I&APs	05-Dec-22	14-Dec-22	9	HM
19	30-day comment period of DSR	15-Dec-22	04-Feb-23	52	I&APs & CA
20	Public Meeting				
21	Include comments from CA and I&APs into Final SR	05-Feb-23	16-Feb-23	11	HM
22	Printing Final SR			0	HM
23	Submission of FSR & PoS to DEA (hard copy) & I&APs (digital copies) - within 44 days of **receipt** of application, including 30-days PPP	17-Feb-23	17-Feb-23	HM	HM
24	Acknowledgement of receipt of FSR by DEA (within 10 days)	18-Feb-23	27-Feb-23	10	DFFE
25	Consideration and acceptance of Final SR by DEA (within 43 days of receipt of FSR)	18-Feb-23	01-Apr-23	43	DFFE
26	Additional Specialist Studies (EIA)	28-Feb-23	18-Mar-23	30	JB, Specialists
27	Review of Specialist Studies & inclusion of findings into DEIAr	19-Mar-23	07-Apr-23	20	JB, HM
28	Compile DEIA report	18-Feb-23	03-May-23	75	HM, JB
28.1	*(a) - (d) General*	18-Feb-23	27-Feb-23	10	JB
28.2	*(e) Legislation*	28-Feb-23	13-Mar-23	14	JB
28.3	*(f) Need & Desirability for Prefer*	14-Mar-23	03-Apr-23	21	HM
28.4	*(g) Motivation for Preferred*	04-Apr-23	17-Apr-23	14	JB
28.5	*(h) Alternative & Impact*	18-Apr-23	27-Apr-23	10	JB

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	Assess				
28.6	*(i) - (j) Impact Assess preferred Alt*	28-Apr-23	13-May-23	16	JB
28.7	*(k) Summary of Specialist Reports*	14-May-23	19-May-23	6	JB, HM
28.8	*(l) Environmental Impact Statement*	20-May-23	21-May-23	2	JB, HM
28.9	*(m) - (w) General & EMPr*	22-May-23	02-Jun-23	12	JB
28.10	Consolidate all info into DEIAr	03-Jun-23	04-Jun-23	2	JB
29	Print DEIAr				
30	Distribute draft EIAr & EMPr to CA & I&APs (digital copies)	05-Jun-23	05-Jun-23	1	HM
31	Comment period on DEIAr (30 days)	06-Jun-23	05-Jul-23	30	I&APs
32	Pubic Meeting				0
33	Incorporate I&AP and CA comments into final EIAr & EMPr	06-Jul-23	15-Jul-23	10	JB, HM
34	Printing of FEIAr & EMPr			0	HM
35	Submission of FEIAr & EMPr to DEA & I&APs (digital copies) (within 106 days of acceptance of FSR)	16-Jul-23	16-Jul-23	1	HM
36	Acknowledge receipt of EIAr by DEA	16-Jul-23	25-Jul-23	10	DFFE
37	DEA decide to grant / refuse EA (within 107 days of receipt of EIAr)	16-Jul-23	30-Oct-23	107	DFFE
38	DEA notify applicant of EA	31-Oct-23	04-Nov-23	5	DFFE
39	Notify I&APs of the decision	31-Oct-23	13-Nov-23	14	HM
40	"Cool down" period & project handover	31-Oct-23	19-Nov-23	20	Soventix

-Alternative No. 10: Scale and Magnitude

The appointed specialists provided feedback on biophysical and social environmental aspects of the proposed development footprint which will in turn guide the scale and magnitude of the layout and design.

-Alternative No. 11: No-go Option

The option of not implementing the activity (no-go option) was used as the benchmark against which all impacts associated with the proposed development were assessed.
The No-Go alternative relates to the option of not developing the proposed Solar PV plant and associated infrastructure (i.e. the Status Quo). If the proposed project is not developed, the current land use activities are assumed to continue in the long-term including grazing of livestock.

If the proposed activity was not to go ahead, there would be no additional impacts on the local biodiversity, hydrology, heritage resources provided the current land use remained the same as livestock grazing intensity and carrying capacity. However, the no-go option would result in a loss of positive opportunities including an increase in renewable energy source and therefore helping reduce South Africa's dependence on non-renewable fossil fuels. There would also be a lost opportunity within job creation and skills development associated with the proposed project.

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(II) DETAILS OF THE PUBLIC PARTICIPATION PROCESS

(ii) details of the public participation process undertaken in terms of regulation 14 of the Regulations, including copies of the supporting documents and inputs.

Table 14: Checklist of regulated public participation processes.

Regulation	Yes	No
If the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land.	☑ The applicant has an agreement in place with the landowner.	
Report submitted in terms of regulation 21 and the environmental impact assessment report and EMPr submitted in terms of regulation 23; was subjected to must give all potential or registered interested and affected parties, including the competent authority, a period of at least 30 days to submit comments on each of the basic assessment report, EMPr, scoping report and environmental impact assessment report, and where applicable the closure plan, as well as the report contemplated in regulation 32, if such reports or plans are submitted at different times.	☑ A Final Scoping Report was submitted to the Competent Authority, following circulation of the Draft Scoping Report to interested and affected parties for the 30day commenting period. This is the Draft EIA Report to be circulated to interested and affected parties for the 30day commenting period.	
The public participation process contemplated in this regulation must provide access to all information that reasonably has or may have the potential to influence any decision with regard to an application unless access to that information is protected by law and must include consultation with- (a) the competent authority; (b) every State department that administers a law relating to a matter affecting the	☑ A background information document was distributed to all potential interested and affected parties. Advertisements were placed. Notices were erected. All reports will be	

environment relevant to an application for an environmental authorisation; (c) all organs of state which have jurisdiction in respect of the activity to which the application relates; and (d) all potential, or, where relevant, registered interested and affected parties.	distributed for a 30day commenting period prior to Departmental submission.	
The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by-	☑ Relevant guidelines have been taken into account for public participation process.	
(a) fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of- (i) the site where the activity to which the application or proposed application relates is or is to be undertaken; and (ii) any alternative site;	☑ Notices were erected.	
(b) giving written notice, in any of the manners provided for in section 47D of the Act, to- (i) the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken; (ii) owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken; (iii) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area; (iv) the municipality which has jurisdiction in the area; (v) any organ of state having jurisdiction in respect of any aspect of the activity; and (vi) any other party as required by the competent authority;	☑ A background information document was distributed to all potential interested and affected parties.	

(c) placing an advertisement in- (i) one local newspaper; or (ii) any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations; (d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii);and (e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to- (i) illiteracy; (ii) disability; or (iii) any other disadvantage.	☑ Advertisements were placed in both a local and provincial newspaper.	
(3) A notice, notice board or advertisement referred.to in subregulation (2) must- (a) give details of the application or proposed application which is subjected to public participation; and (b) state- (I) whether basic assessment or S&EIR procedures are being applied to the application; (ii) the nature and location of the activity to which the application relates; (iii) where further information on the application or proposed application can be obtained; and (iv) the manner in which and the person to whom representations in respect of the application or proposed application may be made.	☑ Notices were erected around the site.	
(4) A notice board referred to in subregulation (2) must-	☑	

(a) be of a size at least 60cm by 42cm; and (b) display the required information in lettering and in a format as may be determined by the competent authority.	The Notices were 60cm by 42cm.	
(5) Where public participation is conducted in terms of this regulation for an application or proposed application, subregulation (2)(a), (b), (c) and (d) need not be complied with again during the additional public participation process contemplated in regulations 19(1)(b) or 23(1)(b) or the public participation process contemplated in regulation 21(2)(d), on condition that- (a) such process has been preceded by a public participation process which included compliance with subregulation (2)(a), (b), (c) and (d); and (b) written notice is given to registered interested and affected parties regarding where the- (I) revised basic assessment report or, EMPr or closure plan, as contemplated in regulation 19(1)(b); (ii) revised environmental impact report or EMPr as contemplated in regulation 23(1)(b); or (iii) environmental impact report and EMPr as contemplated in regulation 21(2)(d); may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due.	Not applicable.	
(6) When complying with this regulation, the person conducting the public participation process must ensure that- (a) information containing all relevant facts in respect of the application or proposed application is made available to potential interested and affected parties; and (b) participation by potential or registered interested and affected parties is facilitated in such a manner that all potential or registered interested and affected parties are provided with a reasonable opportunity to comment on the application or proposed application.	☑ All reports will be distributed for a 30-day commenting period prior to Departmental submission.	

1. Introduction

The Public Participation Process (PPP) is undertaken in accordance with Chapter 6 of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, taking into consideration the Public Participation 2017 Guideline Document (DEA, 2017).

2. Objectives of the public participation

The level of public participation is determined by taking into account the scale of the anticipated impacts of the proposed project/amendments, the sensitivity of the affected environment and the degree of controversy of the project/amendments, and the characteristics of the potentially affected parties. Based on the findings of the above considerations, the PPP will not elaborate on the minimum requirements of the public participation process outlined in the EIA Regulations, 2014. The previous public participations undertaken for the Phase 1 EA and its Amendments have proven that there is no need for alternative methods, as there are no people who are unable to participate in the process due to illiteracy, disability or any other disadvantage.

3. Identification of interested and affected parties

Over and above the placement of site notices on site and an advert in the local newspaper inviting I&APs to participate in the amendment application process, certain stakeholders were specifically & directly approached (organs of state, the owner or person in control of the land etc.) who are automatically regarded as I&AP's.

The following means of identifying stakeholders was used:

- a property and deeds search will be undertaken of all adjacent properties and included as directly affected I&APs.
- the newspaper advert invited and/or called for any other potential I&APs that were not included in the initial EIA process.
- the existing list of I&APs from the original Phase 1 EA Application (authorized under 14/12/16/3/3/2/998) and its Amendments was used for this Phase 2 EA Application.
- network or chain referral systems according to which key stakeholders were asked to assist in identifying other stakeholders, including requesting ward councillors to notify and engage with community members within their ward.
- landowners were provided a tailored Background Information Document (BID)/Notification in Afrikaans, which is the most widely spoken local language, for distribution to their land occupiers.

4. Notification of interested and affected parties

All potential and registered I&APs have a right to be informed early and in an informative and proactive way regarding proposals that may affect their lives or livelihoods. Early communication aims to build trust among participants, allow more time for public participation, and improve community analysis. It also increases opportunities to modify the

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proposed development to effectively address relevant issues and comments received during the PPP.

4.1 Method of notification

The notification of a development/amendment proposal to I&APs can be given through a number of methods including fixing of notice boards, providing written notice and placing advertisements. Potentially interested and affected parties will be notified of the proposed development application by –

a. fixing a notice board at a place conspicuous to the public at the boundary or on the fence of –
    i. the site where the activity to which the application relates is or is to be undertaken; and
    ii. any alternative site mentioned in the amendment application.

Three (3) notices (**Annexure E**) were erected at the below-mentioned locations:

Location 1: 30°50'54.40"S & 24°19'29.10"E
Location 2: 30°52'31.83"S & 24°13'26.69"E
Location 3: 30°50'32.76"S & 24°18'51.09"E

b. giving written notice to –

We already had a database of Interested and Affected Parties from the Phase 1 EA Application and its amendments. Therefore, a Background Information Document (BID) or Notification (in both English and Afrikaans) was prepared and distributed via email to the parties on the I&AP register. Email submissions requested a "delivery receipt" and "read receipt". The notification included the contact details that the I&AP can use to contact and communicate with the EAP.

Written notice (Notification Letter – **Annexure B**) was given to the landowner and occupiers and owners and occupiers of land adjacent to the various farms in the Hanover District (Remainder of Farm Goedehoop 26 C, Portion 6 of Leuwe Fountain 27 C, Remainder of Farm Riet Fountain 39 C, Portion 1 of Farm Riet Fountain 39C, Remainder of Kwanselaars Hoek 40 C, Portion 1 of Kwanselaars Hoek 40 C, Portion 4 of Taaibosch Fontein 41C, Portion 1 of Farm Kafferspoort 56C) and organs of state having jurisdiction in respect of the proposed activity, whose details are captured in the Table below.

The BID/Notification was prepared and distributed via email to all parties on the I&AP register as per section 47D of NEMA. Email submissions requested a "delivery receipt" and "read receipt"; to track receipt of the document. The BID/Notifications were sent on the 18th of February 2022 of which proof of distribution is included as **Annexure C**.

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List and details of landowners, land occupiers and organs of state:

The owner or person in control of that land if the applicant is not the owner or person in control of the land: • Willem Retief: willemjretief@gmail.com; 082 944 7167
Owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken: **Remainder of FARM No. 149 (Farm Goodhope):** Ricky Vimpany, richard.vimpany@bravospace.co.za **Remainder of LEUWE FOUNTAIN No. 27 (Farm: Leeuwfontein):** Corneulis Oosthuizen, cmo.karoo@gmail.com, 074 114 3950 **Portion 1,2 & 4 LEUWE FOUNTAIN No. 27 (Farm Weltevrede):** Pieter du Toit, psdutoit4@gmail.com, 083 278 2590 **Remainder of TAAIBOSCH FONTEIN No. 41 and Portion 1 (Farm: Constancia):** Andries Pienaar, andriespienaar@hotmail.com, 082 762 2206 **Portion 2 & 5 TAAIBOSCH FONTEIN No. 41 (Farm: Skilpadskuil):** Manual Orfao, morfao@worldonline.co.za, 082 784 1972 **Portion 3 of TAAIBOSCH FONTEIN No. 41:** Dawie du Plessis, l.duplessis@live.com, 083 544 4139 **Remainder & Portion 7 &9 of KAFFERSPOORT No. 56 (Farm: Dieprivier):** Andries Pienaar, andriespienaar@hotmail.com, 082 762 2206 **Remainder of BARENDS KUILEN No. 38, Remainder & Portion 1 of BLAAUWBOSCH KUILEN OUTSPAN No. 37 (Farm: Blaawboschkuil):** Christiaan Venter, christiaanv@adsactive.com, 082 378 3601
The municipal councillor of the ward in which the site or alternative site is situated and any organisation of rate payers that represent the community in the area: • Lena Elizabeth Andrews (Ward 6), leandrews@emthanjeni.co.za, 0718089336 • Mr Patrick Mhlawuli (Ward 8), ppmhlauli@emthanjeni.co.za; 083 8829 450 • Mr S Makhandula (Ward 3); smakhandula@emthanjeni.co.za; 063 233 8588. • Jaco Blom (Rate Payers Association), blomdeaar@gmail.com, 072 780 1288 • Hentie vd Merwe (Rate Payers Association), vdm@deaarsa.co.za
The municipality which has jurisdiction in the area: **Emthanjeni Local Municipality** • Mr T Msengana (Municipal Manager); tmsengana@emthanjeni.co.za; Tel: 053 632 9101 • Ms Marushel Meyers (PA); mmeyers@emthanjeni.co.za; Tel: 053 632 9101 • Ms Lucy Billie (Town Planner)); lbillie@emthanjeni.co.za, Tel: 053 632 9111 • Mr M Joka (Director Technical Services), mjoka@emthanjeni.co.za • Ms Lelethu Thiso, thiso@emthanjeni.co.za **Pixley ka Seme District Municipality**

- Mr Isak Visser (Municipal Manager); ivisser@pksdm.gov.za; Tel: 053 631 0891;
- Mr Nomapaseka Present (PA); mm@pksdm.gov.za; Tel: 053 631 0891
- Mr Sonwabile Nkondefhe (Env Director); pixley@telkomsa.net; Tel: 053 631 0891
- Mr Simon Baas (Town Planner); sbaas@pksdm.gov.za; Tel: 053 631 0891

Any organ of state having jurisdiction in respect of any aspect of the activity:

Department of Fisheries, Forestry and the Environment (DFFE)

- Ms Masina Letsoana; MLetsoane@environment.gov.za;
- Mr Lunga Dlova; LDlova@environment.gov.za;
- Ms. Mmatlala Rabothata; MRabothata@environment.gov.za
- Ms. Tsholofelo Sekonko; tsekonko@environment.gov.za
- Ms. Aulicia Maifo; amaifo@environment.gov.za
- Mr Stanley Tshitwamulomoni , stshitwamulomoni@environment.gov.za

Department of Water & Sanitation (DWS)

- Mr A. Abrahams; AbrahamsA@dwa.gov.za; Tel:053 830 8802
- Mr Shaun Cloete; CloeteS@dws.gov.za; Tel: 054 338 5800
- Ms Chantel Schwartz; schwartzc@dws.gov.za; Tel: 054 338 5800
- Ngidi Ziyanda, NgidiZ@dws.gov.za
- Hlengani Alexia, HlenganiA@dws.gov.za
- Mokhoantle Lerato, MokhoantleL@dws.gov.za
- Feni Ntombizanele, FeniN@dws.gov.za
- Moalosi Kelebogile, MoalosiK@dws.gov.za
- Rasikhanya Tendamudzimu, RasikhanyaT@dws.gov.za
- Franks Lindiwe, FranksL@dws.gov.za

Department of Environment & Nature Conservation (DENC)

- Thulani Mthombeni; tmthombeni@ncpg.gov.za; Cell: 072 409 2277
- Doreen Werth; dwerth@ncpg.gov.za; 060 991 4675
- Dineo Moleko; dmoleko@ncpg.gov.za; 053 807 7467

Department of Roads & Public Works (DPW)

- Ms N. Corns (Secretary to HOD); ncorns@ncpg.gov.za; Tel: 053 839 2109
- Mr J Roelofse (Director); roelofse.j@vodamail.co.za; Tel: 053 839 2249

Department of Transport, Safety & Liaison

- Ms T. Modiakgotla; tmodiakgotla@ncpg.gov.za; Tel: 053 839 1702

Department of Agriculture Fisheries and Forestry (DAFF)

- Samkelisiwe Lubanga; SamkelisiweL@daff.gov.za; Cell 083765 4691
- Jacoline Mans; JacolineMa@daff.gov.za; Cell: 0828082737
- Ms Thoko Buthelezi (AgriLAnd Liason office); ThokoB@daff.gov.za; Tel: 012 319 7634
- Ms Hettie Buys (Act 70/70 Registry); HettieB@daff.gov.za

Department of Agriculture, Land Reform & Rural Development

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- Mr Hannes Roux; hroux@ncpg.gov.za; Tel: (053) 631 0074
- Ms Mangalane Du Toit (Chief Director: Land Restitution Support); Mangalane.DuToit@drdlr.gov.za; Tel: (053) 807 5700
- Ms Samantha Rabie (PA); samantha.rabie@drdlr.gov.za

Department of Energy (DoE)

- Johannes Mokobane; johannes.mokobane@energy.gov.za; 0124067804

Department of Mineral Resources (DMR)

- Mr Pieter Swart (Regional Manager); pieter.swart@dmr.gov.za;
- Ms Lungi Mondela (Secretary); lungi.mondela@dmr.gov.za; Tel: (053) 807 1700
- Mr Vincent Muila (Env Officer); vincent.muila@dmr.gov.za; Tel: 053 807 1716

Any other party as required by the competent authority/EAP:

SAHRA

- Loaded onto SAHRIS

EWT

- Head Office, ewt@ewt.org.za; Tel: 011 372 3600
- Cobus Theron; cobust@ewt.org.za; Tel: 021 788 5661
- Bonnie Schumann; bonnies@ewt.org.za; Tel: 021 788 5661

WESSA

- Sandy Crake; admin@wessa.co.za; Tel: (021) 701 1397

South African Civil Aviation Authority (SACAA)

- Themba Thabete; thabethet@caa.co.za

SENTECH

- Leticia Vollner; info@sentech.co.za; Tel: 021 525 3609;

Square Kilometre Array (SKA)

- Dr. Adrian Tiplady; atiplady@ska.ac.za; Cell; 0723720134

Bird Life SA

- Ernest Retief; Email: ernst.retief@birdlife.org.za; Cell: 082 325 6608

South African Large Telescope (SALT)

- Dr Ramotholo Sefako; rrs@saao.ac.za; Cell: 084 770 5100

Northern Cape Provincial Heritage Agency - Ngwao-Boswa Jwa Kapa Bokone

- Andrew Ratha Timothy, rtimothy@nbkb.org.za

Northern Cape Chamber of Commerce and Industry

- Sharon Steyn, sharon@nocci.co.za

South African Photovoltaic Industry Association (SAPVIA)

- Lineo Masopha, lineo@sapvia.co.za

South African National Energy Development Institute (SANEDI)

- Funanani Netshitomboni, funananin@sanedi.org.za

Independent Power Producer Office

- Desiree Otto; desiree.otto@ipp-projects.co.za

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Centre for Environmental Rights • Phumla Yeki, pyeki@cer.org.za
Servitude Holders: **ESKOM** • Bossie Uys; uysj@eskom.co.za; Tel: 053 632 6714 • Henk Wydeman; WydemaH@eskom.co.za • Daan Liebenberg; LiebenDa@eskom.co.za • Keketso Mbete; MbeteKC@eskom.co.za **SANRAL** • Nicole Abrahams; abrahamsn@nra.co.za; Email: 021 957 4602 **TRANSNET** • Joey Bowers; joey.bowers@transnet.net; Tel: 053 632 8303/8

c. placing an advertisement in –
   i. one local newspaper; or
   ii. any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
   iii. one provincial newspaper or national newspaper if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken.

An advertisement was placed in Nooordkaap Bulletin (a provincial newspaper) on 24 February 2022 and Volksblad (a local newspaper) on 18 February 2022. The proposed activity will not have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it will be undertaken (**Annexure F**).

d. using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person desires of but unable to participate in the process due to illiteracy, disability or any other disadvantage.

Landowners were provided a tailored Background Information Document (BID)/Notification in Afrikaans, which is the most widely spoken local language, for distribution to their land occupiers. Additionally, weather-proof notices were erected around the site and the Emthanjeni Local Municipality was asked to place the advert in their Facebook page.

4.2 Proof of notification

Proof of Notification via email was provided.

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4.3. Notification of interested and affected parties of reports and other studies

Proof of Notification of the scoping report via email was provided.

5.Engagement with Interested and affected parties

- I&APs were listed and given access and opportunity to comment on all written submissions via email. Email submissions requested a "delivery receipt" and "read receipt".
- Responses are provided to all comments received,
- Feedback to interested and affected parties is recorded on the Comments and Response sheet, which will be used as a disclosure of interested and affected parties' interests.
- Once a decision has been made, all registered interested and affected parties will be notified via email and Newspaper Advertisement.
- The email correspondence included the below excerpt in compliance with the Protection Of Personal Information Act, 2013 (POPIA).
- **POPIA Consent.** Kindly be advised that should you receive unsolicited correspondence directly from us, and you are (i) an occupier, owner or person in control of the site or any alternative site where the activity is to be undertaken, (ii) an owner, person in control or occupier of land adjacent to the site or any alternative site where the activity is to be undertaken, (iii) the municipal councillor of a ward, (iv) any organisation of ratepayers that represents the community, (v) a municipality, (vi) any organ of state having jurisdiction in respect of any aspect of the activity, or (vii) any other party as required by the competent authority, then we were required to give you notice in terms of EIA Regulation 41(2), and had to therefore derive your information, including name, contact details and address, from a public record. Alternatively, you may have been referred to us. If you are not an organ of state, did not submit written comments or attend meetings, did not request in writing for your name to be placed on the register, then we are not obligated in terms of EIA Regulation 42 to retain a record of your personal information in a register of interested and affected parties, and as such, must obtain proof of consent provided by yourself. To this effect, kindly complete and return the last two pages of the Background Information Document, called POPIA Consent Form, or alternatively, reply to this email and confirm your consent as described below. Failure to provide consent (or comments) may impact your eligibility as a registered I&AP and opportunity to comment on reports and plans. Alternatively, should you not wish to participate or provide comments, then you are welcome to request that we delete your information from our records (the register of I&APs). Thank you.
- ☐ I, in my capacity as the data subject, give consent to ecoleges, in its capacity as the responsible party, to process my personal information for purposes of pursuing its legitimate interests or those of a third party to whom the information is supplied, but

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limited to (1) the submission of reports or plans for comment, (2) transferring the same information to a third party, including registered interested and affected parties, the competent authority and applicant or holder of the environmental authorisation, (3) submitting a copy of an appeal against a decision to grant or refuse environmental authorisation, and/or (4) submission of environmental audit reports (containing recommendations for amending the EMPr) for comment.

5.1. Notification of interested and affected parties of reports and other studies

The "Draft Scoping" report – with the Plan of Study, appendices and specialist plans of study was disseminated on 09 January 2023 to all Interested and Affected Parties (full list of I&APs in **Annexure D**), for a 30-day commenting period.

As such, the Draft Environmental Impact Assessment Report (with appendices and specialist studies) will be disseminated on 02 June 2023 to all Interested and Affected Parties, for a 30-day commenting period.

5.2. Interested and affected parties

- I&APs were listed and given access and opportunity to comment on all written submissions via email, which requested a "delivery receipt" and "read receipt"; to help ensure they receive the document. The notification included the contact details that the I&AP can use to contact and communicate with the EAP.
- Responses are provided to all comments received,
- Feedback to interested and affected parties is recorded in the Comments and Response sheet, which is used as a disclosure of interested and affected parties' interests, and
- Once a decision has been made, all registered interested and affected parties will be notified via email. The decision can also be provided to local councillors in a notice format to erect on community notice boards.

5.3 Access and opportunity to comment on all written submissions

All communication, including but not limited to reports, is disseminated to registered interested and affected parties for a 30-day commenting period.

5.4 Response to comments received: feedback to interested and affected parties

The Comments and Response sheet will be made available to all I&APs.

5.5 Disclosure of interested and affected parties' interests

The Comments and Response sheet will be made available to all I&APs.

5.6 Notifying interested and affected parties of the decision

Once a decision has been made, all registered interested and affected parties will be notified.

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6. Record of issues raised

The Comments and Response sheet will be made available to all I&APs.

7. Addressing the comments and concerns raised by the interested and affected parties

The Comments and Response sheet will be made available to all I&APs.

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Level of Public Participation

LEVEL OF PUBLIC PARTICIPATION QUESTIONAIRE FORM

Questions and Answers	**Expand Geographical Area**	**Expand Interest Groups**	**Expand Process (i.e. no. of meetings, languages, additional permitting etc.)**
Scale of anticipated impacts			
1) Are the impacts of the project likely to extend beyond the boundaries of the local municipality?			
The assessed negative impacts are largely contained within the boundaries of the local municipality, with the exception of low significance impacts linked to transport & deliveries, which extend beyond the local municipal boundary. Positive impacts, associated with the generation of renewable energy to be wheeled to private off-takers, will occur beyond the boundaries of the local municipality. Newspaper adverts were placed in local and provincial newspapers. The BID was written in English and Afrikaans.	X	X	X
2) Are the impacts of the project likely to extend beyond the boundaries of	X	X	X

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Questions and Answers	Expand Geographical Area	Expand Interest Groups	Expand Process (i.e. no. of meetings, languages, additional permitting etc.)
the province?			
The assessed negative impacts are largely contained within the boundaries of the province, with the exception of low significance impacts linked to transport & deliveries, which extend beyond the provincial boundary. Positive impacts, associated with the generation of renewable energy to be wheeled to private off-takers, will occur beyond the boundaries of the province. A Traffic Impact Assessment was undertaken looking at impacts on traffic and logistics from major ports & towns to the site.			
3) Is the project a greenfields development (a new development in a previously undisturbed area)?	N/A	X	X
Yes. The current and dominant land use is livestock grazing and the design of the Solar PV plant will ensure that grazing can continue in harmony with the proposed			

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Questions and Answers	Expand Geographical Area	Expand Interest Groups	Expand Process (i.e. no. of meetings, languages, additional permitting etc.)
renewable energy project. During the S&EIA, exemption was granted by the Department of Agriculture in terms of Section 2 & Regulation 6 of CARA relating to cultivation of virgin soil and authorisation issued in terms of LA27 of LN1 of the EIA Regulations (2014) as amended.			
4) Does the area already suffer from socio-economic problems (e.g. job losses) or environmental problems (e.g. pollution), and is the project likely to exacerbate these?			
Yes, the area already suffers from socio-economic problems; most of the youth are seeking employment. Upon commencement, there will be both temporary (construction phase) and permanent employment opportunities (operational phase) (extracted from IDP & Social Impact Assessment). The authorisation holder will develop and undertake	X	X	X

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Questions and Answers	Expand Geographical Area	Expand Interest Groups	Expand Process (i.e. no. of meetings, languages, additional permitting etc.)
effective stakeholder engagement including formal skills development and socio-economic upliftment projects in the surrounding towns in consultation with the municipalities.			
5) Is the project expected to have a wide variety of impacts (e.g. socio-economic and environmental)?	X	X	X
The scope of the project will have several negative impacts, which have been assessed and mitigated by a suite of specialists. These mitigations have been incorporated into the EMPr for implementation. it is anticipated that the project will have positive impacts on job creation, skills development and local businesses. The area of De Aar and proximity to the N10 have been identified within the IDP to create a renewable energy hub which the project will help achieve.			
Public and environmental sensitivity of the project			
6) Are there widespread public concerns about the	N/A	N/A	N/A

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Questions and Answers	Expand Geographical Area	Expand Interest Groups	Expand Process (i.e. no. of meetings, languages, additional permitting etc.)
potential negative impacts of the project?			
To date there have been no comments or responses from I&AP's that reflect widespread public concerns. Subsequent phases have drawn some concerns from neighbouring landowners.			
7) Is there a high degree of conflict among I&AP's?	N/A	N/A	N/A
To date there have been no comments or responses from I&AP's that reflect a high degree of conflict.			
8) Will the project impact on private land other than that of the applicant?	N/A	X	X
Yes, the project will interphase with other solar PV projects on adjacent properties and associated grid integration infrastructure. Additionally, upgrades may be required to sections of the Burgerville public road.			
9) Does the project have the potential to create unrealistic expectations (e.g. that a new factory	X	X	X

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Questions and Answers	Expand Geographical Area	Expand Interest Groups	Expand Process (i.e. no. of meetings, languages, additional permitting etc.)
would create a large number of jobs)?			
Yes, but the Social Impact Assessment (SIA) has provided measures to help ensure effective stakeholder engagement which have been captured for implementation in the EMPr.			
Potentially affected parties			
10) Has very little previous public participation taken place in the area?			
Phase 1 and Phase 3 of this project has undergone several public participation processes, associated with the S&EIA as well as subsequent amendments for the Phase 1 in 2020 – 2023, for which PPP was being undertaken. The consolidated I&AP registers for all three phases have been used to ensure all relevant parties are informed of changes.			
11) Did previous public participation processes in the area result in conflict?			
No.			
12) Are there existing		X	

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Questions and Answers	Expand Geographical Area	Expand Interest Groups	Expand Process (i.e. no. of meetings, languages, additional permitting etc.)
organizational structures (e.g. local forums) that can represent I&AP's?			
Depending on the relationship between the public and Municipal Ward Councillors, the councillors can best represent the I&AP's. Relevant ward councillors are included in the I&AP database.			
13) What is the literacy level of the community in terms of their ability to participate meaningfully within the public participation process?			
About two fifths of the people in Wards 3, 6 & 8 (affected project properties occur in these wards), aged 20 years or older, have no schooling or only some primary education. This illiteracy level is higher than on local, district or provincial level. These levels of illiteracy were taken into consideration when consulting with the I&APs on the project.			X
14) Is the area characterized by high social diversity (i.t.o socio-economic status,			

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Questions and Answers	Expand Geographical Area	Expand Interest Groups	Expand Process (i.e. no. of meetings, languages, additional permitting etc.)
language or culture)?			
No.			
15) Were people in the area victims of unfair expropriations or relocation in the past?			
Not according to the EAPs knowledge or specialist inputs, especially Social & Heritage.			
16) Is there a high level of unemployment in the area?			
According to the IDP and SIA, the unemployment levels reflect the national average.			
17) Do the I&AP's have special needs (e.g. a lack of skills to read or write, disability, etcetera)?			
The BID was provided in both English & Afrikaans (which is the dominantly spoken language in the area) and a simplified version was also compiled and distributed to particularly land occupiers of the affected properties.			X

Conclusion:

Based on the information provided in the table above, there was reason to elaborate on the minimum requirements of the public participation process as described in the EIA Regulations, 2014, including advertising in a provincial newspaper and utilising a

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consolidated I&AP register from all three solar PV phases, as well as translating the PPP documents into Afrikaans and providing a specific “Land Occupier” explanatory document.

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Background Information Document (BID) in English

Application for Environmental & Water Use Authorisation for the proposed development of a 300MW Solar PV Facility (Phase 2) on several portions of farms in the Hanover District, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality; Northern Cape Province

PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide background information for the proposed project and to provide for objections, comments and contributions from stakeholders, with regards to potential environmental and water use impacts – which includes (but is not limited to): ecological, social, economic, physical, aesthetic, etc.

When an applicant proposes to undertake a Section 21 water use in terms of the National Water Act (NWA, Act 36 of 1998) or a Listed Activity in terms of the National Environmental Management Act (NEMA, Act 107 of 1998) as amended, an application must be made for authorisation. The applications must be supported by a report, which has been compiled following an assessment process.

Ecoleges, as an independent Environmental Consultant, has been appointed to manage the Public Participation Process (PPP) as part of both the Water Use and Environmental Authorisation processes. Water use authorisation is proposed via registration against General Authorisation (GA) for sections 21 (a), (b), (c), (g) & (i) water uses as per Government Notices No. 509 and 538 of 26 August 2016 and 26 March 2016, respectively, as well as Government Notice No. 169 of 03 March 2013, in terms of Section 39 of the National Water Act, 1998 (Act 36 of 1998) or applied for in terms of the Water Use License Application and Appeals Regulations (GN No. R.267, 24 March 2017), as applicable. The Environmental Authorisation is to be undertaken via a Scoping and Environmental Impact Assessment process in accordance with Regulations 21 to 24 of the EIA Regulations, 2014 promulgated in terms of section 24(5) and 44 of the National Environmental Management Act (Act 107 of 1998), as amended. While the General Authorisation process is not governed by any formal PPP, a potential Water Use License and Environmental Authorisation process must be undertaken in accordance with Chapter 6 of the Environmental Impact Assessment Regulations (GG No. 40772, GN No. 326, 07 April 2017) and section 47D of the National Environmental Management Act (Act 107 of 1998) as amended and Regulation 17 of the Water Use License Application and Appeals Regulations (GN No. R.267, 24 March 2017), taking into consideration the Public Participation 2017 Guideline Document (DEA, 2017).

Section 21 water uses will be registered under the relevant General Authorisations or applied for in terms of the Water Use License Application and Appeals Regulations (GN No. R.267,

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24 March 2017), as applicable through the Responsible Authority (Department of Water & Sanitation: Orange Proto Catchment Management Agency) and the S&EIR will be submitted for consideration to the National Department of Forestry, Fisheries and the Environment (DFFE) or the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NCDEA).

BACKGROUND

In 2016 ecoleges undertook a S&EIA for the development of a 225 MW Solar PV facility between Hanover and De Aar in the Northern Cape. Three alternative footprints (PV01, PV02, PV03) were investigated during the assessment process. The central footprint (PV02) was identified as the preferred option because of its lower environmental impact and proximity to an existing 400kV Eskom powerline when compared with PV01 and PV03. The National Department of Environmental Affairs granted an environmental authorisation (DEA Reference: 14/12/16/3/3/2/998) on 16th April 2018. The activity must commence on the PV02 footprint within a period of five years from the date of issue.

An amendment to increase the capacity (not the footprint) of the facility to 300 MW due to technological advancements in solar photovoltaic efficiency and electrical output was granted on 24th November 2020.

A second amendment was granted in 2021 for the inclusion of containerised lithium-ion battery Storage and dual-fuel backup generators with associated fuel storage.

The competent authority was the National Department of Environmental Affairs because the application was part of the REIPPP or RMIPPP BID rounds, which formed part of a Strategic Infrastructure Project (SIP) as described in the National Development Plan, 2011. Soventix SA (Pty) Ltd was an unsuccessful bidder. However, the applicant has since partnered with another company, Solar Africa, with 1.5 GW in private renewable energy offtake agreements, making it economically feasible to develop two more 300 and 400 MW facilities (Phases 2 and 3, respectively).

Soventix will therefore apply for an environmental authorisation to develop an additional 300MW on the PV03 footprint (Phase 2) that was considered during the initial S&EIA. It is proposed to connect this second phase to the substation that forms part of the authorised facility on PV02.

The additional Solar PV facility will feed into the authorised sub-station on the PV02 footprint (Phase 1).

PROJECT DESCRIPTION

Solar PV System

A single PV device is known as a cell. To boost the power output of PV cells, they are connected in chains to form larger units known as modules or panels. Each module is 2.2 by 1.1 m (or 2,42 m^2) in size. Modules are connected to form arrays and mounted on to a rack

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that points the panels toward the sun. The results of the geotechnical assessment will determine whether the racks and panels are held in place by either a ballast or piled foundation. Two rows of twenty-three modules each will be attached to a steel and aluminium rack. Consequently, each rack would accommodate approximately 110 m^2 of panel. Solar arrays will be orientated in a northern direction and track the sun from east (55º) to west (-55º). The arrays shall be placed approximately 7.4 m apart. Several arrays are then connected to an inverter. The inverters convert the voltage from direct current (DC) to alternating current (AC). Inverters at the end of panel mounting structures are cabled to field transformers. The field transformers then transfer and increase (step up) the voltage of the alternating-current circuit to Eskom's electrical grid via an onsite substation.

The size of the proposed development footprint for a 400 MW solar PV facility is approximately 400 ha (1.25 ha per MW). As far as possible, arrays will be arranged in three 100 MW blocks of approximately 125 ha each. There will be five inverters per MW (500 inverters per 100 MW block, or 1500 inverters for 300 MW). Twenty-five inverters are connected to a field transformer, so there will be twenty field transformers per 100MW (or 60 field transformers for 300 MW).

All three 100 MW blocks will feed into an on-site substation. This on-site substation will then be linked to the on-site substation on Phase 1 via overhead (approximately 20 m high) distribution lines (most likely to be a 33kV connection) along a 32 m wide servitude.

Operational Area

The operational area comprises a controlled access, single-storey building, unpaved parking, and a sewerage treatment plant. The building shall be constructed from brick with metal sheet roofing and include space for an office, ablutions (incl. change rooms), medical room, control room, kitchen, storeroom, and workshop.

Services (Water, Domestic Wastewater, Electricity and Waste)

There are several existing boreholes on site, which will be used to abstract groundwater for construction and operational phases. The abstracted water shall be stored in aboveground JoJo type storage tanks. The tanks shall be located near the single storey building in the operational area.

A maximum of 2 kL of domestic wastewater, including sewerage, shall be generated each day, and treated to special limits with a bio-box package plant.

Electricity during construction and operation will be obtained from Eskom via the existing supply to the site.

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General waste will be disposed of at the De Aar licensed landfill site. Electrical waste will be either recycled or disposed of at a licensed hazardous waste landfill.

Roads

Existing roads will be upgraded, and new roads will be built, that is graded, shaped for runoff, and compacted to access the laydown area, construction camp, and components of the PV system, including the operational area, the on-site substation and to each field transformer. Passing lanes will be placed at strategic areas. Precast box culverts or pipes will also be required where the access roads pass through a drainage line. Some road crossings may need to be widened to accommodate large delivery trucks.

Two-track access roads (4.4 to 4.5 m wide) will be constructed between the parallel arrays, and a 4 to 5 m wide fire break road, comprising a jeep track with cleared vegetation, will also be created inside the perimeter fence.

Fencing

The facility will be fenced off with a 2.5 m high wire mesh security fence or Clear View^{TM} fencing, with controlled access using a security gate. Both areas (separated by a watercourse) will be fenced off within one perimeter fence.

Lighting

The facility will not be lit up at night. The fence line will be secured using multiple FLIR PTZ cameras which have a 2km range in absolute darkness. The obvious areas that would have lights is the control and security office, as well as the on-site substation, which is a legal requirement.

Access

The main access is off the N10 between De Aar & Hanover, which enters the site from the west. The provincial unsurfaced road (Burgersville Road) and the existing farm access road will also be utilised.

Timing

The second phase will be built sequentially. There may be some overlap in that once civil works are complete the civils' team would move onto phase 2. Even each 100MW block within each phase will be built sequentially, e.g., the first phase of 300MW would be built in 3 x 100MW blocks. This will limit the amount of people on site, as well as mitigate the need for massive amounts of equipment, storage etc.

Agricultural Activities

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The current land use is sheep farming, which will continue within the solar PV facility to ensure minimal losses on agricultural potential of the land as well as control vegetation growth.

APPLICABLE LEGISLATION

Water Use

An application for Water Use Authorisation in terms of the National Water Act, 1998 (Act No. 36 of 1998) will be submitted to the Department of Water & Sanitation (DWS): Orange Proto Catchment Management Agency for:

Water Uses as defined in Section 21 of the National Water Act (Act 36 of 1998)	
Section 21(a)	taking of water;
Section 21(b)	storing of water
Section 21(c)	impeding or diverting the flow of water in a watercourse.
Section 21(i)	altering the bed, banks, course or characteristics of a watercourse.
Section 21(g)	disposing of waste in a manner which may detrimentally impact on a water resource

Environmental Authorisation

An Environmental Authorisation is required for the development of the Solar PV Plant as per the following Listed Activities through a Scoping & Environmental Impact Assessment (S&EIA) process:

Listing Notice 1 (GN No. 983, 4 December 2014) as amended	
Listed Activity 11	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is— (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.

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Listed Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.
Listed Activity 28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.
Listed Activity 48	The expansion of – (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding -

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	(aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.
Listing Notice 2 (GN No. 984, 4 December 2014) as amended	
Listed Activity 2	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs — (a) within an urban area; or (b) on existing infrastructure.
Listed Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
Listing Notice 3 (GN No. 985, 4 December 2014) as amended	
Listed Activity 14	The development of – (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or **(ii) infrastructure or structures with a physical footprint of 10 square metres or more;** where such development occurs - (a) within a watercourse; (b) in front of a development setback; or **(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;**

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	excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **g. Northern Cape** i. In an estuary; **ii. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; no (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an international convention; as above (**ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined.
Listed Activity 18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. g. Northern Cape i. In an estuary; ii. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in

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	bioregional plans; (ff) Core areas in biosphere reserves

PURPOSE OF THE PROJECT

The overall objective is to undertake and complete a robust and defendable WUA and S&EIA process that will serve to inform the DWS and DFFE or NCDEA′s decision on the acceptability of the proposed project.

LOCATION

The proposed location is on Portion 3 & Remainder of Farm Goedehoop 26 C, Portion 6 of Leuwe Fountain 27 C, the Remainder of Farm Riet Fountain 39 C, Portion 1, 6 & Remainder of Kwanselaars Hoek 40 C and Portion 4 of Taaibosch Fontein 41 C, registration district Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province.

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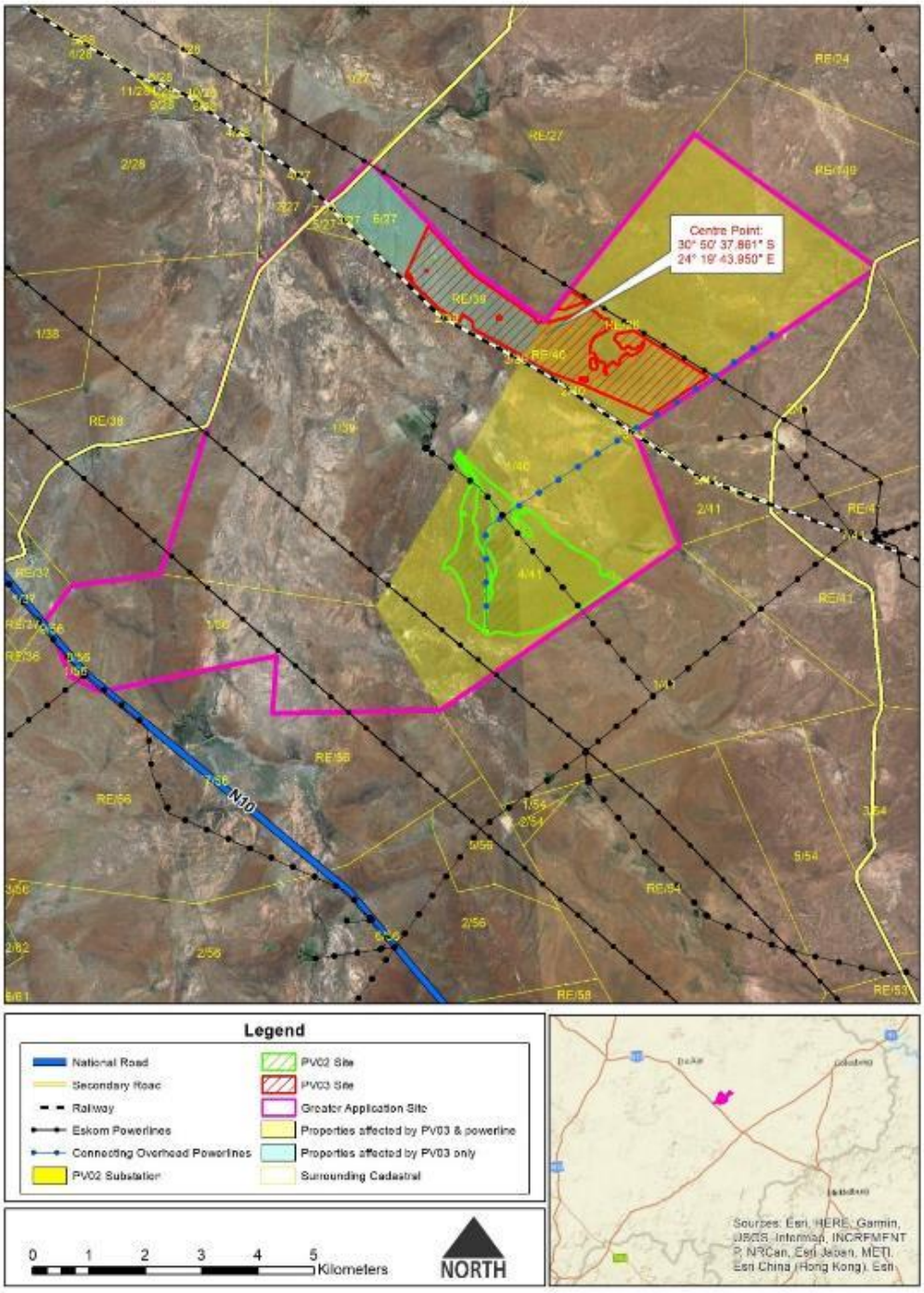

Figure 1: Location map of proposed development in relation to already approved Phase 1 development.

DESCRIPTION OF TASKS

- An advertisement will be placed in the Volksblad and Noordkaap Bulletin Newspapers,

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- Stakeholders, including landowners and land occupiers of neighbouring properties, other interested & affected parties, including the relevant authorities; will be notified of the proposed development in writing, and
- Notice boards advertising the applications have been placed in and around the site.
- Additional public participation processes may be undertaken in light of COVID-19 and prevailing Disaster Management Act Regulations to help ensure thorough dissemination & access of information to I&APs.

ANTICIPATED ISSUES

Environmental issues that may be addressed in the reports could include the following:

- Agricultural Agro-Ecosystem Assessment
- Visual Impact Assessment;
- Archaeological and Cultural Heritage Impact Assessment
- Palaeontology Impact Assessment;
- Terrestrial Biodiversity Impact Assessment (incl. an Animal and Plant Species Assessment – Ecological Study).
- Terrestrial ecology (including fauna & flora);
- Avian Impact Assessment;
- Aquatic Biodiversity Assessment;
- Geotechnical Assessment;
- Social Impact Assessment;
- Bat Impact Assessment;
- Traffic Impact Assessment;
- Hydrology Assessment.

YOUR COMMENTS PLEASE!

Your comments on the proposed projects, the public participation process, and issues needing investigation, will assist the technical studies and the authorities in their consideration of the relevant environmental and social aspects.

You are invited to register as an Interested and Affected Party (I&AP) and to assist us in:

- identifying possible impacts of the proposed development on the environment,
- making suggestions for mitigation and/or alternatives, and
- considering the “Need and Desirability”.

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Mitigations

Mitigation measures will be developed for the anticipated issues. Stakeholders are however welcome to comment on these issues and provide additional observations.

NEMA and the EIA Regulations call for a hierarchical approach to impact management.

The Impact Mitigation Hierarchy

- *Firstly*, alternatives must be investigated to avoid negative impacts altogether.
- *Secondly*, after it has been found that the negative impacts cannot be avoided, alternatives must be investigated to reduce (mitigate and manage) unavoidable negative impacts to acceptable limits.
- *Thirdly*, alternatives must be investigated to remediate (rehabilitate and restore).
- *Fourthly*, unavoidable impact that remain after mitigation and remediation must be compensated for through investigating options to offset the negative impacts.
- While *throughout*, alternatives must be investigated to optimise positive impact.

Alternatives

Consideration of "Alternatives" is one element of the EIA process. Its role is to provide a framework for sound decision-making based on the principle of sustainable development.

Alternatives should be identified as early as possible in the project cycle.

Ecoleges not only welcomes stakeholders' input/suggestions, but also urges the public to submit possible alternatives.

It is important to note that an alternative is defined as a different means of meeting the general purpose and requirements of the activity, which may include alternatives to-

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

When submitting alternatives, the recommended alternative must be:

- Practicable,
- Feasible,

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- Relevant,
- Reasonable and
- Viable.

Need & Desirability

According to Regulation 13(1)(b) and 13(1)(e) read together with Regulation 18 of the amended EIA Regulations, 2014, EAPs and specialists must have knowledge of any guidelines that have relevance to the proposed activity and have regard to the need for and desirability of the undertaking of the proposed activity.

Considering that 'Need and Desirability' is determined by considering the broader societal/community needs and public interests, that is NOT the needs of the applicant/developer, we encourage you to also consider the Guideline on Need and Desirability published by DEA (2017) to help you identify key issues in respect of the need for and desirability of undertaking the proposed activity/development. The guideline is freely available on the web. However, we have also prepared a YouTube video that explains the intended concept of Need and Desirability (https://www.youtube.com/channel/UC0iHr-zE4TPzwhZjzoTPQMw).

The aim of EIA process is to find that (reasonable and feasible) alternative that will ensure sustainable development. Consistent with the aforesaid aim and purpose of EIA, the concept of "need and desirability" relates to, amongst others, the nature, scale and location of development being proposed, as well as the wise use of land.

Strictly speaking, "need" primarily refers to time and "desirability" refers to place, e.g. is this the right time and is it the right place for locating the type of land-use/activity being proposed? However, "need and desirability" are interrelated and the two components collectively can be considered in an integrated and holistic manner by engaging the **Questions** provided in the guideline document. The questions are divided into two broad categories relating to ecological sustainability (e.g. how the development will impact on ecosystems and biological diversity) and justifiable economic and social development.

We suspect the ecological category of questions address desirability and whether it is the right place, while the economic and social category of questions addresses broader societal needs, and whether this is the right time.

Need and desirability is like a drawstring that pulls the assessment process together to decide on the best option. When the sum of the impacts (evaluated during the impact assessment) is considered holistically through the lens of Need and Desirability, that is by presenting them within the framework of

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questions posed by the guideline, then Need and Desirability becomes the overall impact summary to determine if the proposed activity is the best option or to decide on the fate of the application.

When collectively considering ecological, social and economic impacts it is important to remember that while there might be some trade-offs between the considerations, all development must in terms of Section 24 of the Constitution be ecologically sustainable, while economic and social development must be justifiable. Consequently, there are specific "trade-off rules that apply, namely environmental integrity may never be compromised, and the social and economic development must take a certain form and meet certain specific objectives for it to be considered justifiable.

REGISTRATION

To ensure that you are registered as an interested and/or affected party, please complete the enclosed REGISTRATION AND COMMENT SHEET and forward it to the address, fax or email provided below.

Postal Address:
P.O. Box 516
Machadodorp
1170
Fax: 086 697 9316
E-mail: info@ecoleges.co.za or justin@ecoleges.co.za

ENQUIRIES

Please do not hesitate to visit us at our office or give us a call should you have any further queries or concerns regarding the listed activity(ies) or development that is being proposed.

Physical address (Office):
3 Generaal Street
Machadodorp
1170
Cell: 083 644-7179 (office) or 082 451 5608 (Justin Bowers)

Please be assured that your comments will form part of the documents to be submitted to the decision-making authority.

Please complete and return the below Registration and Comment Sheet and/or POPIA Consent Form at your earliest convenience:

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
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● Written comments or objections relating to the application for a water use authorisation must be lodged within 60 days of this notice, no later than 22nd April 2022.

Note: To withdraw your consent at any time please email us directly, and we will immediately delete your information from our records. Thank you.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
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REGISTRATION AND COMMENT SHEET

PHASE 2 DE AAR 300MW SOLAR PLANT

ECOLEGES REFERENCE: 2022_001P

Title: _____Name: _____

Surname: _____

Company Name / Interest Group: _____

_____

Postal or Residential Address:

_____

_____

Town / City: _____

Postal Code: _____

Tel: (_____) _____

Cell: _____

Fax: (_____) _____

E-mail address: _____

A registered interested and affected party is entitled to object and comment, in writing, on all written submissions including draft reports made to the competent authority provided that - (c) the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application. Please supply such information in the space provided below.

_____

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
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Please indicate with an **X** whether you would like to be kept informed of the WUA & S&EIA process.

YES, I would like to be kept informed	
NO, I am not interested	

If "YES", how would you like to be informed? (please mark the appropriate block with an "**X**")

E-mail	
Fax	

COMMENTS: (If you require more space than that which is provided, please attach additional pages)

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
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POPIA CONSENT FORM

Kindly be advised that should you receive unsolicited correspondence directly from us, and you are (i) an occupier, owner or person in control of the site or any alternative site where the activity is to be undertaken, (ii) an owner, person in control or occupier of land adjacent to the site or any alternative site where the activity is to be undertaken, (iii) the municipal councillor of a ward, (iv) any organisation of ratepayers that represents the community, (v) a municipality, (vi) any organ of state having jurisdiction in respect of any aspect of the activity, or (vii) any other party as required by the competent authority, then we were required to give you notice in terms of EIA Regulation 41(2), and had to therefore derive your information, including name, contact details and address, from a public record. Alternatively, you may have been referred to us. If you are not an organ of state, did not submit written comments or attend meetings, did not request in writing for your name to be placed on the register, then we are not obligated in terms of EIA Regulation 42 to retain a record of your personal information in a register of interested and affected parties, and as such, must obtain proof of consent provided by yourself. To this effect, kindly confirm your consent by ticking the boxes below.

☐ I, in my capacity as the data subject, give consent to ecoleges, in its capacity as the responsible party, to process my personal information for purposes of pursuing its legitimate interests or those of a third party to whom the information is supplied, but limited to (1) the submission of reports or plans for comment, (2) transferring the same information to a third party, including registered interested and affected parties, the competent authority and applicant or holder of the environmental authorisation, (3) submitting a copy of an appeal against a decision to grant or refuse environmental authorisation, and/or (4) submission of environmental audit reports (containing recommendations for amending the EMPr) for comment.

☐ I hereby acknowledge that only the minimum personal information that is required to be processed for the purpose of the EIA Regulations (2014) will be processed, including my name, contact details, address, and disclosure on any direct business, financial, personal, or other interest which that party may have in the approval or refusal of the application.

☐ I hereby confirm that the personal information, which I shall provide is mine, and that it is complete, accurate, not misleading and updated.

☐ I hereby acknowledge that my personal information is being collected explicitly for public participation processes associated with this project.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
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☐ Irrespective of the decision to grant or refuse an environmental authorisation, and irrespective of whether the scope of the authorisation includes operational or development aspects only, I hereby give consent to ecoleges to retain my records indefinitely for historical and/or research purposes.

☐ I understand, upon submitting my personal information to ecoleges, that it will be saved on their server, which meets the various conditional "Minimum Security Requirements" of their Cyber Insurance company, including *inter ali*a firewalls to restrict access to digitally stored sensitive information, anti-virus software implemented on all desktops, laptops and sensitive systems, password controls implemented on sensitive systems, etc.

☐ I understand that ecoleges shall inform me when there are reasonable grounds to believe that my personal information has been accessed or acquired by any unauthorised person.

☐ I have read and understand my Section 5 Rights as a data subject including *inter alia*, the right to -

- request access to my personal information,
- request information about the identity of all third parties,
- request ecoleges to correct, update, destroy or delete my personal information, and
- lodge a complaint in writing to the Information Regulator if in my opinion the processing of information is not reasonable.

For more information about the Protection of Personal Information Act, 2013 (POPIA), which commenced on 01st July 2020, it is available at the following link: www.popia.co.za

Your participation in the Public Participation Process (PPP) is voluntary, but it is mandatory in terms of Regulation 42 and 43(1) of the amended EIA Regulations (2014) that we receive the relevant personal information for us to register you as an Interested and Affected Party, and for you to be entitled to comment, in writing, on all reports or plans that we submit to you, respectively.

Failure to supply the information or incomplete information may impact your eligibility as a registered Interested and Affect Party.

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Background Information Document (BID) in Afrikaans

Aansoek vir Omgewings Goedkeuring (OG) en Watergebruik Goedkeuring (WGG), vir die ontwikkeling en konstruksie van 'n 300 MW Fotovoltaïese Sonkrag (FV) fasiliteit (Fase 2), op verskeie plase geleë tussen De Aar & Hanover, Emthanjeni Plaaslike Munisipaliteit, Pixley Ka Seme Distriksmunisipaliteit, Noord Kaap Provinsie, Suid-Afrika.

Datum van kennisgewing: 18 Februarie 2022

DOEL VAN HIERDIE DOKUMENT

Die doel van hierdie dokument is om agtergrond inligting te verskaf oor die beoogde projek en om vir enige belanghebbendes of geïnteresseerde en/of geaffekteerde partye die geleentheid te bied om enige besware, kommentaar, bekommernisse wat hulle mag hê, i.v.m. die potensiële omgewings- of watergebruik impakte, te opper. Hierdie impakte sluit onder meer in, maar is nie beperk tot die voorbeelde hiernaas nie, (ekologiese-, sosiale-, ekonomiese-, fisiese-, estetiese impakte ens.).

Wanneer 'n aansoeker beplan om 'n Seksie 21 watergebruik te onderneem, i.t.v. die Nasionale Water Wet (NWW, Wet 36 van 1998), of 'n Gelyste Aktiwiteit i.t.v. die Nasionale Omgewings Bestuurswet (NOBW, Wet 107 van 1998), soos gewysig, moet daar aansoeke vir goedkeuring by die onderskeie departemente ingedien word. Hierdie aansoeke moet vergesel word deur verslae wat saamgestel word nadat 'n impak studie proses sy verloop geneem het.

Ecoleges, wat 'n diens verrig as 'n onafhanklike konsultant, is aangestel om die Publieke Deelname Proses (PDP) vir beide die WGG en OG prosesse te behartig.

Magtiging vir watergebruik moet geskied in gevolge die toepaslike Algemene Magtigings (General Authorisations). By gebreke hieraan moet daar vir 'n Watergebruik lisensie (Water Use Licence) aansoek gedoen word ingevolge die Water Use Licence Application (WULA) and Appeals Regulations, 2017.

Die Omgewingsmagtiging (Environmental Authorization) moet onderneem word via 'n volledige "Scoping and Environmental Impact assessment (S & EIA) proses in ooreenstemming met Regulasies 21 - 24 van die gewysigde EIA regulasies, 2014, gepromulgeer in terme van seksies 24(5) en 44 van NEMA (National Environmental Management Act (Act 107 of 1998)

Die PDP vir die OG en WGG moet plaasvind onder die vaandel van Hoofstuk 6 van die Environmental Impact Assessment Regulations, 2014, en Seksie 17 van die Water Use

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License Application (WULA) and Appeals Regulations, 2017 (GN No. R. 267 of 24th March 2017) onderskeidelik. Ecoleges sal ook die PDP Regulasies dokument van die Departement van Omgewingsake van 2017 gebruik vir hierdie publieke deelname proses.

AGTERGROND

In 2016 het Ecoleges 'n S&EIA onderneem vir die ontwikkeling van 'n 225 MW Sonkrag-FV-fasiliteit tussen Hanover en De Aar in die Noord-Kaap. Drie alternatiewe voetspore (FV01, FV02, FV03) is tydens die assesseringsproses ondersoek. Die sentrale voetspoor (FV02) is as die voorkeuropsie geïdentifiseer vanweë die laer omgewingsimpak en nabyheid aan 'n bestaande 400kV Eskom-kraglyn in vergelyking met FV01 en FV03. Die Nasionale Departement van Omgewingsake het op 16 April 2018 'n omgewingsmagtiging (DEA Verwysing: 14/12/16/3/3/2/998) toegestaan. Die aktiwiteit moet binne 'n tydperk van vyf jaar vanaf die datum op die PV02-voetspoor begin van kwessie.

'n Wysiging om die kapasiteit (nie die voetspoor nie) van die fasiliteit tot 300 MW te verhoog as gevolg van tegnologiese vooruitgang in sonkragfotovoltaïese doeltreffendheid en elektriese uitset is op 24 November 2020 toegestaan.
'n Tweede wysiging is in 2021 toegestaan vir die insluiting van litium-ioonbatterye in houers en dubbelbrandstof-rugsteunkragopwekkers met gepaardgaande brandstofberging.
Die bevoegde owerheid was die Nasionale Departement van Omgewingsake omdat die aansoek deel was van die REIPPP of RMIPPP BID-rondtes, wat deel gevorm het van 'n Strategiese Infrastruktuurprojek (SIP) soos beskryf in die Nasionale Ontwikkelingsplan, 2011. Soventix SA (Edms.) Bpk. was 'n onsuksesvolle bieër. Die applikant het egter sedertdien 'n vennootskap aangegaan met 'n ander maatskappy, Solar Africa, met 1,5 GW in private hernubare energie-afname-ooreenkomste, wat dit ekonomies haalbaar maak om nog 'n 300 MW fasiliteit (onderskeidelik fase 2) te ontwikkel.

Soventix sal dus aansoek doen vir 'n omgewingsmagtiging om 'n bykomende 300MW op die FV03-voetspoor (Fase 2) te ontwikkel wat tydens die aanvanklike S&OIA oorweeg is. Daar word voorgestel om hierdie tweede fase te koppel aan die substasie wat deel vorm van die gemagtigde fasiliteit op FV02.
Die bykomende sonkrag-FV-fasiliteit (Fase 2) sal in die gemagtigde substasie op die FV02-voetspoor (Fase 1) ingevoer word. Gevolglik sal die uitbreiding van die substasie-voetspoor 'n derde (Deel 2) wysiging aan die bestaande omgewingsmagtiging vereis (DEA Verwysing: 14/12/16/3/3/2/998).

PROJEK BESKRYWING

Fotovoltaïese Sonkrag (FV) Sisteem

'n Enkele Fotovoltaïese-toestel staan bekend as 'n sel. Om die kraglewering van Fotovoltaïese -selle te verhoog, word hulle in kettings verbind om groter eenhede bekend as modules of

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panele te vorm. Elke module is 2,2 by 1,1 m (of 2,42m^2) groot. Modules word verbind om skikkings te vorm en op 'n rek gemonteer wat die panele na die son wys. Die resultate van die geotegniese assessering sal bepaal of die rakke en panele in plek gehou word deur óf 'n ballas óf 'n stapelfondasie. Twee rye van drie-en-twintig modules elk sal aan 'n staal- en aluminiumrak geheg word. Gevolglik sal elke rak ongeveer 110 m^2 paneel akkommodeer. Sonskikkings sal in 'n noordelike rigting georiënteer wees en die son van oos (55º) na wes (-55º) volg. Die skikkings moet ongeveer 7,4 m uitmekaar geplaas word. Verskeie skikkings word dan aan 'n omskakelaar gekoppel. Die omsetters skakel die spanning van gelykstroom (GS) na wisselstroom (WS) om. Omsetters aan die einde van paneelmonteringsstrukture word na veldtransformators gekabel. Die veldtransformators dra dan die spanning van die wisselstroomkring oor en verhoog na Eskom se elektriese netwerk via 'n substasie op die terrein.

Die grootte van die voorgestelde ontwikkelingsvoetspoor vir 'n 300 MW sonkrag-fotovoltaïese-fasiliteit is ongeveer 400 ha (1,25 ha per MW). Sover moontlik sal skikkings in drie 100 MW-blokke van ongeveer 125 ha elk gerangskik word. Daar sal vyf omsetters per MW wees (500 omsetters per 100 MW-blok, of 1500 omsetters vir 300 MW). Vyf-en-twintig omsetters is aan 'n veldtransformator gekoppel, dus sal daar twintig veldtransformators per 100MW wees (of 60 veldtransformators vir 300 MW).
Al vier 100 MW-blokke sal in 'n substasie op die perseel ingevoer word. Hierdie substasie op die perseel sal dan via oorhoofse (ongeveer 20 m hoog) verspreidingslyne (waarskynlik 'n 33kV-verbinding wees) langs 'n 32 m breë serwituut met die ter plaatse substasie op Fase 1 gekoppel word.

Operasionele Area

Die operasionele area bestaan uit 'n beheerde toegang, enkelverdiepinggebou, ongeplaveide parkeerplek en 'n rioolsuiweringsaanleg. Die gebou moet van baksteen met metaalplaatdak gebou word en sal ruimte vir 'n kantoor, ablusies (insluitend kleedkamers), mediese kamer, beheerkamer, kombuis, stoorkamer en werkswinkel insluit.

Dienste (water, huishoudelike afvalwater, elektrisiteit en afval)

Daar is verskeie bestaande boorgate op die terrein, wat gebruik sal word om grondwater vir konstruksie- en bedryfsfases te onttrek. Die onttrekte water moet in bogrondse JoJo tipe opgaartenks gestoor word. Die tenks moet naby die enkelverdiepinggebou in die operasionele area geleë wees.

'n Maksimum van 2 kL huishoudelike afvalwater, insluitend riool, sal elke dag gegenereer word en tot spesiale limiete behandel word met 'n bio-boks pakket aanleg.
Elektrisiteit tydens konstruksie en bedryf sal van Eskom verkry word via die bestaande toevoer na die terrein.

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Algemene afval sal by die De Aar-gelisensieerde stortingsterrein gestort word. Elektriese afval sal óf herwin word óf by 'n gelisensieerde stortingsterrein vir gevaarlike afval weggedoen word.

Paaie

Bestaande paaie sal opgegradeer word, wat gegradeer, gevorm word vir afloop, en gekompakteer word om toegang te verkry tot die neerleggende-area, konstruksiekamp en komponente van die FV-stelsel, insluitend die operasionele area, die substasie op die perseel en aan elke veldtransformator. Verbygaan bane sal by strategiese gebiede geplaas word. Voorafvervaardigde boks duikers of pype sal ook benodig word waar die toegangspaaie deur 'n dreineringslyn gaan. Sommige padkruisings sal dalk verbreed moet word om groot afleweringsvragmotors te akkommodeer.
Tweespoortoegangspaaie sal tussen die parallelle skikkings gebou word, en 'n brandwegpad, bestaande uit 'n jeepspoor met skoongemaakte plantegroei, sal ook binne die omtrekheining geskep word.

Heinings

Die fasiliteit sal omhein word met 'n 2,5 m hoë gaasdraad veiligheidsheining of Clear View™ heining, met beheerde toegang deur 'n veiligheidshek. Beide gebiede (geskei deur 'n waterloop) sal binne een omtrekheining omhein word.

Beligting

Die fasiliteit sal nie snags verlig wees nie. Die heininglyn sal beveilig word met behulp van verskeie FLIR PTZ-kameras wat 'n 2 km-omvang in absolute duisternis het. Die ooglopende gebiede wat ligte sal hê, is die beheer- en sekuriteitskantoor, sowel as die substasie op die perseel, wat 'n wetlike vereiste is.

Toegang

Die hooftoegang is vanaf die N10 tussen De Aar en Hanover, wat die terrein vanaf die weste binnegaan. Die provinsiale onverharde pad (Burgersvilleweg) en die bestaande plaastoegangspad sal ook benut word.

Tydsberekening

Die twee fases sal opeenvolgend gebou word. Daar kan 'n mate van oorvleueling wees deurdat sodra siviele werke voltooi is, die burgerlike span na fase 2 sal beweeg. Selfs elke 100MW-blok binne elke fase sal opeenvolgend gebou word, bv. die eerste fase van 300MW sal in 3 x 100MW blokke gebou word. Dit sal die hoeveelheid mense op die terrein beperk, asook die behoefte aan massiewe hoeveelhede toerusting, berging, ens.

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Landbou-Aktiwiteite

Die huidige grondgebruik is skaapboerdery, wat binne die sonkrag-FV-fasiliteit sal voortgaan om minimale verliese op landboupotensiaal van die grond te verseker, asook om plantegroei te beheer.

TOEPASLIKE WETGEWING

Watergebruike

Watergebruiklisensie sal by dieselfde Verantwoordelike Owerheid ingedien word ingevolge die WLA en Appèlregulasies, 2017. Die Artikel 21-watergebruike wat met die voorgestelde ontwikkeling geassosieer word, is soos volg:

Section 21(a)	*taking water from a water resource*
Section 21(b)	*storing of water*
Section 21(c)	*impeding or diverting the flow of water in a watercourse.*
Section 21(g)	*disposing of waste in a manner which may detrimentally impact on a water resource*
Section 21(i)	*altering the bed, banks, course, or characteristics of a watercourse.*

**Die wetgewing word in Engels aangehaal soos wat dit oorspronklik gepubliseer is om te verhoed dat die bedoeling, intensie, en taalgebruik van die wetgewing met moontlike onakkuraathede beïnvloed kan word tydens die vertalings proses.*

Gelyste Aktiwiteite

'n Aansoek om 'n OB sal by die Noord-Kaapse Departement van Landbou, Omgewingsake, Landelike Ontwikkeling en Grondhervorming ingedien word ingevolge die OIB-regulasies, 2014 soos gewysig om die volgende potensiële gelyste aktiwiteite te onderneem:

Listing Notice 1 (GG No. 40772, GN No. 327, 07 April 2017)	
Listed Activity 11	The development of facilities or infrastructure for the transmission and distribution of electricity - **(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts**; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is - (a) temporarily required to allow for maintenance of existing

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	infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.
Listed Activity 19	**The infilling or depositing of any material of more than 10 cubic metres into**, or the dredging, excavation**, removal or moving of soil**, sand, shells, shell grit, pebbles or rock **of more than 10 cubic metres from a watercourse**; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.
Listed Activity 28	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial, or institutional purposes.
Listed Activity 48	The expansion of – (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion [or expansion and related operation] occurs - (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a

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	watercourse, measured from the edge of a watercourse; excluding - (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.
Listing Notice 2 (GG No. 40772, GN No. 325, 07 April 2017)	
Listed Activity 2	The development of facilities or infrastructure for the **generation of electricity from a renewable resource where the electricity output is 20 megawatts or more**, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs - (a) within an urban area; or (b) on existing infrastructure.
Listed Activity 15	The **clearance of an area of 20 hectares or more** of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
Listing Notice 3 (GG No. 40772, GN No. 324, 07 April 2017)	
Listed Activity 14	The development of – (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or **(ii) infrastructure or structures with a physical footprint of 10 square metres or more;** where such development occurs - (a) within a watercourse;

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	(b) in front of a development setback; or **(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;** excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **g. Northern Cape** i. In an estuary; **ii. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; no (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an international convention; as above (**ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;** (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined.
Listed Activity 18	The **widening of a road by more than 4 metres**, or the **lengthening of a road by more than 1 kilometre.** **g. Northern Cape** i. In an estuary; **ii. Outside urban areas:** (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; no (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention;

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	(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or **(ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;**

**Die wetgewing word in Engels aangehaal soos wat dit oorspronklik gepubliseer is om te verhoed dat die bedoeling, intensie, en taalgebruik van die wetgewing met moontlike onakkuraathede beïnvloed kan word tydens die vertalings proses.*

DOEL VAN DIE OMVANGSBEPALING & OMGEWINGSIMPAKBEPALING

Die oorhoofse doelwit is om 'n robuuste en verdedigbare assesseringsproses te onderneem en te voltooi wat sal dien om die verantwoordelike owerheid (Oranje Proto-opvanggebiedbestuursagentskap (Upington Lower Orange WMA) en bevoegde owerheid (Noord-Kaapse Departement van Landbou, Omgewingsake, Landelike Ontwikkeling en Grondhervorming) by te staan in die besluit oor die aanvaarbaarheid van die voorgestelde projek.

BESKRYWING VAN TAKE

- 'n Advertensie sal in die Volksblad en Noordkaap Bulletin geplaas word.
- Belanghebbendes, insluitend grondeienaars en grondbesetters van naburige eiendomme, ander belanghebbende en geaffekteerde partye, insluitend die relevante owerhede; skriftelik van die voorgestelde ontwikkeling in kennis gestel sal word, en
- Kennisgewingborde wat die aansoeke adverteer, sal op die grensheining van die geaffekteerde eiendomme geplaas word.
- Bykomende prosesse vir publieke deelname kan onderneem word met inagneming van COVID-19 en heersende Rampbestuurwet-regulasies om te help om deeglike verspreiding en toegang tot inligting tot B&GPe te verseker.

LIGGING

Die voorgestelde projekterrein is geleë op gedeelte drie en die oorblywende gedeelte van die plaas Goede Hoop 26C, gedeelte ses van die plaas Leuwe Fountain 27 C, die oorblywende gedeelte van die plaas Riet Fountain 39 C, gedeelte een, ses en die oorblywende gedeelte van die plaas Kwanselaars Hoek 40 C en gedeelte vier van die plaas Taaibosch Fontein 41 C,

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tussen De Aar & Hanover, Emthanjeni Plaaslike Munisipaliteit, Pixley Ka Seme Distriksmunisipaliteit, Noord-Kaap Provinsie. Die hooftoegang tot die terrein is vanaf die N10 tussen De Aar en Hanover.

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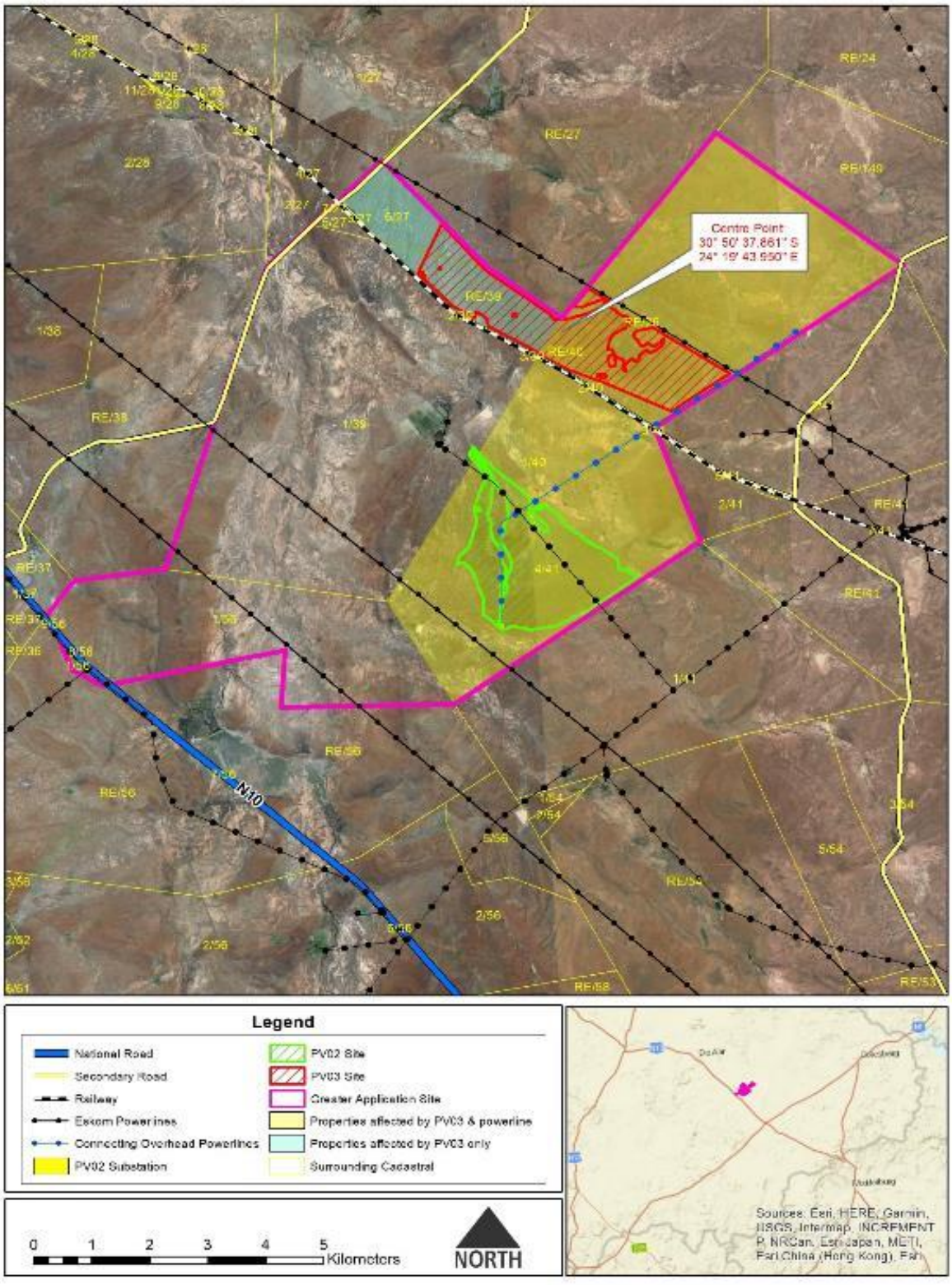

Figuur 1. Omgewingskaart van voorgestelde ontwikkeling.

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VOORSIENDE PROBLEME/KWESSIES

Spesialisstudies

Die volgende spesialisstudies sal onderneem word en is gebaseer op die uitkomste van 'n terreinsensitiwiteitsverifikasie:

- Landbou Agro-ekosisteem Spesialis Assessering
- Terrestriële Dierspesie Spesialis Assessering
- Terrestriële Plantspesie Spesialis Assessering
- Terrestriële Biodiversiteit Spesialis Assessering
- Avifauna Spesialis Assessering
- Akwatiese Biodiversiteit Spesialist Assessering
- Argeologiese & Kulturele Erfenis Spesialis Assessering
- Paleontologies Spesialis Assessering
- Visuele Impak Assessering
- Hidrologiese Assessering
- Geotegniese Assessering
- Vlêrmuis Impak Assessering
- Sosio-Ekonomiese Impak Assessering
- Verkeer Impak Assessering

U KOMMENTAAR ASSEBLIEF!

Jou kommentaar oor die voorgestelde projekte, die openbare deelname proses, en kwessies wat ondersoek moet word, sal die tegniese studies en die owerhede help in hul oorweging van die relevante omgewings- en sosiale aspekte.

U word hiermee uitgenooi om te registreër as ‘n geïnteresseerde en geaffekteerde party om ons by te staan met die volgende:

- Identifisering van moontlike impakte van die beöogde ontwikkeling op die omgewing,
- Die voorstelling van versagtings aspekte of alternatiewe opsies, en
- Die oorweging van die behoefte en wenslikheid van die ontwikkeling.

Versagtings

Versagtende maatreëls sal ontwikkel word vir die voorsiende kwessies. Belanghebbendes is egter welkom om kommentaar te lewer oor hierdie kwessies en bykomende waarnemings te verskaf.

NEMA en die OIB-regulasies vra vir 'n hiërargiese benadering tot impakbestuur.

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Die Impak Versagtings Hiërargie

- Eerstens, alternatiewe moet ondersoek word ten einde negatiewe impakte in totaliteit te vermy.
- Tweedens, as daar gevind word dat ‘n negatiewe impak nie vermy kan word nie, moet alternatiewe opsies oorweeg word om die onvermybare negatiewe impakte te versag en bestuur.
- Derdens, alternatiewe opsies moet oorweeg word om die impakte te remedieër
- Vierdens, onafwendbare impakte wat sal aanbly na versagtings en remediëring, sal vereis dat opsies wat die negatiewe impakte voor kompenseer, ondersoek word.
- Dit alles terwyl alternatiewe opsies ondersoek word om die positiewe impak van die ontwikkeling te optimaliseer.

Alternatiewe

Oorweging van "Alternatiewe" is een element van die S & OIB-proses. Die rol daarvan is om 'n raamwerk te verskaf vir gesonde besluitneming gebaseer op die beginsel van volhoubare ontwikkeling.

Alternatiewe moet so vroeg as moontlik in die projeksiklus geïdentifiseer word.

Ecoleges verwelkom nie net belanghebbendes se insette/voorstelle nie, maar versoek ook die publiek om moontlike alternatiewe voor te lê.

Dit is belangrik om daarop te let dat 'n alternatief gedefinieer word as 'n ander manier om aan die algemene doel en vereistes van die aktiwiteit te voldoen, wat alternatiewe kan insluit tot-
(a) die eiendom waarop of plek waar die aktiwiteit voorgestel word,
(b) die tipe aktiwiteit wat onderneem moet word,
(c) die ontwerp of uitleg van die aktiwiteit,
(d) die tegnologie wat in die aktiwiteit gebruik gaan word,
(e) die operasionele aspekte van die aktiwiteit, en
(f) die opsie om nie die aktiwiteit te implementeer nie.

Wanneer alternatiewe ingedien word, moet die aanbevole alternatief wees:
• Prakties, uitvoerbaar, relevant, redelik en lewensvatbaar.

Behoefte & Wenslikheid

Volgens Regulasie 13(1)(b) en 13(1)(e) saamgelees met Regulasie 18 van die gewysigde OIB-regulasies, 2014, moet OBP'e en spesialiste kennis dra van enige riglyne wat betrekking het op die voorgestelde aktiwiteit en in ag neem die behoefte en wenslikheid van die onderneming van die voorgestelde aktiwiteit.

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Aangesien 'Behoefte en wenslikheid' bepaal word deur die breër maatskaplike/gemeenskapsbehoeftes en openbare belange in ag te neem, dit is NIE die behoeftes van die aansoeker/ontwikkelaar nie, moedig ons jou aan om ook die riglyn oor behoefte en wenslikheid wat deur DEA (2017) gepubliseer is, te oorweeg. om jou te help om sleutelkwessies te identifiseer ten opsigte van die behoefte aan en wenslikheid om die voorgestelde aktiwiteit/ontwikkeling te onderneem. Die riglyn is vrylik op die web beskikbaar. Ons het egter ook 'n YouTube-video voorberei wat die beoogde konsep van behoefte en wenslikheid verduidelik: https://www.youtube.com/channel/UC0iHr-zE4TPzwhZjzoTPQMw.

Die doel van die OIB-proses is om daardie (redelike en haalbare) alternatief te vind wat volhoubare ontwikkeling sal verseker. In ooreenstemming met die voormelde doel en doel van OIB, hou die konsep van "behoefte en wenslikheid" verband met onder andere die aard, skaal en ligging van ontwikkeling wat voorgestel word, asook die wyse gebruik van grond.

Streng gesproke verwys “behoefte” hoofsaaklik na tyd en “wenslikheid” verwys na plek, bv. is dit die regte tyd en is dit die regte plek om die tipe grondgebruik/aktiwiteit wat voorgestel word, op te rig? "Behoefte en wenslikheid" is egter onderling verwant en die twee komponente kan gesamentlik op 'n geïntegreerde en holistiese wyse oorweeg word deur die vrae wat in die riglyndokument verskaf word, te gebruik. Die vrae word in twee breë kategorieë verdeel wat verband hou met ekologiese volhoubaarheid (bv. hoe die ontwikkeling 'n impak op ekosisteme en biologiese diversiteit sal hê) en regverdigbare ekonomiese en sosiale ontwikkeling.

Ons vermoed die ekologiese kategorie vrae spreek wenslikheid aan en of dit die regte plek is, terwyl die ekonomiese en sosiale kategorie vrae breër samelewingsbehoeftes aanspreek, en of dit die regte tyd is.

Behoefte en wenslikheid is soos 'n trekkoord wat die assesseringsproses saamtrek om op die beste opsie te besluit. Wanneer die som van die impakte (geëvalueer tydens die impakbeoordeling) holisties beskou word deur die lens van Behoefte en Wenslikheid, dit wil sê deur dit aan te bied binne die raamwerk van vrae wat deur die riglyn gestel word, dan word Behoefte en Wenslikheid die algehele impakopsomming om te bepaal of die voorgestelde aktiwiteit die beste opsie is of om te besluit oor die lot van die aansoek.

Wanneer ekologiese, sosiale en ekonomiese impakte gesamentlik oorweeg word, is dit belangrik om te onthou dat alhoewel daar 'n paar afwegings tussen die oorwegings kan wees, alle ontwikkeling ingevolge Artikel 24 van die Grondwet ekologies volhoubaar moet wees, terwyl ekonomiese en sosiale ontwikkeling regverdigbaar moet wees. Gevolglik is daar

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spesifieke “afwegingsreëls” wat geld, naamlik omgewingsintegriteit mag nooit in die gedrang gebring word nie, en die maatskaplike en ekonomiese ontwikkeling moet ’n sekere vorm aanneem en aan sekere spesifieke doelwitte voldoen sodat dit as regverdigbaar beskou kan word.

REGISTRASIE

Om te verseker dat jy as 'n belanghebbende en geaffekteerde party geregistreer is, voltooi asseblief die ingeslote REGISTRASIE- EN KOMMENTAARBLAD en stuur dit aan na die adres, faks of e-pos wat hieronder verskaf word.

Pos Adres:
Posbus 516
Machadodorp
1170
Faks: 086 697 9316
E-pos: shannon@ecoleges.co.za

NAVRAE

Moet asseblief nie huiwer om ons by ons kantoor te besoek of 'n oproep te maak indien u enige verdere navrae of bekommernisse het oor die gelyste aktiwiteit(e), watergebruike of ontwikkeling wat voorgestel word nie.

Fisiese Adres (Kantoor):
Generaal Straat 3
Machadodorp
1170

Selfoon: 082 451 5608 (Justin Bowers) of 083 644-7179 (kantoor)

Baie dankie vir u deelname!

Wees asseblief verseker dat u kommentaar deel sal vorm van die finale dokument wat by die besluitnemende gesag ingedien moet word.

Voltooi asseblief en stuur die onderstaande registrasie- en kommentaarblad en/of POPAI-toestemmingsvorm terug **op u vroegste gerief:**

- **'n Konsepverslag sal meer as 30 dae vanaf die datum van hierdie dokument vir kommentaar versprei word.**
- **Skriftelike kommentaar of besware met betrekking tot die aansoek om 'n watergebruikmagtiging moet binne 60 dae vanaf hierdie kennisgewing, nie later as 22 April 2022, ingedien word nie.**

Nota: Stuur 'n e-pos aan ons om enige tyd jou toestemming te onttrek, en ons sal jou inligting onmiddellik uit ons rekords skrap.
Dankie.

REGISTRASIE- EN KOMMENTAARBLAD

300 MW SONFOTOVOLTAISE (FV) FASILITEIT (FASE 2) OP GEDEELTE DRIE EN DIE OORBLYWENDE GEDEELTE VAN DIE PLAAS GOEDE HOOP 26C, GEDEELTE SES VAN DIE PLAAS LEUWE FOUNTAIN 27 C, DIE OORBLYWENDE GEDEELTE VAN DIE PLAAS RIET FOUNTAIN 39 C, GEDEELTE EEN, SES EN DIE OORBLYWENDE GEDEELTE VAN DIE PLAAS KWANSELAARS HOEK 40 C EN GEDEELTE VIER VAN DIE PLAAS TAAIBOSCH FONTEIN 41 C, TUSSEN DE AAR & HANOVER, EMTHANJENI PLAASLIKE MUNISIPALITEIT, PIXLEY KA SEME DISTRIKSMUNISIPALITEIT, NOORD-KAAP PROVINSIE.

Titel: _____Naam: _____

Van: _____

Maatskappynaam / Belangegroep:
_____

_____

Pos- of Woonadres: _____

_____

_____

_____

Dorp / Stad:
_____

Pos Kode: _____

Tel: (_____) _____

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Sel: _____

Faks: (_____) _____

E-posl adres: _____

'n Geregistreerde belanghebbende en geaffekteerde party is geregtig om beswaar te maak en skriftelik kommentaar te lewer op alle skriftelike voorleggings, insluitend konsepverslae wat aan die bevoegde en/of verantwoordelike owerheid gemaak is, mits - (c) die belanghebbende en geaffekteerde party enige direkte besigheid, finansiële, persoonlike of ander belang wat daardie party mag hê by die goedkeuring of weiering van die aansoek. Verskaf asseblief sulke inligting in die spasie hieronder verskaf.

_____

_____

_____

_____

Dui asseblief met 'n **X** aan of u op hoogte gehou wil word van die OG en WGG proses.

JA, ek wil graag op hoogte gehou word	
NEE, ek stel nie belang nie	

As "JA", dui asb aan met 'n **X** hoe u op hoogte gehou wil word.

E-pos	
Faks	

KOMMENTAAR: (Indien u meer spasie benodig as wat voorsien word, heg asseblief additionele bladsye aan)

_____

_____

_____

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Reg: 2006/023163/23

POPIA TOESTEMMINGSVORM

Kindly be advised that should you receive unsolicited correspondence directly from us, and you are (i) an occupier, owner or person in control of the site or any alternative site where the activity is to be undertaken, (ii) an owner, person in control or occupier of land adjacent to the site or any alternative site where the activity is to be undertaken, (iii) the municipal councillor of a ward, (iv) any organisation of ratepayers that represents the community, (v) a municipality, (vi) any organ of state having jurisdiction in respect of any aspect of the activity, or (vii) any other party as required by the competent authority, then we were required to give you notice in terms of EIA Regulation 41(2), and had to therefore derive your information, including name, contact details and address, from a public record. Alternatively, you may have been referred to us. If you are not an organ of state, did not submit written comments or attend meetings, did not request in writing for your name to be placed on the register, then we are not obligated in terms of EIA Regulation 42 to retain a record of your personal information in a register of interested and affected parties, and as such, must obtain proof of consent provided by yourself. To this effect, kindly confirm your consent by ticking the boxes below.

☐ I, in my capacity as the data subject, give consent to ecoleges, in its capacity as the responsible party, to process my personal information for purposes of pursuing its legitimate interests or those of a third party to whom the information is supplied, but limited to (1) the submission of reports or plans for comment, (2) transferring the same information to a third party, including registered interested and affected parties, the competent authority and applicant or holder of the environmental authorisation, (3) submitting a copy of an appeal against a decision

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
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to grant or refuse environmental authorisation, and/or (4) submission of environmental audit reports (containing recommendations for amending the EMPr) for comment.

☐ I hereby acknowledge that only the minimum personal information that is required to be processed for the purpose of the EIA Regulations (2014) will be processed, including my name, contact details, address, and disclosure on any direct business, financial, personal, or other interest which that party may have in the approval or refusal of the application.

☐ I hereby confirm that the personal information, which I shall provide is mine, and that it is complete, accurate, not misleading and updated.

☐ I hereby acknowledge that my personal information is being collected explicitly for public participation processes associated with this project.

☐ Irrespective of the decision to grant or refuse an environmental authorisation, and irrespective of whether the scope of the authorisation includes operational or development aspects only, I hereby give consent to ecoleges to retain my records indefinitely for historical and/or research purposes.

☐ I understand, upon submitting my personal information to ecoleges, that it will be saved on their server, which meets the various conditional "Minimum Security Requirements" of their Cyber Insurance company, including *inter ali*a firewalls to restrict access to digitally stored sensitive information, anti-virus software implemented on all desktops, laptops and sensitive systems, password controls implemented on sensitive systems, etc.

☐ I understand that ecoleges shall inform me when there are reasonable grounds to believe that my personal information has been accessed or acquired by any unauthorised person.

☐ I have read and understand my Section 5 Rights as a data subject including *inter alia*, the right to -

- request access to my personal information,
- request information about the identity of all third parties,
- request ecoleges to correct, update, destroy or delete my personal information, and
- lodge a complaint in writing to the Information Regulator if in my opinion the processing of information is not reasonable.

For more information about the Protection of Personal Information Act, 2013 (POPIA), which commenced on 01st July 2020, it is available at the following link: www.popia.co.za

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Your participation in the Public Participation Process (PPP) is voluntary, but it is mandatory in terms of Regulation 42 and 43(1) of the amended EIA Regulations (2014) that we receive the relevant personal information for us to register you as an Interested and Affected Party, and for you to be entitled to comment, in writing, on all reports or plans that we submit to you, respectively.

Failure to supply the information or incomplete information may impact your eligibility as a registered Interested and Affect Party.

**Die wetgewing word in Engels aangehaal soos wat dit oorspronklik gepubliseer is om te verhoed dat die bedoeling, intensie, en taalgebruik van die wetgewing met moontlike onakkuraathede beïnvloed kan word tydens die vertalings proses.*

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
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Landowner Notification in English & Afrikaans

Written Notice to Land Occupiers:
Soventix (Pty) Ltd wants to build a Solar PV Facility

What is going to happen? South Africa cannot make enough electricity to supply its people and economy. That's why we have "load shedding." And most (80%) of our electricity is made by burning coal, which is very bad for the environment and our health. So, a company, called Soventix, is proposing to build two solar PV facilities that make electricity using the sunshine. The second facility will use lots of solar panels to capture the sun's energy from a large area (400 ha) and change it into electricity.

Who is going to do it? Soventix (Pty) Ltd will develop the Solar Facility.

Where will the solar facility be? The second solar facility (the first phase is already approved) will be developed on Portion 3 & Remainder of Farm Goedehoop 26 C, Portion 6 of Leuwe Fountain 27 C, the Remainder of Farm Riet Fountain 39 C, Portion 1, 6 & Remainder of Kwanselaars Hoek 40 C and Portion 4 of Taaibosch Fontein 41 C, registration district Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province, South Africa.

Why are you telling me? South Africa's laws about our environment (National Environmental Management Act, 1998) and water resources (National Water Act, 1998) say that a person must get permission from the government before they can build a big solar facility and powerlines on a farm, and especially if it is going to impact the surface water, groundwater and remove a lot of the plants (*Listed Activities 11, 19, 28 & 48 of Listing Notice 1, Listed Activities 2 & 15 of Listing Notice 2, & Listed Activities 14 & 18 of Listing Notice 3, as well as Section 21(a), (b), (c), (g) and (i) water uses*). Before Soventix can get permission from the government (Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform and the Orange Proto Catchment Management Agency), they must first make a study, called a Scoping & Environmental Impact Assessment, to see if and how the facility will impact the land, river, animals, plants, and people in the surrounding area. **Part of the study is to tell the people in the surrounding area about the project so that you know about it and, if you believe it will affect you, then you can tell us what you think.**

What next? If you have any questions, want to tell us something, or if you want us to put your name on a list so that we can give you more information, then please send your name, cell phone number, email, and postal address to Justin Bowers. You can use one of the following ways: Tel: 083 644 7179, Cell: 082 451 5608, Fax: 086 697 9316, E-mail:

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justin@ecoleges.co.za, Post: PO Box 516, Machadodorp, 1170.We will start sending out information more than 30 days from the date of this notice. If you are worried about the surface or groundwater, then you must tell us before 22nd April 2022.

Geskrewe kennisgewing:
Soventix (Edms) Bpk. wil 'n sonkrag-PV-fasiliteit bou

Wat gaan gebeur? Suid-Afrika kan nie genoeg elektrisiteit maak om sy mense en ekonomie te voorsien nie. Dit is hoekom ons "beurtkrag" het. En die meeste (80%) van ons elektrisiteit word gemaak deur steenkool te verbrand, wat baie sleg is vir die omgewing en ons gesondheid. So, 'n maatskappy, genaamd Soventix, gaan drie sonkrag-PV-fasiliteite bou wat elektrisiteit maak deur die sonskyn te gebruik. Die tweede fasiliteit sal baie sonpanele gebruik om die son se energie van 'n groot gebied (400 ha) op te vang en dit in elektrisiteit te verander.

Wie gaan dit doen? Soventix (Edms) Bpk. sal die sonkragfasiliteit ontwikkel.

Waar sal die kruising wees? Die tweede sonkragfasiliteit sal ontwikkel word op gedeelte drie en die oorblywende gedeelte van die plaas Goede Hoop 26C, gedeelte ses van die plaas Leuwe Fountain 27 C, die oorblywende gedeelte van die plaas Riet Fountain 39 C, gedeelte een, ses en die oorblywende gedeelte van die plaas Kwanselaars Hoek 40 C en gedeelte vier van die plaas Taaibosch Fontein 41 C, tussen De Aar & Hanover, Emthanjeni Plaaslike Munisipaliteit, Pixley Ka Seme Distriksmunisipaliteit, Noord-Kaap Provinsie, Suid-Afrika.

Hoekom vertel jy my? Suid-Afrika se wette oor ons omgewing (Wet op Nasionale Omgewingsbestuur, 1998) en waterbronne (Nasionale Waterwet, 1998) sê dat 'n persoon toestemming van die regering moet kry voordat hulle 'n groot sonkragfasiliteit en kraglyne op 'n plaas kan bou, en veral as dit die oppervlakwater, grondwater gaan beïnvloed en baie van die plante gaan verwyder (Gelyste Aktiwiteite 11, 19, 28 & 48 van Lyskennisgewing 1, Gelyste Aktiwiteite 2 & 15 van Lyskennisgewing 2, & Gelyste Aktiwiteite 14 & 18 van Noteringskennisgewing 3, sowel as Artikel 21(a), (b), (c), (g) en (i) watergebruike). Voordat Soventix toestemming van die regering (Noord-Kaapse departement van landbou, omgewingsake, landelike ontwikkeling en grondhervorming en die Orange Proto-opvanggebiedbestuursagentskap) kan kry, moet hulle eers 'n studie, genaamd 'n Omvang- en omgewingsimpakstudie, maak om te sien of en hoe die fasiliteit die grond, rivier, diere, plante en mense in die omliggende area sal beïnvloed. **Deel van die studie is om die mense in die omgewing van die projek te vertel sodat jy daarvan weet en, as jy glo dit sal jou raak, dan kan jy vir ons sê wat jy dink.**

Wat gebeur volgende? As jy enige vrae het, iets vir ons wil vertel, of as jy wil hê ons moet jou naam op 'n lys plaas sodat ons vir jou meer inligting kan gee, stuur asseblief jou naam,

selfoonnommer, e-pos, en posadres aan Me. Shannon Farnsworth. Jy kan een van die volgende maniere gebruik: Tel: 083 644 7179, Sel: 082 451 5608, Faks: 086 697 9316, E-pos: justin@ecoleges.co.za, Pos: Posbus 516, Machadodorp, 1170. Ons sal begin om inligting uit te stuur meer as 30 dae vanaf die datum van hierdie kennisgewing. As jy bekommerd is oor die oppervlak of grondwater, moet jy ons voor 22 April 2022 in kennis stel.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

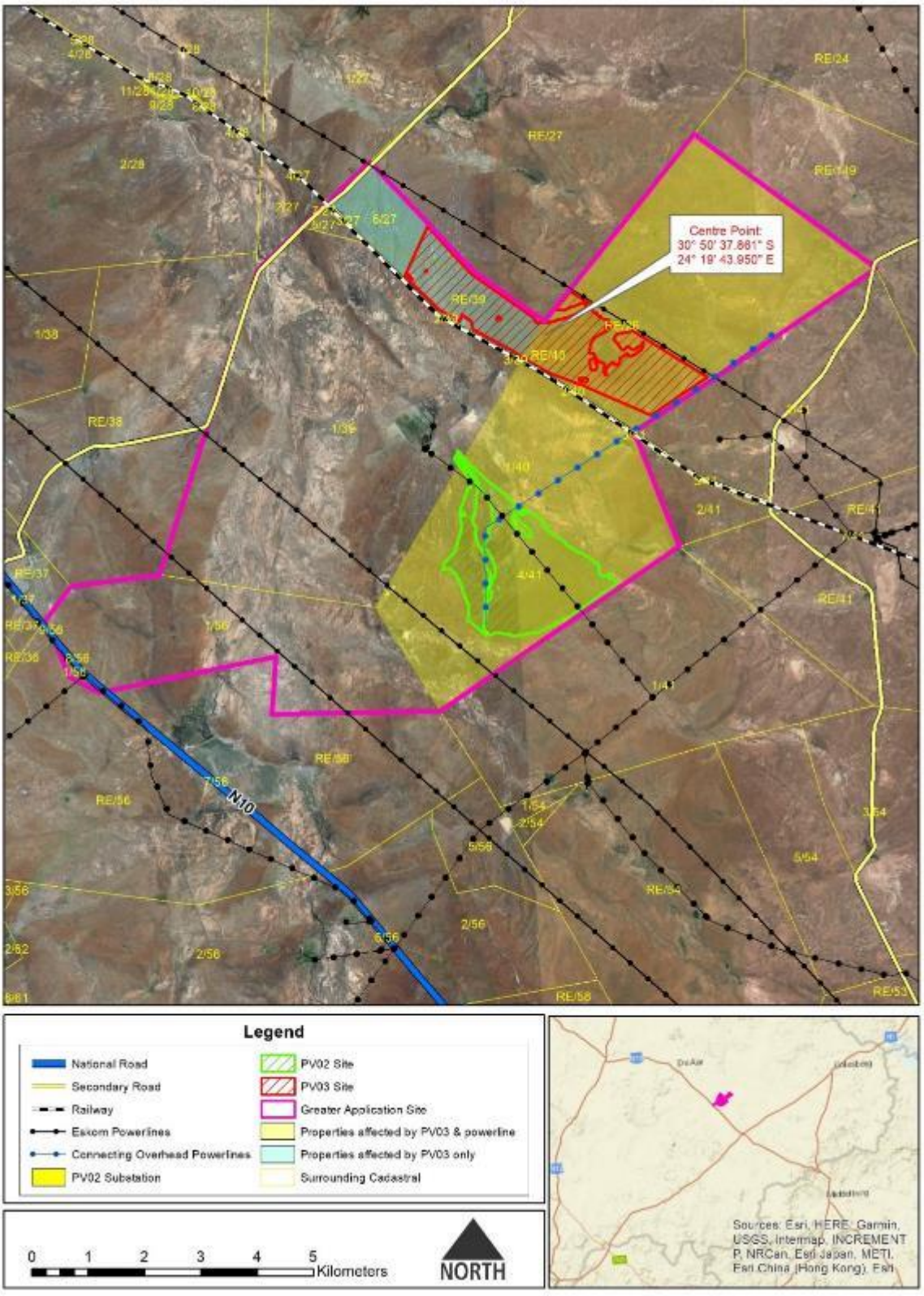

Figure 1: Location map of proposed development in relation to already approved Phase 1 development / Omgewingskaart van voorgestelde ontwikkeling.

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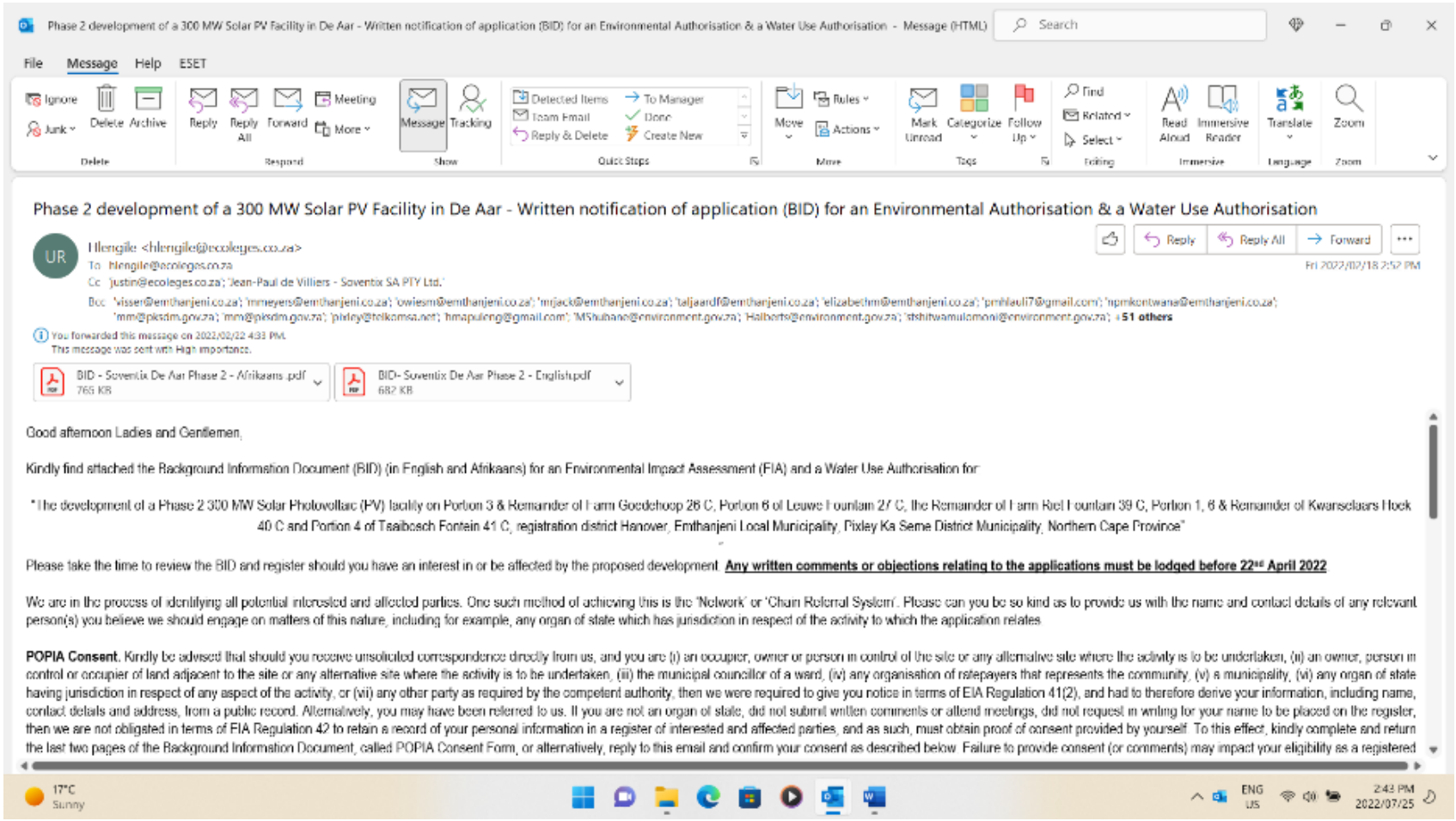
BID Distribution



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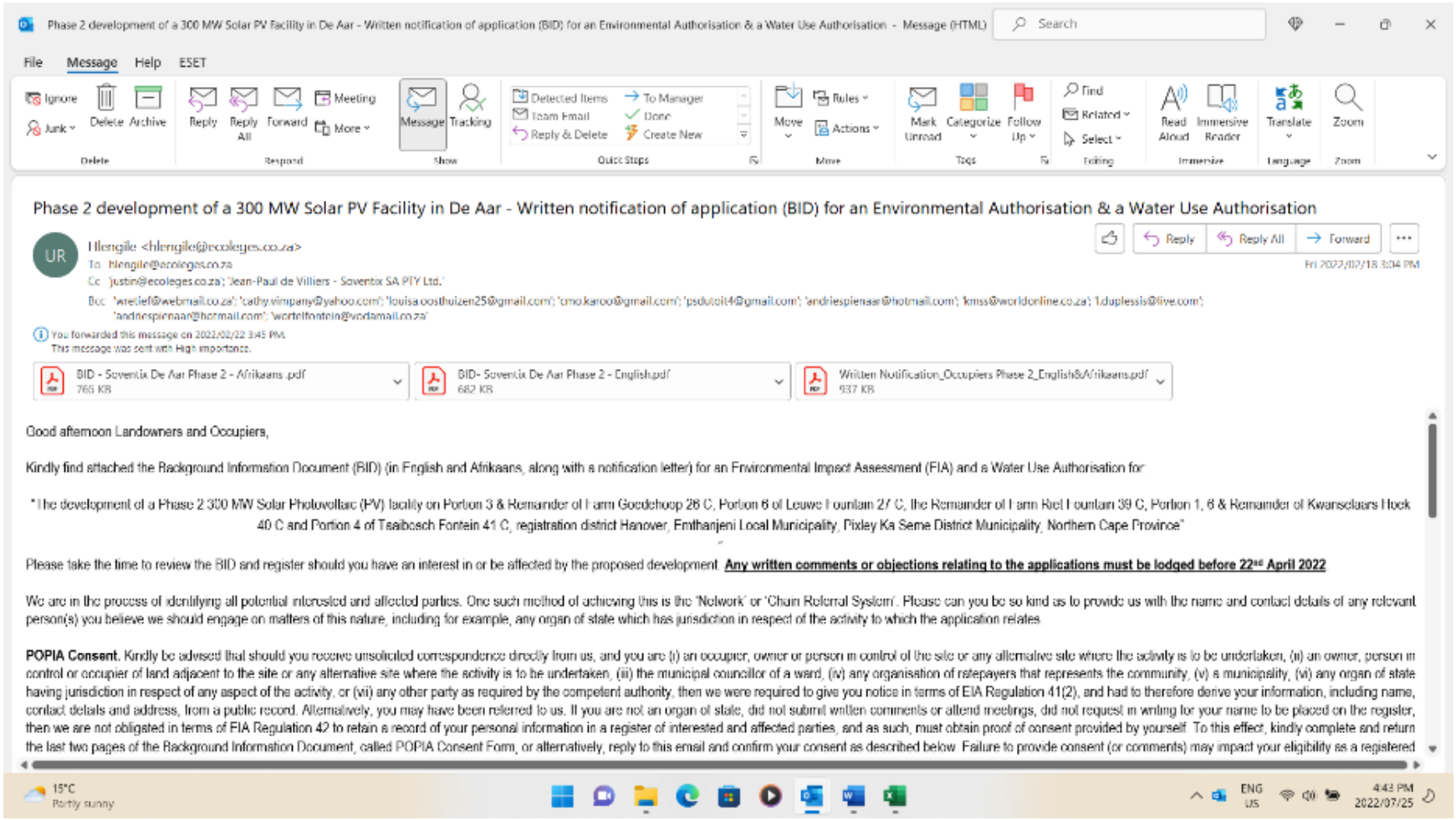
Landowner Notification Distribution



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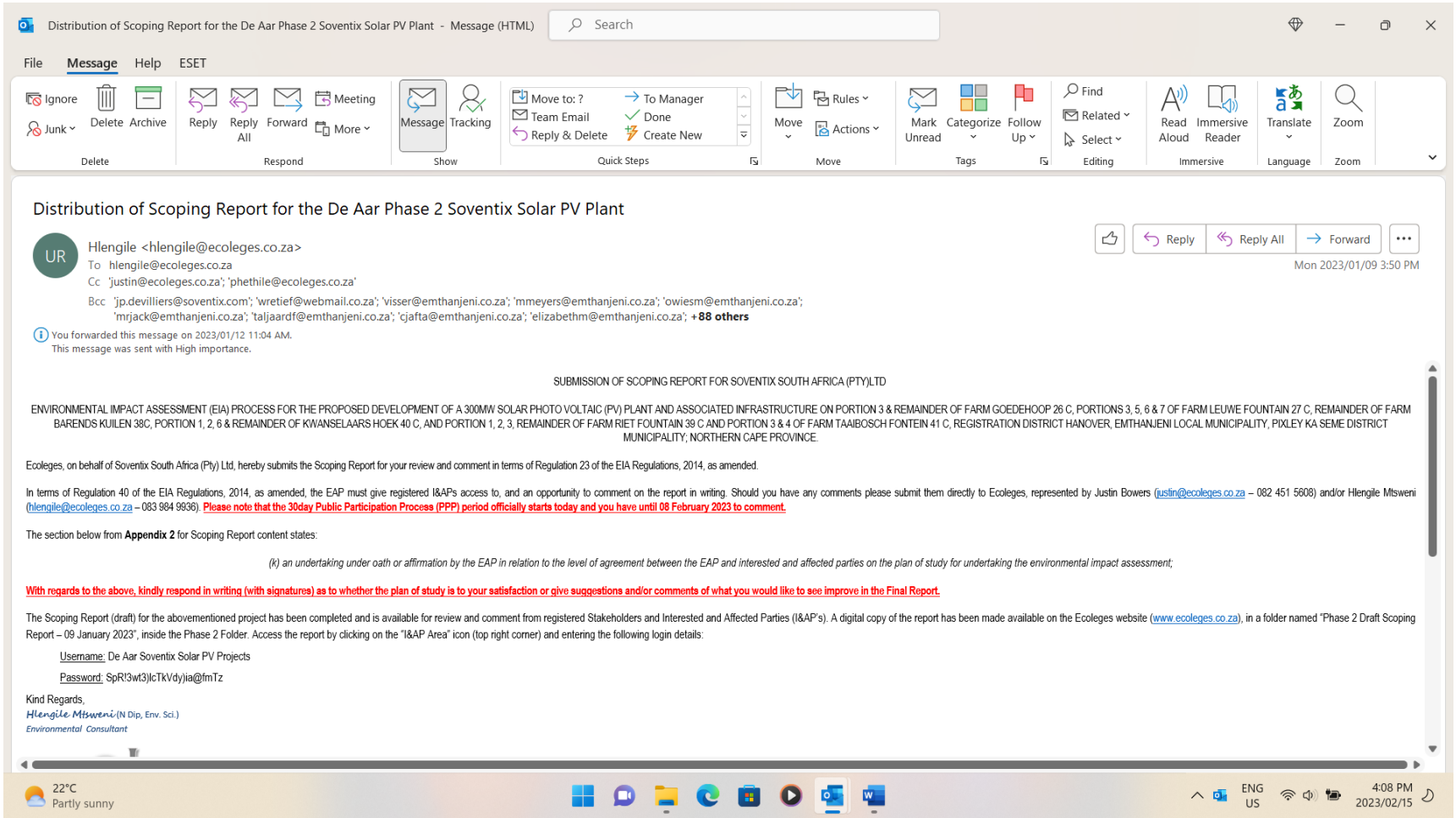
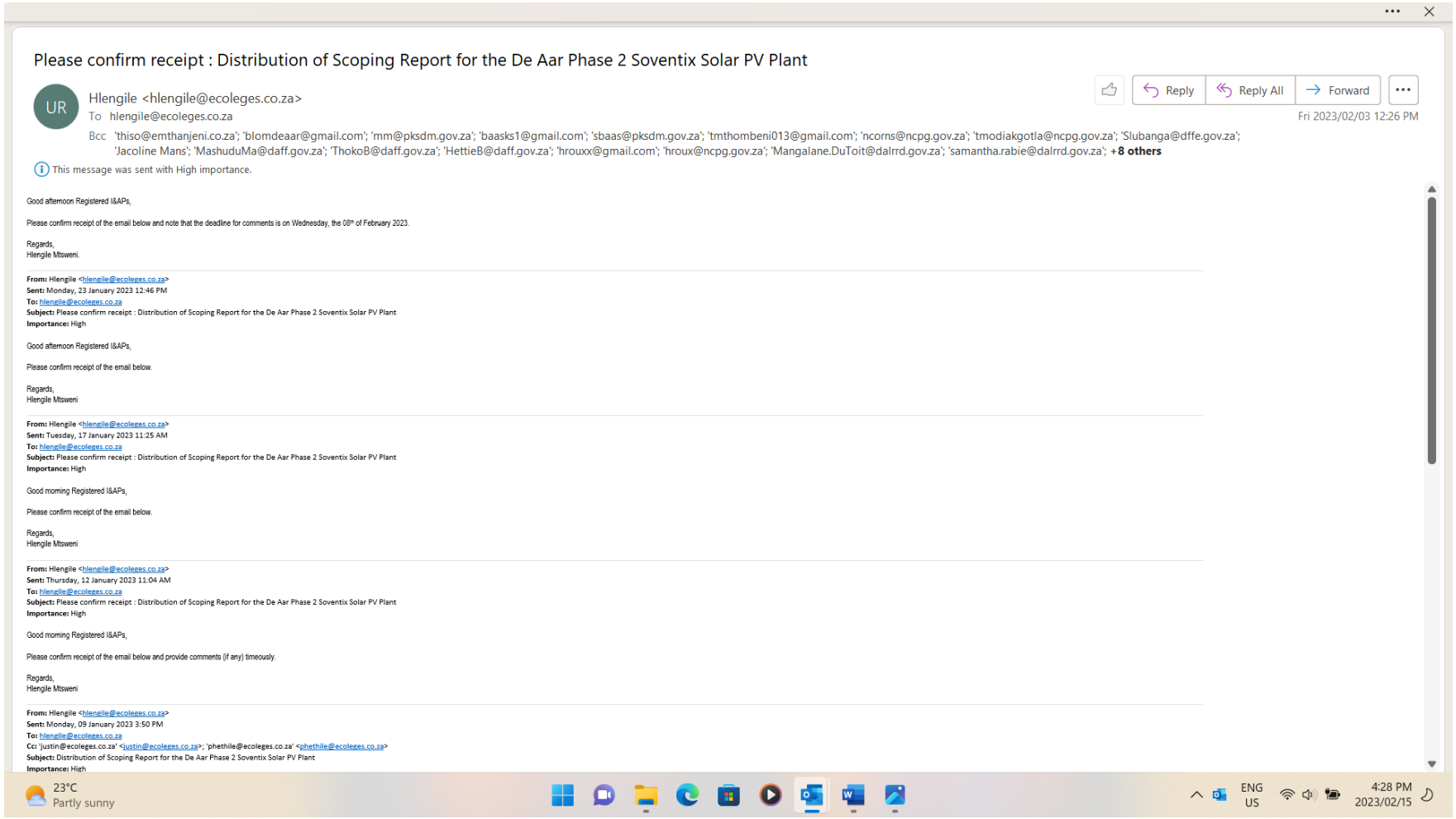
Reg: 2006/023163/23

Draft Scoping Report Distribution



MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

Attempts to obtain comments – Draft Scoping Report



Please confirm receipt : Distribution of Scoping Report for the De Aar Phase 2 Soventix Solar PV Plant

UR

Hlengile <hlengile@ecoleges.co.za>

To hlengile@ecoleges.co.za

Bcc 'thiso@emthanjeni.co.za'; 'blomdeaar@gmail.com'; 'mm@pksdm.gov.za'; 'baasks1@gmail.com'; 'sbaas@pksdm.gov.za'; 'tmthombeni013@gmail.com'; 'ncorns@ncpg.gov.za'; 'tmodiakgotla@ncpg.gov.za'; 'Slubanga@dffe.gov.za'; 'Jacoline Mans'; 'MashuduMa@daff.gov.za'; 'ThokoB@daff.gov.za'; 'HettieB@daff.gov.za'; 'hrouxx@gmail.com'; 'hroux@ncpg.gov.za'; 'Mangalane.DuToit@dalrrd.gov.za'; 'samantha.rabie@dalrrd.gov.za'; **+8 others**

Reply | Reply All | Forward

Fri 2023/02/03 12:26 PM

This message was sent with High importance.

Good afternoon Registered I&APs,

Please confirm receipt of the email below and note that the deadline for comments is on Wednesday, the 08th of February 2023.

Regards,
Hlengile Mtsweni.

From: Hlengile <hlengile@ecoleges.co.za>
Sent: Monday, 23 January 2023 12:46 PM
To: hlengile@ecoleges.co.za
Subject: Please confirm receipt : Distribution of Scoping Report for the De Aar Phase 2 Soventix Solar PV Plant
Importance: High

Good afternoon Registered I&APs,

Please confirm receipt of the email below.

Regards,
Hlengile Mtsweni

From: Hlengile <hlengile@ecoleges.co.za>
Sent: Tuesday, 17 January 2023 11:25 AM
To: hlengile@ecoleges.co.za
Subject: Please confirm receipt : Distribution of Scoping Report for the De Aar Phase 2 Soventix Solar PV Plant
Importance: High

Good morning Registered I&APs,

Please confirm receipt of the email below.

Regards,
Hlengile Mtsweni

From: Hlengile <hlengile@ecoleges.co.za>
Sent: Thursday, 12 January 2023 11:04 AM
To: hlengile@ecoleges.co.za
Subject: Please confirm receipt : Distribution of Scoping Report for the De Aar Phase 2 Soventix Solar PV Plant
Importance: High

Good morning Registered I&APs,

Please confirm receipt of the email below and provide comments (if any) timeously.

Regards,
Hlengile Mtsweni

From: Hlengile <hlengile@ecoleges.co.za>
Sent: Monday, 09 January 2023 3:50 PM
To: hlengile@ecoleges.co.za
Cc: 'justin@ecoleges.co.za' <justin@ecoleges.co.za>; 'phethile@ecoleges.co.za' <phethile@ecoleges.co.za>
Subject: Distribution of Scoping Report for the De Aar Phase 2 Soventix Solar PV Plant
Importance: High

23°C Partly sunny

ENG US 4:28 PM 2023/02/15

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

Attempts to obtain comments - Evidence of opportunity to provide comments

Name	Date	Method of Communication & Action Taken to obtain comments
South African Astronomical Observatory	18/01/2023	Phone call – Was informed that the area is too far from their areas of concern (a radius of more than 100km).
Northern Cape Environmental Department	18/01/2023	Phone call – Official said he saw the report, but haven't gone through it.
Pixley ka Seme District Municipality (Environmental Director)	18/01/2023	Email – Received "read receipt".
Emthanjeni Local Municipality (Municipal Manager)	09/01/2023	Email – Received "read receipt".

List of Interested and Affected Parties

Available on request in order to comply with the POPIA.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

Site Notice Pictures

Photo 1: Close up of the Site Notices.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

Photo 2: Site Notice along the fence of the property.

Photo 3: Site Notice at an entrance to the site.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

Photo 4: Site Notice along a fence next to the road to the property.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

Site Notice Wording

Notice

is hereby given in accordance with Chapter 6 of the Environmental Impact Assessment Regulations, 2014 as amended and section 47D of the National Environmental Management Act (Act 107 of 1998) as amended, of an application for Environmental Authorisation as well as Water Use Authorisation in terms of the National Water Act (Act 36 of 1998) Date of Notice: 18th February 2022

Description of activity

The development of a 300MW Solar Photo Voltaic (PV) plant on Portion 3 & Remainder of Farm Goedehoop 26 C, Portion 1, 6 & Remainder of Kwanselaars Hoek 40 C, Portion 4 of Taaibosch Fontein 41 C and the Remainder of Farm Riet Fountain 39 C, registration district Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality; Northern Cape Province. The proposed development will be connected to an already authorised solar photo-voltaic (PV) facility by means of overhead powerlines, so that both facilities feed into existing Eskom 400KVa overhead powerlines via an on-site sub-station.

Environmental Authorisation (EA)

An application for Environmental Authorisation (EA) will be submitted to the Competent Authority (Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform) to undertake the following Listed Activities (as amended):

Listing Notice 1 (GN No. 983, 4 December 2014):
Listed Activity 11, 19, 28, 48
Listing Notice 2 (GN No. 984, 4 December 2014):
Listed Activity 2 & 15
Listing Notice 3 (GN No. 985, 4 December 2014):
Listed Activity 14 & 18

Water Use Authorisation

Section 21 water uses will be registered under the relevant General Authorisations or applied for in terms of the Water Use License Application and Appeals Regulations (GN No. R.267, 24 March 2017), as applicable through the Responsible Authority (Department of Water & Sanitation: Orange Proto Catchment Management Agency) for:

- Section 21 (a) – taking of water;
- Section 21 (b) – storing of water;
- Section 21 (c) – impeding or diverting the flow of water in a watercourse;
- Section 21 (i) - altering the bed, banks, course or characteristics of a watercourse; and

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

- Section 21 (g) - disposing of waste in a manner which may detrimentally impact on a water resource.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

Applicant:

Consultant:

Contact person:

Justin Bowers

Cell: +27 (0)82 451 5608
Fax: +27 (0)86 697 9316
E-Mail: justin@ecoleges.co.za
Postal: P.O. Box 516, Machadodorp, 1170
Website: www.ecoleges.co.za

Registration:

For further information and/or to be registered as an interested and affected party (I&AP) or to lodge a written objection, please submit in writing your name, contact details including address, and interest in the matter to the contact person and in the manner(s) provided above, at your earliest convenience, we shall submit the draft reports for comment at a later stage.

Written objections relating to the application for Water Use Authorisation must be lodged within 60 days of this notice, no later than 22 April 2022.

POPIA Disclaimer:

Kindly be advised that should you submit written comments or attend meetings, request in writing for your name to be placed on the register, or if you are an organ of state which has jurisdiction in respect of the activity, then we are required in terms of EIA Regulation 42 to record your name, contact details and address in a register of interested and affected parties, as well as a disclosure of any direct business, financial, personal or other interest which you may have in the approval or refusal of the application, in terms of EIA Regulation 43(1). Your personal information will be stored on a secure server explicitly for the public

participation process (PPP) associated with this project but shall be retained indefinitely for historical and/or research purposes. Other recipients of your personal information include registered I&APs, the competent authority and applicant or holder of the environmental authorisation. Your participation in the PPP is voluntary. However, failure to supply the said information or incomplete information may impact your eligibility as a registered I&AP and opportunity to comment on reports and plans. For more information about the Protection of Personal Information Act, 2013 (POPIA), including your Section 5 Rights as a data subject, visit www.popia.co.za.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
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Advertisements

Violence can end

Even if you are not personally affected by gender-based violence (GBV), you can contribute to curbing it and help to create a kinder, better South Africa.

"Domestic violence and GBV is the real state of disaster in South Africa," said Adv. Tarisai Mchuchu-MacMillan, executive director of Mosaic.

Mosaic is a community-based non-governmental organisation working to prevent and reduce abuse and domestic violence, which reached almost 22 000 people in 2020-'21.

Mosaic gives five tips to help cure this social ill:

- Learn the signs of abuse. This can be obvious (bruises, cuts and other injuries), subtle (fearful demeanour), or invisible. Abuse is also not just physical, but includes verbal, emotional, psychological, sexual, economic or spiritual abuse.
- Listen to and believe the survivors, who have a fear of not being believed.

Sometimes outsiders can be in denial that someone they know is in an abusive situation. "Victim blaming" can also take place.

- Understand consent. "No" does not mean "yes" and sayings such as "boys will be boys" or "she was asking for it" do not solve the problem.
- Guard against a rape culture.

According to the United Nations Women, rape culture is, "the social environment that allows sexual violence to be normalised and justified, fuelled by the persistent gender inequalities and attitudes about gender and sexuality".

We need to work to cut off the elements that fuel it, says Mosaic.

Harmful attitudes include ideas like "the man is the boss of the house" or that women should not express their sexuality.

- Fund organisations dedicated to helping GBV survivors.

Non-profit organisations often show that a little can go a long way.

Do not be discouraged if you do not have a lot to give, because even the smallest amount can help.

Runners support furry friends

At the Kimberley Harriers Running Club's annual SPCA Valentine's Fun Run, much needed items and money were donated to assist the assocation.

The event took place at the Diamantveld High School on 15 February.

Participants donated 224 kg of dry dog food, 34 kg of dry cat food, 10 kg of canned dog food, 2 kg of canned cat food, nine blankets, a variety of pet toys and R2 425.

At the handing over of cash and much-needed items to the Kimberley SPCA after the Kimberley Harriers' Valentine's Fun Run are from the left Alet Steyn (SPCA), Ramona Brand (Kimberley Harriers), Melissa Swanepoel (Diamantveld High School) and Roshelle Jacobs (club captain, Kimberley Harriers). PHOTO: SUPPLIED

PUBLIC PARTICIPATION NOTICE OF APPLICATION TO CONDUCT A SCOPING & ENVIRONMENTAL IMPACT ASSESSMENT (S&EIA) AND WATER USE AUTHORISATION (WUA)

Notice is hereby given in accordance with Chapter 6 of the Environmental Impact Assessment Regulations, 2014 as amended and section 47D of the National Environmental Management Act (Act 107 of 1998) as amended, of an application for Environmental Authorisation (EA) as well as Water Use Authorisation in terms of the National Water Act (Act 36 of 1998).

Description of the proposed development

The development of a 300MW Solar Photo-Voltaic (PV) plant on Portion 3 & Remainder of Farm Goedehoop 26 C, Portion 1, 6 & Remainder of Kwanselaars Hoek 40 C, Portion 6 of Leuwe Fountain 27 C, Portion 4 of Taaibosch Fontein 41 C and the Remainder of Farm Riet Fountain 39 C, registration district Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality; Northern Cape Province. The proposed development will be connected to an already authorised solar PV facility by means of overhead powerlines, so that both facilities feed into existing Eskom 400KVa overhead powerlines via an on-site sub-station.

Environmental Authorisation

An application for an EA will be submitted to the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform in terms of the EIA Regulations, 2014 as amended to undertake the following listed activities:

Listing Notice 1 (GN No. 983, 4 December 2014):
- Activity number 11,19,28 & 48.

Listing Notice 2 (GN No. 984, 4 December 2014):
- Activity number 2 & 15.

Listing Notice 3 (GN No. 985, 4 December 2014):
- Activity number 14&18

Water Use

Section 21 water uses will be registered under the relevant General Authorisations or applied for in terms of the Water Use License Application and Appeals Regulations (GN No. R.267, 24 March 2017), as applicable through the Responsible Authority (Department of Water & Sanitation: Orange Proto Catchment Management Agency) for:

- Section 21 (a) – taking of water;
- Section 21 (b) – storing of water;
- Section 21 (c) – impeding or diverting the flow of water in a watercourse;
- Section 21 (i) - altering the bed, banks, course or characteristics of a watercourse; and
- Section 21 (g) - disposing of waste in a manner which may detrimentally impact on a water resource.

For further information and/or to be registered as an interested and affected party (I&AP) or to lodge a written objection, please submit in writing your name, contact details including postal and email address, and interest in the matter to the contact person and in the manner(s) provided below, at your earliest convenience – Reports shall be distributed for comment at a later stage. Date of publication of this notice: 25 February 2022.

Written objections relating to the application for Water Use Authorisation must be lodged within 60 days of this notice, no later than 22 April 2022.

Applicant: Soventix South Africa (Pty) Ltd
Consultant: Ecoleges Environmental Consultants
Contact person: Mr Justin Bowers Cell: 082 451 5608, Fax: 086 697 9316, e-mail: justin@ecoleges.co.za, PO Box 516, Machadodorp, 1170, www.ecoleges.co.za

POPIA Disclaimer: Kindly be advised that should you submit written comments or attend meetings, request in writing for your name to be placed on the register, or if you are an organ of state which has jurisdiction in respect of the activity, then we are required in terms of EIA Regulation 42 to record your name, contact details and address in a register of interested and affected parties, as well as a disclosure of any direct business, financial, personal or other interest which you may have in the approval or refusal of the application, in terms of EIA Regulation 43(1). Your personal information will be stored on a secure server explicitly for the PPP associated with this project but shall be retained indefinitely for lawful, historical and/or research purposes. Other recipients of your personal information include registered I&APs, the competent authority and applicant or holder of the environmental authorisation. Your participation in the PPP is voluntary. However, failure to supply the said information or incomplete information may impact your eligibility as a registered I&AP and opportunity to comment on reports and plans. For more information about the Protection of Personal Information Act, 2013 (POPIA), including your Section 5 Rights as a data subject, visit www.popia.co.za

Unemployed Science, Engineering and Technology Graduates Required to Volunteer in the DSI's National Youth Service Programme

The South African Agency for Science and Technology Advancement (SAASTA), a business unit of the National Research Foundation on behalf of the Department of Science and Innovation (DSI), is **inviting unemployed science, engineering and technology graduates (18 to 35 years of age)** to volunteer their services towards the implementation of the Youth into Science Strategy under the auspices of the National Youth Service Programme. Volunteers will be deployed for a period of up to 12 months to participating organisations that collaborate with the DSI in its youth development programmes. A stipend will be paid to volunteers per month as follows: National Diploma NQF Level 6 (R 4 500), Bachelor's Degree / [illegible] Level 7 (R 5 000), Honours NQF Level 8 (R 5 500), [illegible]vel 9 (R 6 500), PhD NQF Level 10 (R 7 700).

Vacancies [illegible] become available during the year at a various organisa[illegible]n all nine provinces.

Interested youth, wh[illegible]meet required qualifications, are invited to submit a motivati[illegible] letter indicating why they would like to volunteer and the [illegible]ferred province where they would like to be placed. C[illegible]dates should also include a curriculum vitae, certifie[illegible]s (not older than three months) of ID [illegible] and all their contact details. To view a list [illegible]ipating organisations, please visit our website: [illegible].saasta.ac.za/programmes/nurturing-talent/ .

Human Resource Volunteer Department
South African Agency for Science and Technology Advancement
1st Floor Didacta Building
211 Nana Sita Street
PRETORIA
0001

Email your detailed CV to **nysprecruitment@saasta.ac.za**

Closing date: 11 March 2022

Only shortlisted candidates will be notified of the screening outcomes. Candidates who have not been contacted within three months after the closing date should consider their applications unsuccessful. All travel and relocation costs will be at the candidate's expense.

All enquiries: MacDonald Kapu Tel: (012) 392 9300

Unemployed Graduates required for the Science Journalism Community Service Project and Science Journalism Internship Project as part of the DSI's National Youth Service Programme

Unemployed graduates (18 to 35 years of age) in science and technology, communications or journalism and media studies are invited to apply for a one-year Community Service Project and Science Journalism Internship opportunity. SAASTA will place successful applicants at mainstream media outlets and community media outlets in specific district municipalities to produce stories for broadcast, online and print media about science, technology and innovation.

A stipend will be paid to volunteers and interns per month as follows: National Diploma NQF Level 6 (R 4 500), Bachelor's Degree / BTech NQF Level 7 (R 5 000), Honours NQF Level 8 (R 5 500), Master's NQF Level 9 (R 6 500), PhD NQF Level 10 (R 7 700).

Requirements:

- A relevant tertiary qualification e.g. Journalism and Media Studies, Communications, Science or Technology
- Computer literacy
- Self-motivation and ability to work under pressure
- Excellent communication and organisational skills
- Writing and/or radio and television skills
- Good analytical and interpersonal skills

Interested youth, who meet the minimum requirements, are invited to submit a certified copy of their qualification, a motivational letter and a detailed CV to the following email address: internship@saasta.ac.za by no later than **11 March 2022**.

For more information about the Science Journalism Community Service Project, visit our website https://www.saasta.ac.za/programmes/nurturing-talent/youth-journalism-programme/

science & innovation
Department: Science and Innovation
REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation | SAASTA South African Agency for Science and Technology Advancement

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Reg: 2006/023163/23

Geklassifiseerd

REGSKENNISGEWINGS & TENDERS

OIS OMGEWINGSIMPAKSTUDIE

4015

PUBLIC PARTICIPATION NOTICE OF APPLICATION TO CONDUCT A SCOPING & ENVIRONMENTAL IMPACT ASSESSMENT (S&EIA) AND WATER USE AUTHORISATION (WUA)

Notice is hereby given in accordance with Chapter 6 of the Environmental Impact Assessment Regulations, 2014 as amended and section 47D of the National Environmental Management Act (Act 107 of 1998) as amended, of an application for Environmental Authorisation (EA) as well as Water Use Authorisation in terms of the National Water Act (Act 36 of 1998).

Description of the proposed development

The development of a 300MW Solar Photo-Voltaic (PV) plant on Portion 3 & Remainder of Farm Goedehoop 26 C, Portion 1, 6 & Remainder of Kwanselaars Hoek 40 C, Portion 4 of Taalbosch Fontein 41 C and the Remainder of Farm Riet Fountain 39 C, registration district Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality; Northern Cape Province. The proposed development will be connected to an already authorised solar PV facility by means of overhead powerlines, so that both facilities feed into existing Eskom 400KVa overhead powerlines via an on-site sub-station.

Environmental Authorisation

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" Activity number 11,19,28 & 48.

Listing Notice 2 (GN No. 984, 4 December 2014):
" Activity number 2 & 15.

Listing Notice 3 (GN No. 985, 4 December 2014):
" Activity number 14&18

Water Use

Section 21 water uses will be registered under the relevant General Authorisations or applied for in terms of the Water Use License Application and Appeals Regulations (GN No. R.267, **24 March 2017), as applicable** through the Responsible Authority (Department of Water & Sanitation: Orange Proto Catchment Management Agency) for:
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" Section 21 (g) - disposing of waste in a manner which may detrimentally impact on a water resource.

For further information and/or to be registered as an interested and affected party (I&AP) or to lodge a written objection, please submit in writing your name, contact details including postal and email address, and interest in the matter to the contact person and in the manner(s) provided below, at your earliest convenience - Reports shall be distributed for comment at a later stage. Date of publication of this notice: **18 February 2022.**

Written objections relating to the application for Water Use Authorisation must be lodged within 60 days of this notice, no later than 22 April 2022.

Applicant: Sowentix South Africa (Pty) Ltd

Consultant: Ecoleges Environmental Consultants
Contact person: Mr Justin Bowers Cell: 082 451 5608, Fax: 086 697 9316, e-mail: justin@ecoleges.co.za, PO Box 516, Machadodorp, 1170, www.ecoleges.co.za

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Goedehoop / Kwanselaars

FEB 18(E)4045

[illegible]ELKENNIS-WINGS

BO[illegible]DELS: KREDI[illegible]EURE EN DEBI[illegible]TEURE

4201

CAPAZO[illegible]O:EF

In die b[illegible] van wyle ENRI[illegible]ANCISCO CA[illegible]O, [illegible]snommer [illegible]5201 08 2, in lewe [illegible]agtig te Velsstraat 7, [illegible]oonstad, Vrystaat, Boedelnommer 10247/2021, Datum van afsterwe 21/06/2021. Krediteure en debiteure in bogemelde word hiermee versoek om hulle eise in te lewer en hul skulde te betaal by die ondergetekende binne 'n tydperk van dertig (30) dae vanaf 18 Februarie 2022.

JH DELPORT
Gevolmagtigde Eksekuteur
Posbus 1606
KROONSTAD
9500

WOOBERG:HAB

In die boedel van wyle HELENA ANN BOYD WOOBERG (Voorheen EHLERS, HOFMEYER Gebore STIGLINGH), Identiteitsnommer 570704 0034 08 9, in lewe woonagtig te Kameeldoringstraat 4, Woodland Hill Estate, Bloemfontein, Vrystaat, Boedelnommer 9954/2021, Datum van afsterwe 28/08/2021. Krediteure en debiteure in bogemelde word hiermee versoek om hulle eise in te lewer en hul skulde te betaal by die ondergetekende binne 'n tydperk van dertig (30) dae vanaf 18 Februarie 2022.

JH DELPORT
Eksekuteur Testamenter
Posbus 1606
KROONSTAD
9500

(III) A SUMMARY OF THE ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES, AND AN INDICATION OF THE MATTER IN WHICH THE ISSUES WERE INCORPORATED, OR THE REASONS FOR NOT INCLUDING THEM.

See Appendix C.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
Reg: 2006/023163/23

(IV) THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE ALTERNATIVES

(iv) The environmental attributes associated with the alternatives focusing on geographical, physical, biological, social, economic, heritage and cultural aspects.

Geographical Aspects

De Aar is situated in the Northern Cape Province, with an approximate population of 35 539 people (census 2001). De Aar situated within the Emthanjeni Municipality, is renowned for its central location on the main railway line between Johannesburg, Cape Town, Port Elizabeth and Namibia. The Municipality is further situated in the Pixley ka Seme District Municipality with an approximate population of 164 607 people (census 2001), this represents 16, 92% of the Northern Cape population. The Municipality is also approximately 300km south west of Kimberley, 440 km south east of Upington, 300 km north east of Beaufort West and 300 km south west of Bloemfontein. De Aar represents 3.7% of the total population in the Northern Cape Province (Emthanjeni Local Municipality, Integrated Development Plan 2021 – 2022).

Hanover lies approximately 65 km east of De Aar on N1 main north to south route. Britstown is situated about 55 km west of De Aar on the N12 route. Both these main routes link Johannesburg and Cape Town. The towns of Emthanjeni lie in an extensive stock farming area with the emphasis on sheep, mutton and wool farming, especially Merino's. Emthanjeni Municipality, specifically De Aar, is the seat of Pixley ka Seme District Municipality; the Municipality further hosts all Government Departments. Emthanjeni Municipality covers an area of approximately 11390km². Emthanjeni comprises 11% of the district land area and 3% of the province. Emthanjeni further represent approximately 23% of the district's population (Emthanjeni Local Municipality, Integrated Development Plan 2011 – 2016; 2021-2022).

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Figure 42. Google Earth™ map of the location of the proposed development site and footprint relative to the towns of De Aar & Hanover. The grey shaded area indicates a strategic electricity distribution & transmission corridor.

Physical Aspects

Climate

The climate of the study area (Koch & Kotze, 1986) can be regarded as warm to hot with a summer rainfall and dry, cold winters. Temperatures vary from an average monthly maximum and minimum of 32.6ºC and 15.4ºC for January to 16.8ºC and 0.3ºC for July, respectively. Temperature ranges are large with lows of -10°C in winter to mid-40°C in summer. The long-term average annual rainfall in this region of the Northern Cape is only 289mm, of which 201 mm (70%) falls from November to April. Frost occurs most years, 30 days on average, between late May and early September. The climatic restrictions (namely very low rainfall) means that this part of the Northern Cape is best suited for grazing, although the grazing capacity is low (approximately 20-25 ha/large stock unit) (ARC-ISCW, 2004). The only means of cultivation would be by irrigation. The region is subject to periodic droughts which have a serious impact on the surrounding farming areas and on the economy of the towns. The area has a low prevailing agricultural potential.

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP.)
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Topography

The area is characterised by wide open plains with relatively flat topography typical of the Central Karoo. The site is relatively flat (average slope gradient is less than 10% from the east to the west) with some low rocky ridges in the east and north-east of the site. There are a few shallow drainage lines present on site. The site is located at an altitude of approximately 1 300 m to 1 340 m above sea level.

Large portions of the proposed development footprint have denuded topography with slight surface slope towards the west and north. A low ridge cuts through the centre of the site in a southwest to northeast direction and tuning into a low hill with the highest elevation on the site (1 351 masl) near the northern corner. The lowest elevation on the site (1 314) masl occurs at the north-western most corner. A number of short channels provide drainage south-westwards and westwards towards the upper reaches of the non-perennial Brak River (Stapelberg, 2021).

Geology

The geology of the area comprises shales, mudstones and sandstones of the Adelaide Formation (Beaufort Group, Karoo Supergroup), which have been intruded in places by dolerite of the Jurassic age. The sedimentary shales and sandstones are more readily weathered than the dolerite that forms resistant rocky outcrops (Barichievy, 2010; Outeniqua Geotechnical Services, 2011).

The bedrock of the region consists of sediments (mostly fine to medium grained sandstone, but also siltstone and mudstone) of the Adelaide Subgroup, Beaufort Group, Karoo Supergroup.

Dolerite dykes and sills both are sheet-like rock bodies intruded into the sedimentary rock. They are distinguished by their orientation relative to the sedimentary bedding [sills are orientated parallel or sub-parallel to the sedimentary bedding (thus roughly horizontal in this area), while dykes cut across the sedimentary bedding planes (and are thus roughly orientated vertical or near-vertical in this area)].

A number of dolerite dykes of Karoo age have been intruded into the sediments on the site. Due to the fact that the dykes are often very narrow (meter scale), they do not have such a pronounced effect on topography as that of the wide dyke in the central exclusion zone. (Dolerite in general has a slow weathering rate compared to that of sediments and often forms local topographical high points). Consequently, some dolerite dykes have not been included in the pre-existing 1:250 000 scale geological map for the area (Le Roux, 1985). Some of the dykes omitted on the pre-existing large scale map have been confirmed during the site visit and added to the geological features. Additionally, the location of a small number of possible dykes (not

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Reg: 2006/023163/23

confirmed as such during the ground truthing visit but visible as linear structures on satellite images).

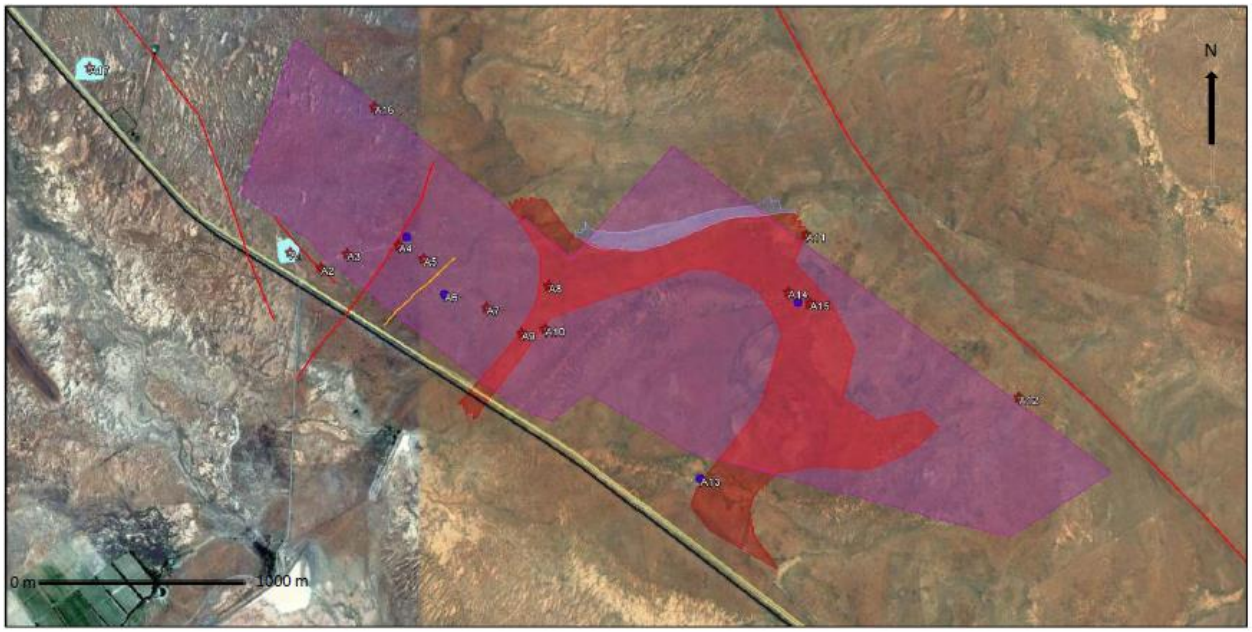

Figure 43. Position of particular observation localities (numbered red stars) of proposed development footprint. Additional polygons are as follows: Light maroon = sedimentary rock sub-outcrop on site, red coloured area = dolerite sill, red lines = dolerite dykes, orange lines = unconfirmed dolerite dykes, light purple = sedimentary rock outcrop on site, yellow = alluvial soil covering sub-outcrop, dark blue dots = reservoirs and ground fill dams, light blue = quarries/dormant quarries.

Soils

Observations during the geotechnical ground truthing exercise indicate that the entire site has very shallow soils and either bedrock sub-outcrop at less than 0,5 metres depth below ground surface or bedrock outcrop/dispersed outcrop. The thickest soils (0,5 to 0,76 metres thickness over minor parts) occur in areas of either gully wash material deposits or alluvial deposits (along the eastern border of the site). Furthermore, the soils are generally of a silty sand to clayey sand nature. These results generally correlate well with earlier studies [Stapelberg (2017); Van den Berg and De Wet (2017)] (Stapelberg, 2021).

Duplex soils (Prisma- and Pedocutanic soils) – these are potentially dominant soils in some landscapes within the De Aar/Hanover area within the sediments of this Beaufort Geological Group geology. The Beaufort Group is a sub-division of the Karoo Super-group (Norman and Whitfield, 2006). The geology that underlies these soils that are deposited in the Karoo Basin,

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP.)
Reg: 2006/023163/23

consist essentially of sandstone, mudstone and shale. Illuviation accumulation of clay in the subsoil results in strong blocky, prismatic or columnar structure and cutanic character. The amount of organic matter is usually low and due to textural contrast the permeability is often limited by the sub (B-) horizon (although surface crusting may also impede infiltration. The electrical conductivity (CEC), pH and reserves of plant nutrients are typically greater in the B-horizon than the Orthic A topsoil. Base status may differ considerably within duplex soils. High levels of exchangeable sodium (and sometimes magnesium are common especially in the prisma-cutanic forms and in those families of pedocutanic forms that have coarser, more angular structure (i.e., macropedal structure). Salinity may be evident immediately below the B-horizon. Duplex character often manifests itself not only in a clear or abrupt increase in clay content with depth, but also in contrasting mineralogical composition of the coarser fractions and show clear evidence of cutanic character (Fey, 2010). The vegetation of these soils are often heavily grazed.

Dominant Soil form	Count	%
Mispah	11	39.3
Swartland	4	14.3
Hutton	1	3.6
Valsrivier	2	7.1
Oakleaf	4	14.3
Addo	2	7.1
Augabies	1	3.6
Gamoep	2	7.1
Sepane	1	3.6
Total		100.0

Figure 44. Table derived from soil mapping undertaken by van den Berg (2017) indicating the percentage soil forms over the proposed development footprint.

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No	Class	Dominant soils	%	Area (ha)
1	Sandstone outcrops	Outcrop/Ms complex	4.6	23.7
2	Dolerite outcrops	Outcrop	2.1	10.6
3	Very shallow yellow brown loamy soils	Ms	33.0	170.2
4	Very shallow yellow brown clayey soils	Ms	0.0	0.0
5	Very shallow red loamy soils	Ms, Gs	9.7	49.8
6	Very shallow red clayey soils	Ms, Hu, (Gs)	0.8	3.9
7	Shallow to medium deep yellow brown loamy soils	Gs, (Ms, Cv)	20.9	107.4
8	Shallow to medium deep yellow brown clayey soils	Oa, Ad, Ag, (Gm)	0.0	0.0
9	Shallow to medium deep red loamy soils	Hu (Gs)	9.6	49.5
10	Shallow to medium deep red clayey soils	Hu, Oa	0.0	0.0
11	Structured shallow soils	Sw	13.1	67.5
12	Structured medium deep soils	Va	6.1	31.2
13	Permanent wetland		0.2	1.2
	Total		**100.0**	**515.0**

Figure 45. Table derived from soil mapping undertaken by van den Berg (2017) providing soil map analysis for the proposed footprint.

Biological Aspects (Fauna & Flora)

- Broad Scale Vegetation Patterns

According to the national vegetation map (Mucina & Rutherford 2006), the entire site falls within a single vegetation type, Northern Upper Karoo. Northern Upper Karoo is one of the most extensive vegetation types in the country and occupies over 40 000km^2 of the interior Karoo. This vegetation type occurs on the Upper Karoo plateau from Prieska, Vosburg and Carnarvon in the west to Phillipstown, Petrusville and Petrusburg in the east. It is bordered by Niekerkshoop, Douglas and Petrusburg in the north and by Carnarvon, Pampoenpoort and De Aar in the south. The vegetation consists of shrubland dominated by dwarf Karoo shrubs, grasses and *Acacia mellifera* subsp. *detinens*, and other low trees particularly on the sandy soils. The vegetation is flat to gently sloping with isolated hills of Upper Karoo Hardeveld in the south and Vaalbos Rocky Shrubland in the northeast and with many interspersed pans (Mucina & Rutherford 2006). Soils and geology are not very specific and consist of shales of the Volksrust formation and the Prince Albert Formation, as well as Dwyka Group diamictites, while there are also dolerite sills and sheets in places. Large areas are also covered by superficial deposits of calcrete from the Kalahari Group. Soils are variable and may be deeper sandy soils or shallow soils of the Glenrosa and Mispah forms. Land types are mainly Ae, Ag and Fc. Four plant

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species are known to be endemic to the vegetation type, *Lithops hookeriana*, *Stomatium pluridens*, *Galenia exigua* and *Manulea deserticola*.

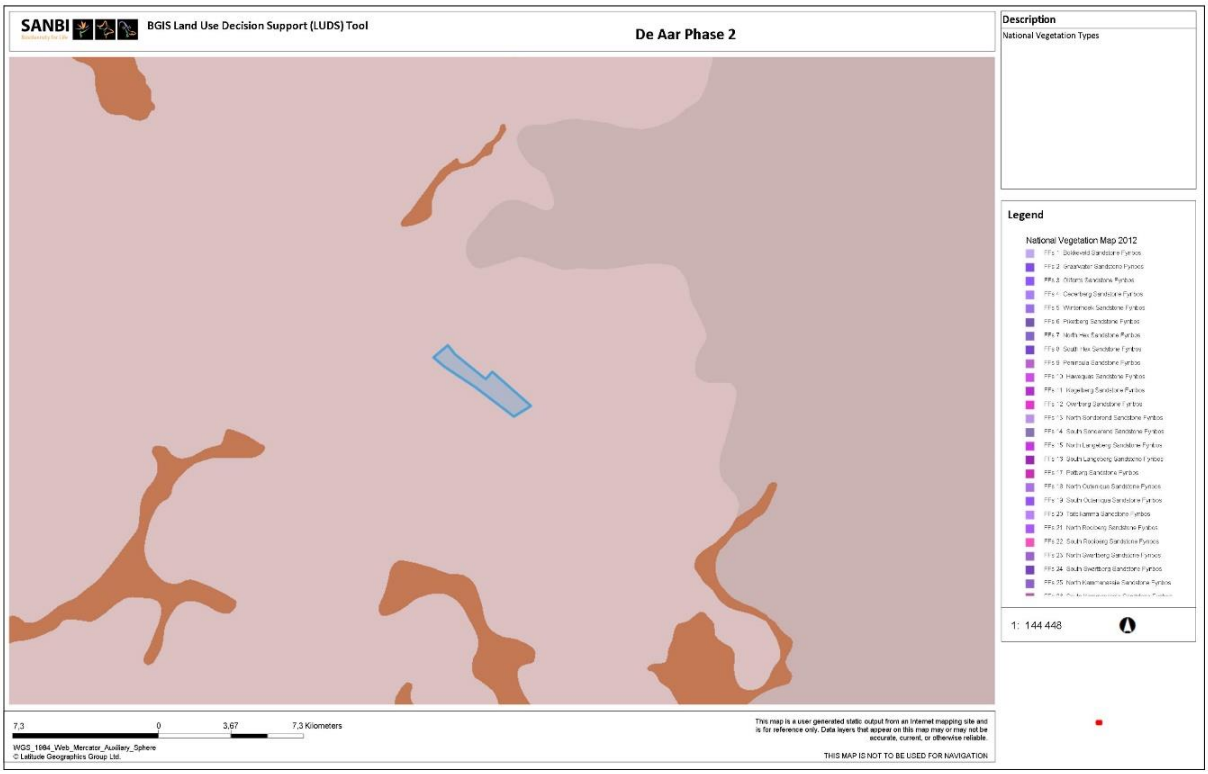

Figure 46. Broad-scale overview of the vegetation in and around the proposed Soventix solar PV development footprint. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006).

Northern Upper Karoo has not been significantly affected by transformation and is still approximately 96% intact and is classified as Least Threatened (Mucina & Rutherford 2006). The NFEPA aquatic ecosystems layers show that several highly ranked priority wetlands occur in the area, many supporting cranes, some of which are adjacent to the PV sites. The Brak River is also considered a high priority NFEPA river.

From the satellite imagery of the site and presence of the Brak River on the site, which clearly has a large floodplain area, it is clear that the VegMap provides an oversimplification of the vegetation of the site and it is likely that there are at least three distinct vegetation types present on the site. The open plains of the site correspond with the Northern Upper Karoo vegetation type, but there are also some small rocky hills and koppies present which are likely to have vegetation more closely allied with Upper Karoo Hardeveld, while the floodplain of the Brak

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River is clearly characterised by an azonal vegetation type, perhaps allied with Upper Gariep Alluvial Vegetation. The floodplain has however been heavily modified by human activity with a lot of diversion walls and disturbance present.

According to the SIBIS database, a total of 407 plant species are found in the QDS 3024, of which only four red data-listed plant species are represented, *Chasmatophyllum maninum* and *Chasmatophyllum rouxii* (listed as DDD (data deficient, insufficient information)), *Cynodon polevansii*, which is listed DDT (Data Deficient – Taxonomically Problematic), and *Rapanea melanophloeos*, which is listed as Declining. The *Chasmatophyllum* species are usually associated with rocky areas and areas of exposed bedrock and if present would potentially only be present in the vicinity of the western PV area. *Rapanea* is associated with forest patches that usually occur around the base or in small kloofs of sandstone outcrops in vegetation types such as Besemkaree Koppies Shrubland and it is highly unlikely that this species is present at the site. There are however likely to be additional species present such as *Boophone disticha* as well as numerous provincially protected species.

Sprecified Geographic Areas

The site falls within the planning domain of the Northern Cape Provincial Biodiversity Plan, developed by the Department of Environment and Nature Conservation, Northern Cape (2016). The potential impact of the development on Critical Biodiversity Areas should be considered in detail as these areas have been identified through systematic conservation planning exercises and represent biodiversity priority areas which should be maintained in a natural to near natural state in order to safeguard biodiversity pattern and ecological processes. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to meet national biodiversity objectives. Once gazetted, and incorporated into municipal SDFs and bioregional plans, such fine-scale plans are recognized under NEMA and the various activities listed under the act come into effect.

Figure 38 indicates that the majority of the area under application is ecologically important and consists of Ecological Support Areas, and a few of the sites border Critical Biodiversity Areas, particularly the western sites. In terms of other broad-scale planning studies, the site does not fall within a National Protected Areas Expansion Strategy Focus Area (NPAES), indicating that the area has not been identified as an area of exceptional biodiversity or of significance for the long-term maintenance of broad-scale ecological processes and climate change buffering within the region.

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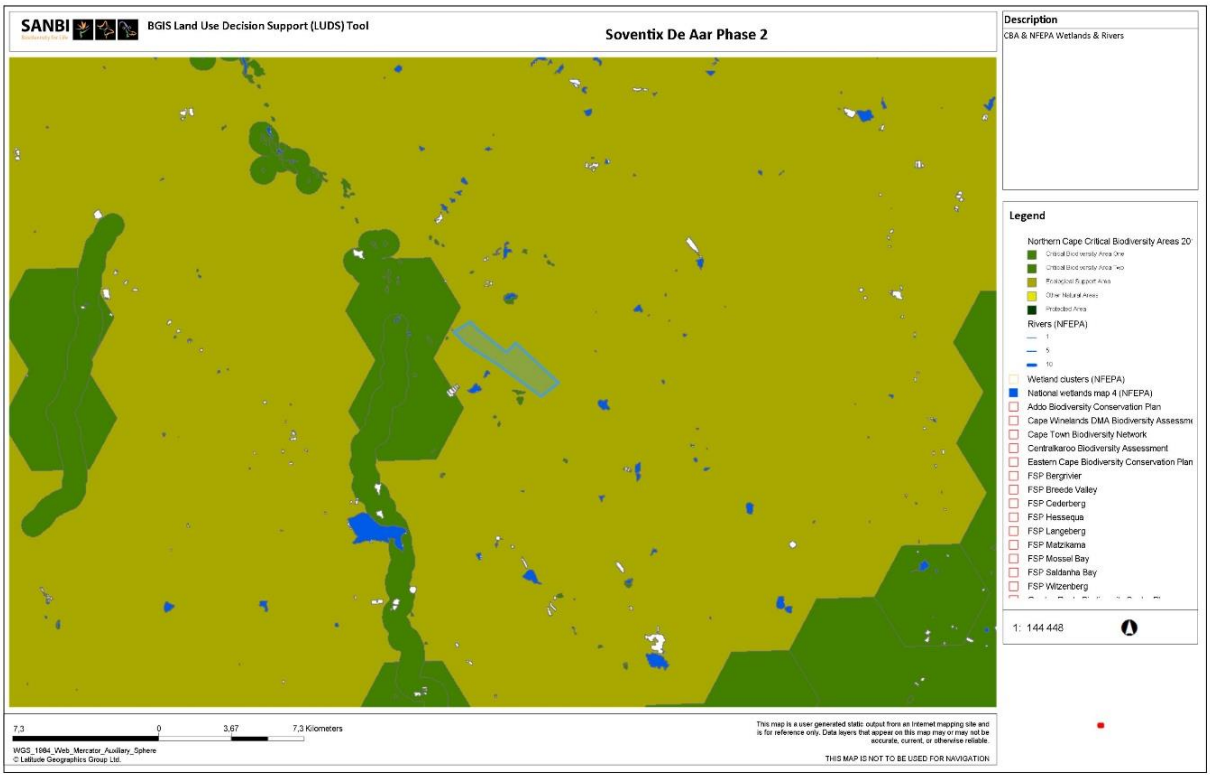

Figure 47. Critical Biodiversity Areas map of the proposed Soventix PV project and the surrounding area.

Due to the large number of developments in the area the potential for cumulative impacts is high. A map of all the DEA-registered renewable energy developments in the area is depicted in Figure 48 below and illustrates that the current development site is surrounded by a large number other renewable energy developments. Several of these are already constructed or currently under construction. However, the DFFE map does not indicate the actual footprint of the facilities which are in most cases much smaller than the cadastral units indicated. Consequently, cumulative impacts are a concern in the area and their impact on fauna is highlighted as a greater concern than that on flora. The vegetation in the area, especially on the plains is Northern Upper Karoo which is one of the most extensive vegetation types in the country and has a low overall abundance of species of conservation concern. In terms of fauna, smaller fauna such as rodents will certainly experience some habitat loss due to transformation within the footprint of the current and other PV facilities. Medium and larger fauna are however likely to be most vulnerable to development as they would be affected by habitat loss, difficulty in passing security fencing as well as noise and disturbance. In context of the current project, the three different development areas are separated by some distance, which would facilitate movement across the site there will still be large intact corridors present. In addition, the Brak River is

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likely to be an important movement corridor in the region and as this will not be directly affected by the development, the overall impact on landscape connectivity is likely to be low, especially given the largely intact nature of the surrounding landscape. Nevertheless, cumulative impacts resulting from the development are clearly a concern and the potential disruption of the landscape due to the development will need to be investigated in greater detail during the EIA phase, once the final footprints have been delineated.

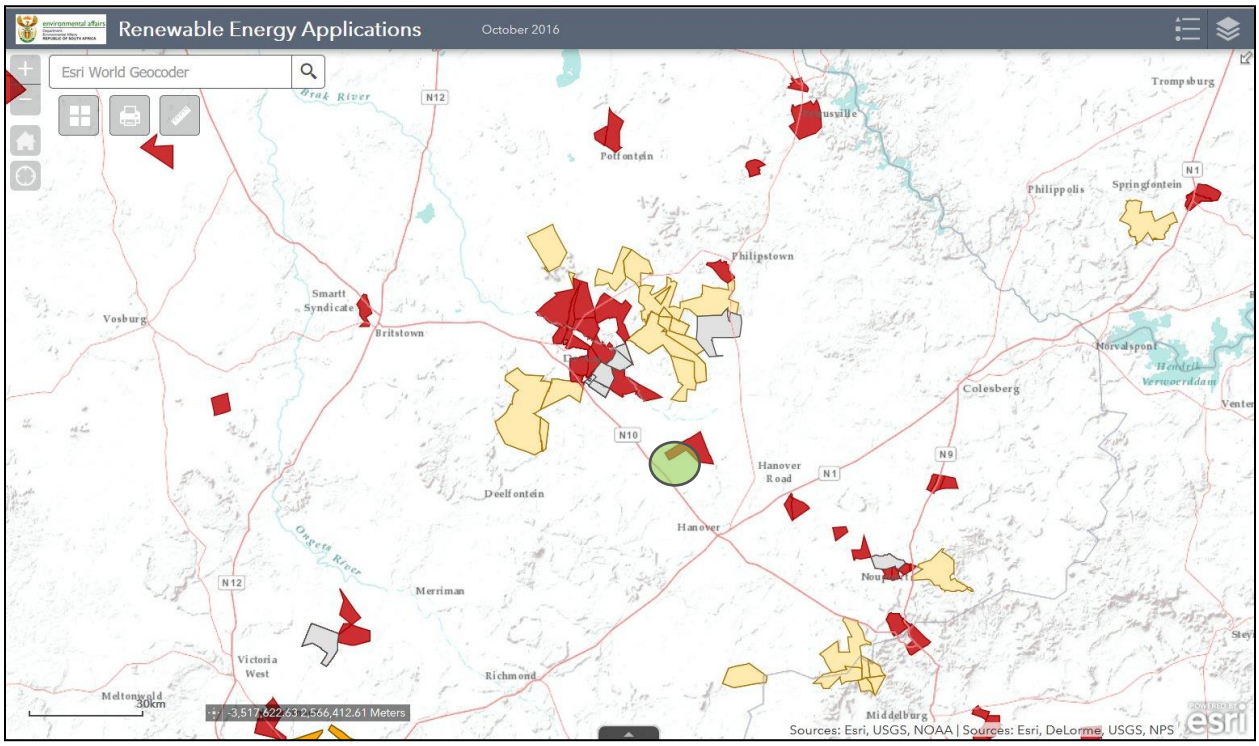

Figure 48. The Soventix PV site, represented by the green oval, lies within a broader matrix of other proposed and built renewable energy facilities (red indicates PV and the pale yellow wind energy developments) in the landscape. It is however important to note that the actual facilities are considerably smaller than the cadastral units depicted above (Todd, 2017).

Faunal Communities

Mammals

The site lies within the range of 63 terrestrial mammals, including four listed species. The four listed species are the Brown Hyaena *Hyaena brunnea* (NT), South African Hedgehog *Atelerix frontalis* (NT), African White-tailed Rat *Mystromys albicaudatus* (EN) and Honey Badger *Mellivora capensis* (SA RDB EN). While the Hedgehog, Black-footed Cat and Honey Badger are likely to occur in the broad area, the Brown Hyaena is less likely to be present due to naturally low population density as well as persecution from farmers. All of these species have

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relatively wide ranges across South Africa and the development would not be likely to result in a significant overall decline in the available habitat for these species. At a local level, there is likely to be some impact on listed species if present. However as these are secretive animals which occur at a low density, it is likely that affected individuals would still be able to utilise the majority of the site. In terms of specific habitats and areas at the site which are likely to be of above average significance for mammals, the south-facing slopes with dense vegetation, riparian areas and rocky outcrops are identified as likely to harbour higher mammalian species richness or be home to specialised species.

Faunal diversity in the area is quite high and a wide array of species has directly or indirectly been observed during the numerous previous site visits to the area. The majority of species that have been observed are medium sized mammals, typical of the area and no particularly rare or notable species were observed. Species that were observed in the area include Cape Porcupine *Hystrix africaeaustralis*, Steenbok *Raphicerus campestris*, Springbok *Antidorcas marsupialis*, Aardvark *Orycteropus afer*, Rock Hyrax *Procavia capensis*, Cape Hare *Lepus capensis*, South African Ground Squirrel *Xerus inauris*, Namaqua Rock Mouse *Aethomys namaquensis*, Black-backed Jackal *Canis mesomelas*, Bat-eared Fox *Otocyon megalotis*, Yellow Mongoose *Cynictis penicillata* and African Wild Cat *Felis silvestris*.

Potential impacts on mammals are likely to be restricted largely to disturbance during the construction phase and habitat loss during the operational phase. Although this is relatively low in the context of the landscape, impacts on habitat fragmentation and landscape connectivity are likely to be increasingly significant as the landscape becomes increasingly transformed as a result of the large number of the developments in the area. There are however no reasons to expect that the affected areas are of above average importance for landscape connectivity and although the Brak River is likely to be significant in terms of landscape connectivity, this will not be disrupted by the current development.

Reptiles

According to the distribution maps available in the literature and the SARCA database, as many as 31 reptiles could occur at the site. Species observed in the vicinity of the site in the past include Karoo Girdled Lizard *Karusasaurus polyzonus*, Spotted Sand Lizard *Pedioplanis lineoocellata lineoocellata*, Western Three-striped Skink *Trachylepis occidentalis* and Leopard Tortoise *Stigmochelys pardalis*. The site represents a relatively rich habitat for reptiles as it contains various types of rocky outcrops, koppies as well as more densely vegetated riparian areas, and flats of varying texture. Despite the likely high reptile richness at the site, no listed species are known from the area.

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In terms of the likely impact of the development on reptiles, habitat loss is likely to be of local significance only due to the relatively low footprint of the development and the relatively low reptile diversity of the site. Furthermore, many species would be able to use the vegetation under the panels and some species would take advantage of the buildings and structures present. Some transient disturbance of reptiles during construction is likely due to disturbance and vegetation clearing. Overall, as there are few range-restricted or listed reptile species at the site, impacts on reptiles from the development is likely to be local in nature and not of broader significance.

Amphibians

Eleven frog species are known from the broad area around the site, including the Giant Bullfrog *Pyxicephalus adpersus* which is listed as Near Threatened. The majority of species known from the area are toads and sand frogs which are relatively independent of water except for breeding purposes, which reflects the aridity of the area. A large proportion of the farm contains well developed drainage lines and wetlands, which are likely to be the most important areas for amphibians at the site. Pans would represent suitable breeding habitat for the Giant Bullfrog, although there do not appear to be any significant pans at the site which would be suitable for this species. Erosion would be a primary risk factor for amphibians associated with the development, as this would impact water quality and amphibian habitat.

During the construction phase, pollution, particularly from petrochemicals would also be a significant risk factor. With the appropriate mitigation, these risks can however be reduced to an acceptable level.

Avifauna

According to the SABAP 2 database 114 species have been recorded from area, suggesting that it has not been well sampled in the past as the likely total should be closer to 150. This includes eight listed species (Table 15). Some of the listed species are birds which rely on wetlands or rivers which are numerous in the area, suggesting that they may be common visitors or residents. The wetlands in the area are listed as priority NFEPA wetlands due to the presence of Blue Crane *Anthropoides paradiseus* (NT), which often breeds in these areas.

Apart from habitat loss within the development footprint, another major potential source of impact of the development on birds would be from any power lines needed for the grid connection which could cause mortalities through electrocution and collisions of susceptible species such as bustards, cranes and flamingos. Given the proximity of the Eskom lines to the site, any required overhead lines would be short, which would be important in mitigating this impact to a low level.

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Table 15: Listed bird species known to occur in the vicinity of the proposed site, according to the SABAP 2 databases, and the major potential impact source on these species associated with the development.

Common name	Taxon name	Conservation Status
Bustard, Ludwig's	*Neotis ludwigii*	EN
Crane, Blue	*Anthropoides paradiseus*	NT
Flamingo, Greater	*Phoenicopterus ruber*	NT
Korhaan, Blue	*Eupodotis caerulescens*	Global=NT
Korhaan, Karoo	*Eupodotis vigorsii*	NT
Pipit, African Rock	*Anthus crenatus*	NT
Sandpiper, Curlew	*Calidris ferruginea*	Global=NT
Secretarybird, Secretarybird	*Sagittarius serpentarius*	VU

The following species were identified during the initial site inspection with additional species claimed by the landowner to be resident, but a full species list will be supplied in the Specialist Biodiversity Assessment:

- Blue crane
- Caracal
- Cape fox
- Bat-eared fox
- Black korhaan
- Steenbok
- Mountain reedbuck
- Pale chanting goshawk
- Black-backed jackal
- Side-striped jackal
- Aardvark
- Porcupine
- Aardwolf
- Springbok
- Riverine rabbit
- Rock rabbits
- Mountain tortoise
- Gemsbok

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- Bustard
- Rock hyrax
- Warthog
- Sable

Social Aspect

Administrative context

The proposed project will be located in Ward 6 of the Emthanjeni Local Municipality that falls under the Pixley Ka Seme District Municipality in the Northern Cape Province. For the baseline description of the area, data from Census 2011, Community Survey 2016, municipal IDP's and websites were used. The Emthanjeni Local Municipality is the seat of the district and is located centrally on the main railway line between Johannesburg, Cape Town, Port Elizabeth and Namibia. It covers an area of 13 472 km^2. The main towns in the area are Britstown, Burgerville, De Aar, Griesenkraal and Hanover.

-Population and population groups

The Pixley ka Seme District Municipality's total population was estimated at 166 849 people, where ELM represents approximately 22, 7% of the district's population. The Pixley ka Seme District has an approximate population of 186 351 people (Census 2011) representing 16, 26% of the Northern Cape population with its 1 145 861 residents. According to Statistics South Africa, Census 2011 the total population of Emthanjeni Municipality was 42 356 and Stats SA Community Survey of 2016 the population had increase to 45 404 with slightly increase population growth of 1.69% (ELM IDP, 2021-2022). Given the size of the Municipality and the relatively small total population size, the population density within the Municipality generally is low at 3.4 people per km^2. According to the ELM IDP (2010), the municipal population is largely Coloured (57.5%), followed by Black African (35.3%), White (7.1%) and Asian (<1%). (Emthanjeni Local Municipality, Integrated Development Plan 2011 – 2016).

The study area of Ward 6 almost half of the population belongs to the Coloured population group, with just over two fifths of the population belonging to the Black population group. Ward 6 has a higher proportion of people belonging to the Black population group than on local or district level. The average age in all the municipal areas are around 28 years, with the lowest average age (28.24) in Ward 6. Just below a third of the population in Ward 6 is aged 14 years or younger, with almost half aged 24 years or younger. Such a young population place a lot of pressure on resources and infrastructure of the area, and a great demand for future infrastructure and creation of livelihoods can be expected.

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Education

About two fifths of the people in Ward 6 aged 20 years or older have no schooling or only some primary education. This is higher than on local, district or provincial level. These high levels of illiteracy should be taken into consideration when consulting with farmworkers or communities on the project (ELM IDP, 2016-2021).

Employment

Ward 6 has the highest proportion of people aged between 15 – 65 years that are employed. Just over half of the people who are employed in Ward 6, are employed in the formal sector. This is much lower than on local or district level. About a quarter of the employed work in the informal sector, which is proportionately higher than on local or district level (EML IDP, 2016-2021).

Economic Aspects

Agriculture forms the backbone of the economy of the Emthanjeni LM (Emthanjeni LM IDP, 2016-2021) with mutton and wool being the main produce. Besides sheep farming, cattle, goat, pig and game are also being farmed. The manufacturing sector shows potential for growth through the introduction of renewable energy projects in De Aar and the surrounding areas. There are also stone crushers in the area that specialise in the manufacturing of sand, bricks cement and rocks. Other economic activities include services, retail, transport and tourism.

De Aar is the main town of Pixley ka Seme and is a potential industrial growth point with ample industrial sites, reasonable prices and tariffs, affordable labour and the necessary infrastructure. De Aar is therefore the ideal place to establish industries, a fact which can be borne out by various major industries which have already established themselves here. The central location and excellent rail and road links have resulted in several chain stores opening branches.

Hanover is also well endowed with qualified construction industry artisans. Like the other towns in this region, wool is exported to Port Elizabeth without being processed. We note with great concern the opportunities for local people in relation to the second economy but we also further identified the need for the municipality to become involved with the empowerment of SMME's and the roll out of cooperatives. This should enable the second economy initiatives to become active contributors to the economy of Emthanjeni as well as the entire district.

Palaeontological Resources

The possible impact of the proposed development on palaeontological resources is gauged by using the fossil sensitivity maps available on the SAHRIS and the nature of the proposed development.

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Karoo Sedimentary Rocks

The Beaufort Group contains fossils of diverse terrestrial and freshwater tetrapods of Tapinocephalus and Lystrosaurus genere (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways) and sparse vascular plants (Glossopteris Flora, including petrified wood) that dates to the Late Permian – Early Triassic Periods (c. 266 – 250 Ma).
The area of the proposed development where this geological signature is regarded as highly sensitive with regards to palaeontological heritage.

Karoo Dolorites

No fossil heritage has been recorded in these intrusive dolerites (dykes, sills) and associated diatremes. The dolorite dykes and sills within the area of the proposed development are not palaeontologically significant. Notice must however be taken of the presence of these features as Stone Age quarry sites are usually found at the foot of dolerite hills hornfel outcrops occur. Dolerite is also associated with engraving sites. One such site has been recorded at the Commonage in Hanover Town.

Archaeological Resources

Archaeological heritage resources and cultural landscapes are linked to specific time periods. In summary the various eras are as follows:

The Stone Age time period is divided between three different time periods, namely:
Early: c. 2 500 000 to 150 000 Before Common Era
Middle: c. 150 000 to 30 000 Before Common Era
Late: c. 30 000 Before Common Era until the historical time periods commenced

The Stone Age is well represented in the area by the archaeological remains associated with Stone Age hunter gatherers and herders and includes cave shelters and surface sites (Goodwin & van Riet Lowe 1929, Sampson 1985 and Bousman 1991). These occurrences cover represent the Early, Middle and Later Stone Ages. Erosion gullies and river/streambeds and dolerite outcrops are usually associated with stone tool assemblages.

Sampson (1972 & 1974) surveyed the Seaco Drainage near Hanover and recorded numerous Stone Age sites ranging from the Early, Middle and Later Stone Ages. Proto-historic sites associated with pastoralist was also recorded. His research established a model for identifying stone tool industries and occupations in the entire district (Huffman 2013).

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Surface scatters of stone tools (mostly Early and Middle Stone Age) were recorded during various Heritage Impact Assessments:

The farm Plooysfontein 93 (Palaeo Field Services) in the Hanover District Erf 3094 on the old De Aar 180 farm (Huffman, 2013).

Low to medium density stone tools have been identified within 46 metres of the borrow pit and these are the type of stone tools that are known to occur in the De Aar and Burgerville areas. S 30 50 1.95 E 24 18 10.3. A variable density of stone artefacts, mostly of Pleistocene age, was noted over most of the area examined during the Archaeological Specialist Input on the site of the proposed Taaibosch Photovoltic between De Aar and Hanover (David Morris, 2011).

Rock art sites have also been recorded (Morris 1988, Rudner & Rudner 1968). Included is the engraving sites at the Hanover Town Commonage and at the farm Groenfontein, Hanover District (Palaeo Field Services).

The Iron Age and farmer period occurred in southern Africa from Common Era (2000 years ago to 1950) to historical periods. The definition is divided between Early Iron Age (c. 200 CE to c. 1400 CE) and Late Iron Age (c. 1400 CE to 1800's (Archaic, 2008)). The historical period indicates dates from 1500s to present (Natalie Swanepoel, Amanda Esterhuysen and Phillip Bonner, 2007). The Iron Age is defined as a time period that occurred during c. 200 to c. 1000 Common Era, named as the early period, and c. 1000 to 1800's Common Era (Archaic, 2008). The Iron Age is not represented in the general area of the development. No Iron Age sites should be present.

More Recent Events/Historical Period

Usually refers to white or literate history, but more recently also refers to the last five hundred years of South African history. Dates from 1500s to present. Farms and other historical settlements in the area dates back to the 1840's, whilst the area also have evidence associated with the South African (Anglo Boer War). Signs of historical occupation is common in the general area and includes abandoned sheep kraals and homestead ruins. Old railway infrastructure (housing, old railway lines and foundations) was also recorded (S30°49'26.29" E24°17'31.31") at nearby Burgervilleweg (Becker). The proximity of the railway means that material traces may exist alongside that relate to its construction, maintenance and use, and its protection by way of blockhouses, as a major transport route for British forces further inland during the Anglo-Boer War. The Google Earth image of the area clearly shows different generations of railway alignment within the study area. Jean Beater's heritage report describes

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Anglo-Boer War redoubts (components of a blockhouse line) on the north side of the older railway.

Where dolerite koppies occur there is a possibility that rock engravings might be found, while rock paintings might be found in shelters formed either in certain dolerite topographic formations or in shelters where sandstone scarps provide for their formation. More or less rich spreads of Stone Age artefacts may occur across this Karoo landscape with localised 'sites' having higher densities. More recent heritage features of note may exist in the vicinity of railway and farm infrastructure.

Cultural Heritage

De Aar

It is the second-most important railway junction in the country[1], situated on the line between Cape Town and Kimberley. The junction was of particular strategic importance to the British during the Second Boer War. De Aar is also a primary commercial distribution centre for a large area of the central Great Karoo. Major production activities of the area include wool production and livestock farming. The area is also popular for hunting, although the region is rather arid. De Aar is also affectionately known as " Die SES " deriving its nickname from the six farms that has surrounded De Aar since the 1900 (Website: www.wikipedia.org).

Hanover

Hanover claims to be the country's most central place. It is equidistant from Cape Town and Johannesburg, centrally positioned between Cape Town and Durban as well as Port Elizabeth and Upington and it is the hub of an arc formed by Richmond, Middelburg and Colesberg. Historic figures were at the centre of life here, people like Olive Schreiner, author and women's rights champion, and the tempestuous Rev. Thomas Francois Burgers. Among its residents were the wealthy and eccentric. The town's chief constable was the grandson of Lord Charles Somerset, the magistrate's clerk a son of Charles John Vaughan, Dean of Llandaff, well-known churchman and devotional writer of his day, and the local doctor was the son of a former Solicitor-General of Jamaica. Well-known people of today hailing from Hanover includes Zwelinzima Vavi, the General Secretary of the Congress of South African Trade Unions.

Today the busy Karoo N 1 route cuts through the veld between the town and its cemetery. But during the last century all roads converged in Hanover and all travellers passed through the town. It was on an important stop for stage coaches carrying passengers to the Diamond Fields, and the Free State mail was carried through by post cart. Daily life bubbled with people ever on the

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move. But then in 1884, the advent of the railway deprived the town of much of its through traffic and its character slowly changed (Website: www.wikipedia.org).

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(V) THE IMPACTS AND RISKS IDENTIFIED

(1) An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including-
(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-
(aa) can be reversed;
(bb) may cause irreplaceable loss of resources; and
(cc) can be avoided, managed or mitigated;
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.

Ecoleges sets out to identify, predict and evaluate impacts and risks firstly by identifying the activities that are to be undertaken during the development, and where applicable, related operation of a listed or specified activity. Once the activities and associated environmental aspects, or elements of the contractor's activities that interact or can interact with the environment, are identified, e.g., air emissions, it is possible to identify the potential environmental impact and risks, considering that an impact is any change to the environment resulting from the contractor's environmental aspects. This process of identification is facilitated by a Leipold Matrix, which considers the possible outcomes of each aspect and the cause of that aspect (or activity) within the context of the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment. Other critical inputs are received from Interested & Affected Parties, and, where applicable, the findings contained in specialist studies.

Impacts versus Risks

It is our opinion that a risk is nothing more than a potential impact, meant to encourage people to think beyond the obvious impact and consider (1) variable driving forces, and (2) uncertain outcomes, to identify potential or indirect impacts so that specific actions can be taken in response to that risk.

(1) Variable driving forces

Some variable driving forces include nature, human behaviour, and exposure scenario.

An **environmental aspect** is described in BS EN ISO 14001 as an "element of an organisation's activities, products or services that interacts or can interact with the environment".

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An **environmental impact** is an "adverse or beneficial change to the environment resulting from the organization's environmental aspects."

For example, if an activity is driving a covered coal truck on a surfaced road, then one aspect of that activity is emissions to air, including greenhouse gases, and the impact is global warming. If a person changes the exposure scenario to a dirt road, then another emission to air is dust, and the potential impacts or risks include dust fall on vegetation, and the inhalation of dust by people. It would not have been possible to identify the potential risks if one did not consider an alternative exposure scenario.

(2) Uncertain outcomes

Uncertain outcomes relate to the nature and extent of an outcome most often because of a lack of information, data or understanding about, for example, stressors, responses and distributions over space and time.

For example, a lack of meteorological data would make it difficult to assess the effects of wind on dust emissions, and how it can influence the certainty of the impact.

So, the determination of an impact versus risk is based on whether an activity can be exposed to variable driving forces or generate uncertain outcomes. The methodology used in assessing impacts and risks is the same as described below. However, the legislated precautionary principle is adopted when identifying mitigations for risks.

Motivation for the methodology

A **significant impact** means, "an impact that may have a notable effect on one or more aspects of the environment, or may result in non-compliance with accepted quality standards, thresholds or targets, and…"

According to the EIA Regulation's definition, there are two measures of significance: (1) a notable effect on the environment, and (2) non-compliance with standards, thresholds, or targets.

(1) A notable effect on the environment

An impact can be significant based on a measurable effect to the environment.

(2) Non-compliance with standards, thresholds, or targets

An impact can be significant based on non-compliance, which is basically a failure to act in accordance with formal requirements such as a law, regulation, term of a contract, rule or in this context, environmental standards, thresholds, and targets.

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a. An example of a standard is the General Authorisation for Section 21(f) water uses relating to the "discharge of waste or water containing waste into a water resource…" published in GN No. 665 of 2013. It contains a table of wastewater limit values applicable to the discharge, including such parameters as Chemical Oxygen Demand, pH, Suspended Solids, and the concentration of other dissolved elements.
b. An example of a threshold is 300m2 in the case of Listed Activity 12 of Listing Notice 3 relating to the clearance of indigenous vegetation in an identified geographical area.
c. An example of targets are the biodiversity targets for ecosystems, species, or ecological processes that CBAs are required to meet.

Consequently, the methodology differentiates between two measures of significance, namely **Impact Magnitude** and **Impact Importance**. Impact Magnitude relates to a notable effect on the environment and Impact Importance refers to non-compliance. Significance is assessed using both approaches. If either one is, or both are, significant, then the impact is significant.

Each approach entails assigning ranks, usually Low, Medium, or High, to a set of judgemental criteria, that is criteria that are based on clearly defined value judgements (or descriptors) that have been adapted to the South African EIA context.

This requirement is written into the second part of the EIA Regulation's definition of **significant Impact**. It continues, "…and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as **duration**, **magnitude**, **intensity** and **probability** of occurrence."

So, not only does the definition identify four key criteria that we need to consider, but it also requires that these criteria are ranked, implying levels of severity determined by the EAP's judgement.

Additional criteria identified by the EIA Regulations (see Resources used to inform methodology above) for inclusion in the assessment process include **nature**, **significance**, **consequence**, and **extent**.

In total, eight different criteria must be taken into consideration when undertaking an impact and risk assessment. However, which criteria should be used to evaluate **Impact Magnitude** and which criteria should be used to evaluate **Impact Importance**.

Description of the criteria

The "**Nature**" of something means the basic or inherent features, character, or qualities of something. However, considering that identified potential environmental impacts should as far as possible be quantified, the nature of an impact should be evaluated by predicting those attributes

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that are measurable, or at least prone to minimal subjectivity during their judgment, such as intensity, extent, duration, and status.

The "**Status**" of an impact identifies whether it is a positive or beneficial, negative, or adverse, or neutral impact. Status is not mentioned as a criterion in the EIA Regulations, 2014 as amended, but the Regulations do refer to the inclusion of both positive and negative effects. So, status has been incorporated into the assessment process as a criterion and specifically with reference to evaluating the nature, or determining the inherent qualities, of an impact.

In summary, nature is a composite score that combines four different impact values: (1) **intensity** or severity, (2) geographic **extent** or spatial scale, (3) **duration** (and if applicable frequency), and (4) status.

Once the nature of an impact has been considered together with the **probability**, likelihood of occurrence or, also called, degree of certainty, then a person will arrive at **Impact Magnitude**, which is a separate and standalone measure of significance.

The other measure of **significance** is Impact Importance. Impact importance is effectively a value judgement placed on the degree of change by affected parties and is determined by combining a criterion called "**Level of Acceptability**" with the probability or likelihood of exceeding a threshold of sorts.

Although the Level of Acceptability is not identified as a criterion in the EIA Regulations, it is alluded to in the definition of "significant impact" as non-compliance with standards, thresholds, or targets, e.g., non-compliance with a threshold is unacceptable, and if highly probable, then it constitutes a significant impact.

In fact, the Level of Acceptability is very likely synonymous with, and achieves the same intent as, "**Consequence**."

A single impact can have multiple consequences, e.g., the consequences of global warming are many, ranging from rising sea levels to earlier flowering seasons. So, consequence is an extension of impact. Some consequences may be significant. Some may be insignificant. It is simply not possible to pick up on any significance if not by considering all the context-specific consequences. Therefore, considering that potential consequences are so many and varied, the only way of ranking a consequence is through its level of acceptability.

The Level of Acceptability criterion measures the degree of change in an environmental resource against (1) quantitative thresholds provided by legal requirements and scientific standards, and which represent that point at which a project's potential environmental effects become significant, and (2) qualitative thresholds of social acceptability informed by *inter alia* the Public Participation Process.

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Furthermore, the Level of Acceptability criterion, if considered properly in its formulation, also allows for the findings from undertaking a need and desirability to be brought into the impact and risk assessment process, e.g., the answers to the questions in the Need and Desirability Guideline document should be used to inform the Level of Acceptability for applicable impacts.

Value Judgement

Significance, being an anthropocentric concept, is a value judgement, dependant on the nature of the impact expressed in terms of both biophysical and socio-economic values (**Impact Magnitude**), and its acceptability to affected communities (**Impact Importance**).

Considering value judgements can vary greatly amongst different stakeholders, professional judgement, such as that of the EAP, shall be used in conjunction with the different value judgements expressed by various stakeholders. In other words, significance shall be communicated from a variety of perspectives other than the professional opinion of a multidisciplinary study team, and include environmental, socio-economic, or cultural attributes perceived by society to be significant. Despite the potential variety of perspectives, they can be categorized into three broad forms of recognition for determination of impact significance, namely institutional (laws, plans or policy statements), public and technical (scientific or technical knowledge or judgement of critical resource characteristics) (DEAT 2002). Consequently, thresholds of significance were as far as possible based on / determined by reference to legal requirements, accepted scientific standards or social acceptability (Table 19).

Significance is relative and must always be set in a context to show whose values they represent. The selected criterion, "Level of Acceptability," provides such a context, taking all three forms of recognition into account by asking whether impacts are legally, publicly, and professionally recognized as important.

Natural environmental, socio-economic, and cultural heritage impacts were identified systematically by considering how the activities to be undertaken during the development phase will interact with all elements of the receiving environment, as well as inputs received from I&APs and specialists.

Once identified, natural environmental, socio-economic, and cultural heritage impacts were then assessed using the approach outlined below. All impacts, including those identified by I&APs and Specialists, are measured against the current land-use activity (the no-go option / option of not implementing the activity) and assessed by ranking a suite of generic criteria. The criteria, as well as the descriptors that are used to assign specific rankings for each criterion, provide a consistent and systematic basis for the comparison and application of judgements. Consequently, this methodology has been distributed to the specialists to avoid inconsistency between the EAP and specialists when determining impact significance.

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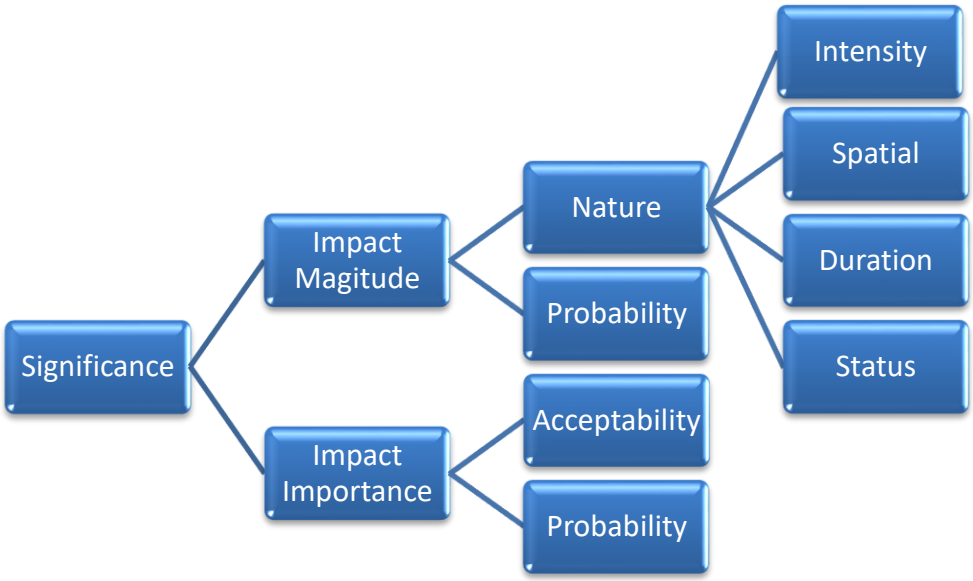
Methodology

The methodology comprises two phases: (1) Phase 1 involves an assessment of significance without mitigation, and (2) Phase 2 involves an assessment with mitigation. If the outcome of a Phase 1 assessment is not significant, then the impact(s) are omitted from further assessment. However, if either Impact Magnitude or Impact Importance are significant, then the highest rank prevails, e.g., if an impact is of low magnitude, but unacceptable to certain affected parties, then the Impact Importance rank needs to proceed to the Phase 2 assessment. In the case of both Impact Magnitude and Impact Importance being significant, then both ranks shall be simultaneously subjected to a Phase 2 assessment. During Phase 2 either or both Significance ranks (Impact Magnitude and/or Impact Importance) are considered together with the following three criteria to determine whether a phase 1-assessment should be repeated with mitigation or whether the proposed activity needs to be refused or redesigned: Reversibility, Irreplaceable Loss of Resources, and Mitigatory Potential.

Important Note: Non-significant impacts are omitted from further assessment, that is no phase 2-assessment. There is one exception, that is impacts with a positive **Status**. Impacts with a positive status are assessed according to their mitigatory potential to identify further opportunities for enhancing positive effects.

(1) Phase 1-Assessment without mitigation



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Impact Magnitude and Impact Importance ratings are predicted as described below. However, the outcomes of the phase 1-assessment (rankings) should still be verified within the context of the descriptors described in the figure above.

Table 16: Significance Criterion (Impact Magnitude and Impact Importance Rating).

Ranks	Description
High	• Of a substantial or the highest order possible within the bounds of impacts that could occur. • In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. • Social, cultural, and economic activities of communities are disrupted to such an extent that these come to a halt.
Medium	• Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. • In the case of adverse impacts, mitigation is both feasible and easily possible. • Social, cultural, and economic activities of communities are changed, but can be continued (albeit in a different form). • Modification of the project design or alternative action may be required. • In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort.
Low	• Zero impact or impact is of a low order and therefore likely to have little real effect. • In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. • Social, cultural, and economic activities of communities can continue unchanged. • In the case of beneficial impacts, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.

a. Impact Magnitude (Significance)

Impact Magnitude is a composite score that is made up of the following two criteria: (1) Nature (composite score), and (2) Probability, likelihood of occurrence or degree of certainty.

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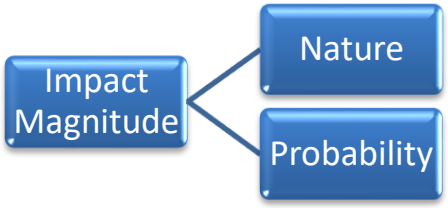


The possible composite scores for Impact Magnitude are:

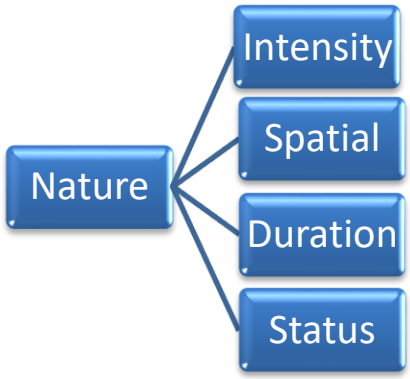
IMPACT MAGNITUDE		Probability		
		High	**Medium**	**Low**
Nature	**High**	±1	±1	±0
	Medium	±1	±1	±0
	Low	±0	±0	±0

Assumption: If the Nature and/or Probability is low, then Impact Magnitude is non-significant.

Significant	±1	Non-significant	±0

i. **Nature**

Nature is a composite score that is made up of the following four criteria: (1) Intensity or severity, (2) Geographic extent or spatial scale, (3) Duration and frequency, and (4) Status (positive/beneficial, negative/adverse, or neutral).



The possible composite scores for Nature are:

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Nature		Intensity		
		High	**Medium**	**Low**
Spatial and Duration	**High**	H	H	H
	Medium	H	M	M
	Low	H	M	L

Assumption: if any one of the criteria are Medium or High, then Nature is significant.

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Table 17: Criteria used in evaluating Impact Magnitude (Significance).

Criteria	Ranks and Descriptors		
	Low	**Medium**	**High**
Intensity or Severity	• No disturbance or the disturbance of degraded areas, which have little conservation value. • Zero to a minor change in species occurrence or variety. • Natural function and processes are not affected, or if affected, then not modified. • Social, cultural, and economic activities of communities can continue unchanged, or they are changed, but can be continued (albeit in a different form) without stakeholder consultation.	• Disturbance of areas that have potential conservation value or are of use as resources. • Moderate change in species occurrence and variety. • Modified processes will continue. • Social, cultural, and economic activities of communities are changed, but can be continued (albeit in a different form) with stakeholder consultation.	• Disturbance of pristine areas that have important conservation value. • Complete change in species occurrence and variety/Destruction of rare or endangered species. • Functioning of processes will cease. • Social, cultural, and economic activities of communities are disrupted to such an extent that these come to a halt. • Sensitive environmental receptors with a low capacity (tolerance) to accommodate the change.
Geographical extent or spacial scale (the boundaries at local and regional extents will be different for biophysical	• Within site boundary. • Distribution within a population. • Within one property.	• Beyond site boundary. • Distribution across populations • Traverses several properties.	• Widespread. • Far beyond site boundary. • Distribution across ecosystems • Crosses municipal or

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and social impacts)		• Local area.	provincial boundaries. • Regional, national international scale.
Duration and frequency (Long term (High), Medium term (Medium), Short term (Low))	• Immediate, once-off • Temporary - quickly reversible. • Less than the project lifespan. • 0 to 5 years (or for rehabilitation <1yr, restricted to a season).	• Delayed, intermittent • Temporary - reversible over time. • Lifespan of the project. • 5 to 15 years (or for rehabilitation >1yr, extending into other season cycles).	• Continuous • Permanent. • Beyond closure or decommissioning. • More than 15 years (or for rehabilitation >2yr, extending into multiple season cycles).
Status (-ve (High), neutral (Medium), +ve (Low))	• Beneficial effects • Net gain of resources	• Neutral • Indifferent • No net loss or gain	• Adverse effects • Costs • Net loss of resources
Probability (Definite (High), Probable (Medium), Improbable (Low))	• The impact will not occur, or it is highly unlikely that the impact will occur. • Limited useful information on and understanding of the environmental factors potentially influencing this impact (uncertainty) or a high degree of certainty that it will not occur. • Low probability or negligible - less than 1:20 chance of	• There is a chance/risk of the impact occurring. • Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact. • Moderate probability (5-95%) of a particular fact or the likelihood of an impact	• Impact will occur regardless of prevention measures. Substantial supportive data exist to verify the assessment. • Wealth of information on and sound understanding of the environmental factors potentially influencing the impact. • Definite or high probability (>95%) of a particular fact

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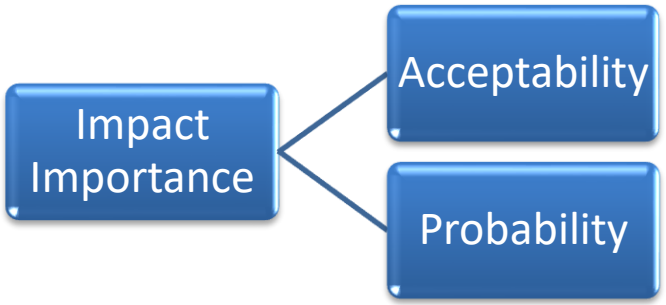
	occurrence *(P<0.05)* of an impact occurring.	occurring.	or the likelihood of an impact occurring.

b. **Impact Importance (Significance)**

Impact Importance is a composite score that is made up of the following two criteria: (1) Level of acceptability/consequence, and (2) Probability, likelihood of occurrence or degree of certainty.



The possible composite scores for Impact Importance are:

IMPACT IMPORTANCE		**Probability**		
		High	**Medium**	**Low**
Level of Acceptability	**High**	±1	±1	±0
	Medium	±1	±1	±0
	Low	±0	±0	±0

Assumption: If the Level of Acceptability and/or Probability is low, then Impact Importance is non-significant.

Significant	±1	Non-significant	±0

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Table 18: Probability Criterion used in evaluating Impact Importance.

Ranks	Description
High (H) Definite	• Wealth of information on and sound understanding of the level of acceptability. • High degree of certainty. Definite or high probability (>95%) of a particular fact or the likelihood of a level of acceptability.
Medium (M) Probable	• Reasonable amount of useful information on and relatively sound understanding of the level of acceptability. • Moderate degree of certainty or probability (5-95%) of a particular fact or the likelihood of a level of acceptability.
Low (L) Improbable	• Limited useful information on and understanding of the level of acceptability. • Low degree of certainty or probability or negligible - less than 1:20 chance *(P<0.05)* for a level of acceptability.

Table 19: Level of Acceptability Criterion used in evaluating Impact Importance.

Ranks	**Description** Source of information: Quantitative thresholds (legal requirements, scientific standards, international standards), qualitative thresholds (social acceptability expressed during PPP), Need & Desirability, Specialist Assessments
High (Unacceptable)	Consequence of impact or risk: • Need & Desirability results relating to this impact or risk, and within the context of a specific aspect of the environment, indicate that it is **unnecessary and/or undesirable**. • Environmental quality standards (e.g., GA for S21(f) with wastewater discharge limit values), thresholds (e.g., in listing notices) and targets (e.g., for biodiversity, species and ecological processes that CBAs are required to

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meet) **will be exceeded**.

- Normative thresholds of impacts or resource use that are clearly established by social norms, usually at the local or regional level and often tied to social or economic concerns.
- Non-compliance

ENVIRONMENT

- Extinction of biological species, loss of genetic diversity, rare or endangered species, critical (CR, EN) habitat.
- Critically Endangered Species
    - lead to a long-term decrease in the size of a population,
    - reduce the area of occupancy of the species,
    - fragment an existing population into two or more populations,
    - adversely affect habitat critical to the survival of a species, or
    - disrupt the breeding cycle of a population.
- Critically Endangered Ecological Communities
    - lead to a long-term adverse effect on an ecological community,
    - reduce the extent of a community,
    - fragment an occurrence of the community, or
    - adversely affect habitat critical to the survival of an ecological community.
- Listed Migratory Species
    - substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species,
    - result in invasive species that is harmful to the migratory species becoming established in an area of important habitat of the migratory species, or
    - seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population.
- Disruption of food webs.
- Discharges or release of persistent and/or toxic chemicals, microbiological agents, nutrients (nitrogen,

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	phosphorous), radiation or thermal energy (e.g., cooling wastewater). SOCIO-ECONOMIC • Appropriate and justifiable social and economic outcomes, including meeting basic needs and equity, **cannot be achieved, <u>and</u> will be exacerbated,** e.g., increase in unemployment or shrinkage in the economy. • Social **outrage <u>and/or</u> widespread condemnation** expressed during PPP. • Negative effects on human health, well-being or quality of life, e.g., reduction of the quality or quantity of recreational opportunities or amenities or detrimental change in the current use of lands and resources for traditional purposes by aboriginal persons. • Negative effects on cultural, heritage (incl. architectural), archaeological, or palaeontological resources. <u>Required action:</u> • Abandon project in part or in its entirety. • Redesign project to remove or avoid impact or risk.
Medium (Manageable)	<u>Consequence of impact or risk:</u> • Need & Desirability results relating to this impact or risk, and within the context of a specific aspect of the environment, indicate that it is **unnecessary or undesirable, but is manageable to the extent that it is neutral**. • Conflict with policies or land-use plans. • Environmental quality standards (e.g., GA for S21(f) with wastewater limit values), thresholds (e.g., in listing notices) and targets (e.g., biodiversity, species and ecological processes that CBAs are required to meet) **may be exceeded**. • Controversial thresholds of impacts or resource use that are highly controversial, or which are sources of conflict between various individuals, groups or organizations.

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	ENVIRONMENT • **Threat** of extinction of biological species, loss of genetic diversity, rare or endangered species, critical habitat. • **Threat** of disruption of food webs. • Some loss of threatened (VU) habitat. • Loss of populations of or damage to commercial biological species. • Spread of biological disease, pests, feral animals or weeds can be avoided with mitigation. • **Threat** of discharges or release of persistent and/or toxic chemicals, microbiological agents, nutrients (nitrogen, phosphorous), radiation or thermal energy (e.g., cooling wastewater). SOCIO-ECONOMIC • Appropriate and justifiable social and economic outcomes, including meeting basic needs and equity, **may be achieved**. • **Legitimate** concerns expressed by individuals or groups during the PPP **are manageable to the satisfaction of those concerned**. • Increases level of risk on human health, well-being or quality of life, e.g., potential reduction of the quality or quantity of recreational opportunities or amenities, or for detrimental change in the current use of lands and resources for traditional purposes by aboriginal persons. • **Threat** of negative effects on cultural, heritage (incl. architectural), archaeological, or palaeontological resources. <u>Required action:</u> • Implement regulatory and/or management controls (with the project proponent's commitments). • Adequate compensation must be given to affected communities.
Low (Acceptable)	<u>Consequence of impact or risk:</u>

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	• Need & Desirability results relating to this impact or risk, and within the context of a specific aspect of the environment, indicate that it is **needed and desirable, or neutral.** • Environmental quality standards (e.g., GA for S21(f) with wastewater discharge limit values), thresholds (e.g., in listing notices) and targets (e.g., biodiversity, species and ecological processes that CBAs are required to meet) **will not be exceeded**. • Preference thresholds of impacts or resource use that are preferences for individuals, groups, or organizations only, as distinct from society at large. • Compliance ENVIRONMENT • **No** extinction of biological species, loss of genetic diversity, rare or endangered species, critical habitat. • **No** disruption of food webs. • Some loss of populations and habitats of non-threatened species. • Modification of landscape without downgrading special aesthetic values. • Emissions demonstrably less than the carrying capacity of the receiving environment. • **Zero** discharges or release of persistent and/or toxic chemicals, microbiological agents, nutrients (nitrogen, phosphorous), radiation or thermal energy (e.g., cooling wastewater). SCIO-ECONOMIC • Appropriate and justifiable social and economic outcomes, including meeting basic needs and equity, **will be achieved or at least remain unaffected**. • Project is **welcomed by I&APs, <u>or</u> they are indifferent**. • Zero risk or positive effects on human health, well-being, or quality of life, e.g., improvement of the quality or increase in the quantity of recreational opportunities or amenities. • Zero or positive effects on cultural, heritage (incl. architectural), archaeological, or palaeontological resources.

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	• Positive, beneficial, or neutral, that is no risk of harm to the biophysical, economical, or social (incl. cultural heritage and public health) environments. <u>Required action:</u> • Enhance beneficial impacts or risks.

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(2) Phase 2-Assessment with mitigation

Once an impact has been identified, predicted, and evaluated to determine significance, the EIA Regulations, 2014 as amended, further require one to determine the degree to which these impacts (1) can be reversed, (2) may cause irreplaceable loss of resources, and (3) can be avoided, managed, or mitigated.

The fact these requirements are written as a separate provision in the EIA Regulations implies that they are not considered as part of the evaluation of significance but are rather to be considered afterwards.

Furthermore, the fact that the EIA Regulations require "the degree" to be determined also implies that rankings must be assigned to each of these considerations.

Reversibility, irreplaceability and mitigatory potential, when considered together with the outcome of the outcome of the Phase 1 assessment, will decide on whether the activity responsible for an impact should be refused or can be entertained further by re-assessing the impact with mitigation to confirm whether the activity may proceed.

So, during Phase 2 either or both Significance ranks (Impact Magnitude and/or Impact Importance) are considered together with the following three criteria; Reversibility (Table 20), Irreplaceable Loss of Resources (Table 21), and Mitigatory Potential (Table 22), to determine whether (1) a phase 1-assessment should be repeated with mitigation, or (2) the proposed activity needs to be refused or redesigned.

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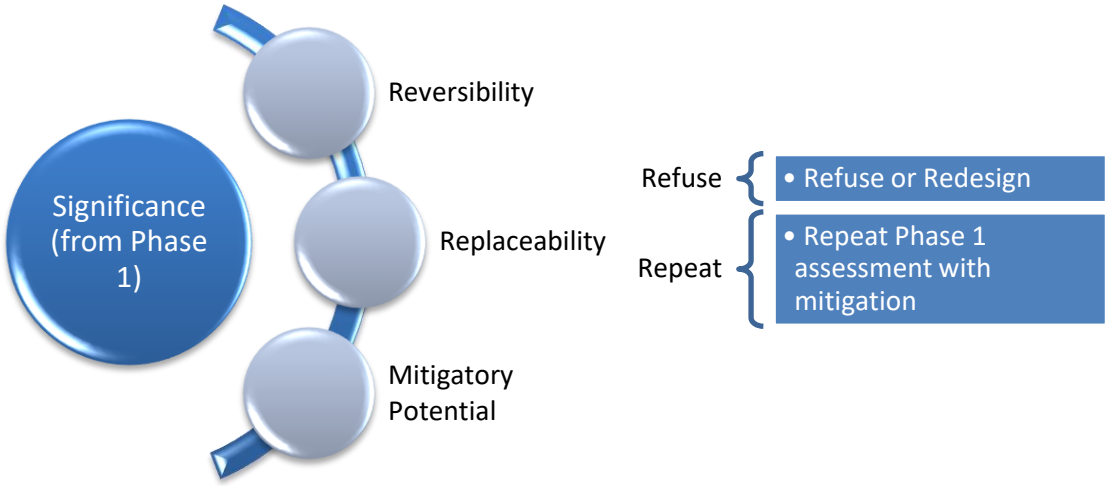

Table 20: Reversibility Criteria.

Ranks	Description
No to low degree	• If functional thresholds established for resource use are exceeded, the impacts will disrupt the functioning of an ecosystem sufficiently to destroy resources important to the nation or biosphere irreversibly and/or irretrievably. • Impacts are irreversible and/or the costs of human intervention are unaffordable.
Moderate degree	• Impacts are reversible with moderate to high (but affordable) human intervention.
High degree	• Impacts are naturally reversible, e.g., do not require any or only little human intervention.

Table 21: Irreplaceability Criteria.

Ranks	Description
Low degree to irreplaceable	• If functional thresholds established for resource use are exceeded, the impacts will disrupt the functioning of an ecosystem sufficiently to destroy resources important to the nation or biosphere irreversibly and/or irretrievably.

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Moderately replaceable	• Large scale loss of productive capacity of renewable resources. • Moderate scale loss of productive capacity of non-renewable resources.
High degree of replaceability	• Low to moderate loss of productive capacity of renewable resources. • Low scale loss of productive capacity of non-renewable resources.

Table 22: Mitigatory Potential (for negative and positive impacts or risks) Criteria.

Ranks	Description
Low	• Little or no mechanism for mitigation and/or achieving the objectives. • No possible mitigation that could offset the impact or mitigation is difficult, expensive, time-consuming or some combination of these.
Moderate	• Moderate potential (few mechanisms) to mitigate negative impacts, but there remains a risk of the objectives not being met and/or the implementation of mitigation measures may still not prevent some negative effects. • Mitigation is both feasible and possible.
High	• High potential to mitigate negative impacts to the level of insignificant effects and achieve objectives. • Mitigation is either easily achieved or little will be required, or both.

Important Note: provide mitigation objectives that would result in a measurable reduction in the impact or risk (using expertise and/or experience). Mitigations must be realistic, that is reasonable and feasible. Quantifiable standards (performance criteria) for reviewing or tracking the effectiveness of the proposed mitigation action should be provided where appropriate.

Residual Risk

Finally, the level of residual risk after mitigation is determined.

If adequate mitigations are applied, then the residual risk should be at a level of acceptable risk, meaning either the consequences of the impact will be below the quantitative or qualitative thresholds prescribed by legal, scientific, or social acceptability or the magnitude will be low.

If the mitigated risk is not at a level of acceptable risk, then the mitigations are lacking, or if all reasonable mitigations have been exhausted, then the activity responsible for the impact must be refused.

Residual risk also includes the consideration of other factors that could prevent the desired outcomes of the proposed management measures and mitigations.

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1.2 Results

(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including—
(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—
(aa) can be reversed;
(bb) may cause irreplaceable loss of resources; and
(cc) can be avoided, managed or mitigated;
(viii) the possible mitigation measures that could be applied and level of residual risk;
(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such (Appendix 3 of the EIA Regulations, 2014 as amended).

The tables below provide an assessment of the location and activity alternatives against the No-Go option (current status quo) and the impacts and risks they pose to the receiving environment (i.e. geographical, physical, biological, social, economic, heritage and cultural aspects) along with associated mitigations.

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Legend:

Neutral Impact	
Very Low Impact	
Low Impact	
Medium Impact	
High Impact	
Positive Impact	

Table 23: Pre- and post-mitigation risk matrix for preferred development footprint against the No-Go option of all assessed environmental attributes.

Environment+B11:AI31al Attributes	Sensitivity Rating			Activity Alternatives	PHASE 1 IMPACT ASSESSMENT														PHASE 2 IMPACT ASSESSMENT									
					IMPACT SIGNIFICANCE	IMPACT MAGNITUDE	NATURE	NATURE				PROBABILITY	IMPACT IMPORTANCE	ACCEPTABILITY	PROBABILITY	DEGREE OF			REFUSE/RE-DESIGN	IMPACT SIGNIFICANCE	IMPACT MAGNITUDE	NATURE	NATURE				PROBABILITY	IMPACT IMPORTANCE	ACCEPTABILITY	PROBABILITY
	Screening	SSV	Specialist					INTENSITY	SPATIAL	DURATION	STATUS					REV	IR	MIT					INTENSITY	SPATIAL	DURATION	STATUS				

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Agriculture	Medium	Medium	Medium	Phase 2	Significant	Significant	Medium	Medium	Low	Medium	Medium	Probable	Significant	Unacceptable	Probable	Moderate	Moderate	Moderate	Proceed to Phase 2	Non-significant	Non-significant	Medium	Medium	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
				No-Go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable	High	High	High	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Definite
Animal species	High	High	High	Phase 2	Significant	Significant	Medium	Medium	Medium	Medium	High	Probable	Significant	Unacceptable	Probable	Moderate	Moderate	Moderate	Proceed to	Non-significant	Non-significant	Medium	Medium	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable

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				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable	High	High	High	Phase 2 to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
Aquatic biodiversity	Very High	Very High	Very High	Phase 2	Significant	Significant	Medium	Medium	Medium	Medium	High	Probable	Non-significant	Unacceptable	Improbable	Moderate	Moderate	Moderate	Proceeded to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable

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				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable	High	High	High	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Definite
Archaeology & Cultural Heritage	Low	Medium	Medium	Phase 2	Significant	Significant	Medium	Medium	Low	Low	Medium	Probable	Non-significant	Unacceptable	Improbable	Moderate	Moderate	Moderate	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP.)
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				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable	Moderate	High	High	Proceeded to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Definite
Avian	Low	High	High	Phase 2	Significant	Significant	High	Medium	Medium	High	High	Probable	Significant	Unacceptable	Probable	Moderate	Moderate	Moderate	Proceeded to Phase 2	Significant	Significant	Medium	Medium	Low	Medium	High	Probable	Significant	Manageable	Probable
				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable	Moderate	High	High	Proceeded to	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Definite

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																			Phase 2											
Bat	Low	High	High	Phase 2	Significant	Significant	Medium	Medium	Medium	Medium	High	Probable	Significant	Unacceptable	Probable	Moderate	Moderate	Moderate	Proceeded to Phase 2	Non-significant	Non-significant	Medium	Medium	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Unacceptable	Improbable	Moderate	High	High	Proceeded to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP.)
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Defence	Low	Low	Low	Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Unacceptable	Improbable	Moderate	Moderate	Moderate	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Unacceptable	Improbable	Moderate	High	High	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
Landscape (Visual)	Medium	Medium	Medium	Phase 2	Significant	Significant	Medium	Medium	Medium	Medium	Medium	Probable	Non-significant	Unacceptable	Improbable	Moderate	Moderate	Moderate	Proceed to	Non-significant	Non-significant	Medium	Low	Medium	Medium	Medium	Improbable	Non-significant	Acceptable	Probable

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				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable	Moderate	High	High	Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
Palaeontology	Very High	High	High	Phase 2	Significant	Significant	Medium	Medium	Low	Medium	High	Probable	Significant	Unacceptable	Probable	Moderate	Moderate	Moderate	Proceeded to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Low	Improbable	Non-significant	Acceptable	Probable

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				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable	Moderate	High	High	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Definite
Plant Species	Low	Medium	Medium	Phase 2	Significant	Significant	Medium	Medium	Low	Medium	High	Probable	Significant	Unacceptable	Probable	Moderate	Moderate	Moderate	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable	Moderate	High	High	Proceed to	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable

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																			Phase 2											
RFI	Medium	Low	Low	Phase 2	Non-significant	Non-significant	Medium	Low	Medium	Low	Medium	Improbable	Non-significant	Unacceptable	Improbable	Moderate	Moderate	Moderate	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Unacceptable	Improbable	Moderate	High	High	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable

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Civil aviation	Low	Low	Low	Phase 2	Non-significant	Non-significant	Medium	Low	Medium	Low	Medium	Improbable	Non-significant	Unacceptable	Improbable	High	High	High	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
				No go option	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Unacceptable	Improbable	Moderate	High	High	Proceed to Phase 2	Non-significant	Non-significant	Low	Low	Low	Low	Medium	Improbable	Non-significant	Acceptable	Probable
Terrestrial biodiversity	Very High	Very High	Medium	Phase 2	Significant	Significant	Medium	Medium	Low	Medium	High	Probable	Significant	Unacceptable	Probable	Moderate	Moderate	Moderate	Proceed to	Non-significant	Non-significant	Medium	Low	Low	Medium	Medium	Improbable	Non-significant	Acceptable	Probable

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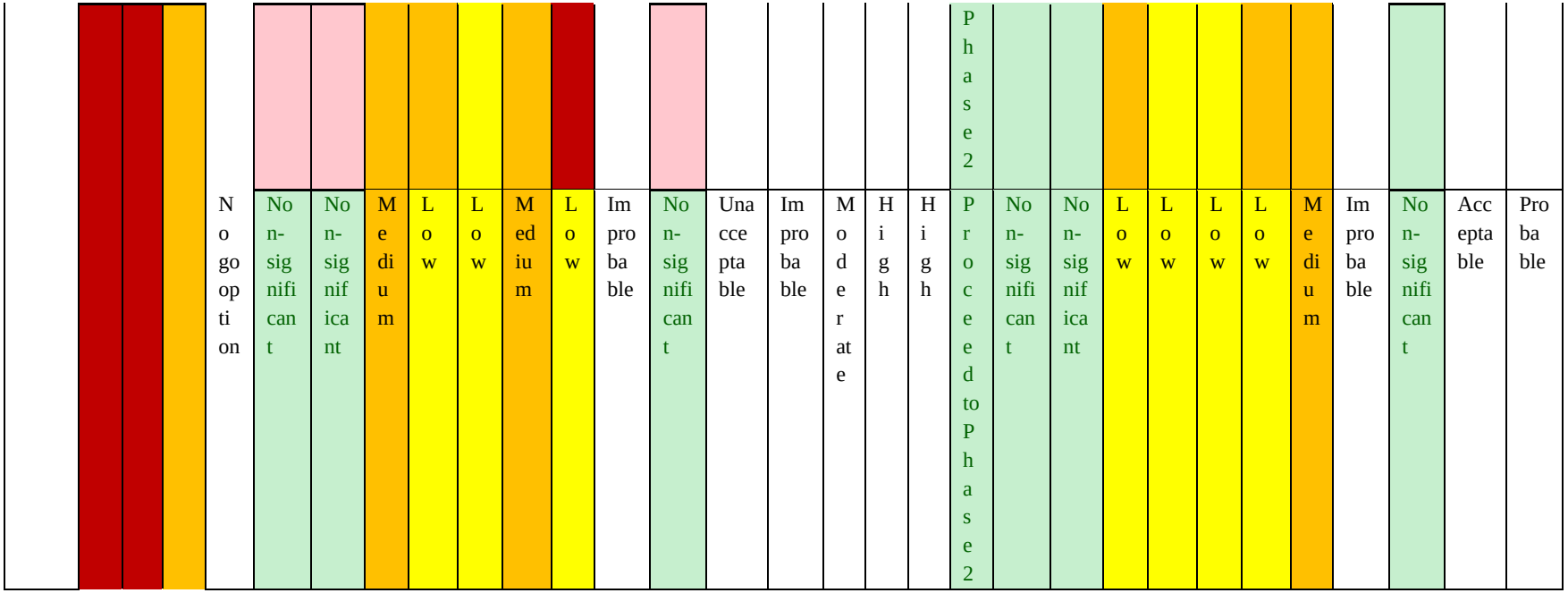

The footprint table above shows the impact of the Solar PV activity compared to the No-go option. The impacts on the receiving environment remain non-significant when choosing the No-go option.

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Agriculture: The impact of the Solar PV activity in the footprint on agriculture before the implementation of mitigations is significant since the project area that is zoned as agricultural land use. The impact is non-significant when there is implementation of mitigations that ensure less impacts on agriculture.

Animal species: The impact of the Solar PV activity in the footprint on animal species is significant when there is no implementation of mitigations because the project footprint has a high animal species sensitivity rating and there is going to be habitat loss and erosion which would be a primary risk factor for amphibians, as this would impact water quality and amphibian habitat (Henning, 2023). But it is non-significant when there is implementation of mitigations which will ensure the risks are reduced to an acceptable level.

Aquatic: The impact of the Solar PV activity in the footprint on aquatic is significant because without the implementation of mitigations the proposed Solar PV development will have an impact on the water quality of aquatic habitat by causing erosion and sedimentation that is going to lead to increased turbidity and siltation of aquatic habitats and there is also going to be chemical pollution of the water resources (Deacon, 2022). With the implementation of mitigations, the impacts imposed by the Solar PV activity can be reduced which can lead to a non-significant impact.

Archaeology & Cultural Heritage: The impact of the Solar PV activity in the footprint on Archaeology & Cultural Heritage is significant because the specialist studies conducted by A.J. Pelser in 2017 and 2021 indicated that the there was fairly large number of sites that were identified in the study dating the Stone Age, proto-historical and later historical, therefore this means this will be directly & negatively impacted by the proposed development actions (Pelser A. J., 2022).The impact of the proposed development can be reduced with the implementation of the correct mitigations.

Avian: The Solar PV activity in the footprint is going to have a significant impact on Avifauna since the sensitivity rating of avifauna on the area is high and this is because the proposed development site is located within the Platberg Karoo Conservancy Important Bird Area (Henning, 2023), this means that the area is characterised by different kinds of avifauna species, and some are of conservation concern. The proposed development will lead to displacement of the avifauna species due to habitat loss and disturbance associated with construction and maintenance activities. There is also going to be an impact related to avian collisions with solar panels and power line infrastructure (Henning, 2023). Mitigation need to be implemented to minimise the disturbance of the proposed development on to the species (Herrmann, 2017).

Bat: The impact of the Solar PV facility on Bat species is significant since there is going to be removal of vegetation for the installation and operation of solar power plants and degradation of habitat which will result in the disturbance of important areas of bat activity

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(Toussaint, 2017). The impact of the Solar PV facility will be low or non-significant with the implementation of the recommended mitigations.

RFI: The overall impact of the Solar PV activity in the footprint on RFI is non-significant since the proposed solar farm development is not close to the airport, and this means there is hardly going to be any interference with radar from the solar farm (Night, 2023).

Civil aviation: The overall impact of the Solar PV activity in the footprint on civil aviation is non-significant since the proposed solar farm development is not close to the airport (Night, 2023). Even though the impact is non-significant, the applicant will still be obliged to obtain an obstacle permit from CAA.

Defence: The overall impact of the Solar PV activity in the footprint on defence is non-significant this is because there is a low environmental theme sensitivity for Defence in the footprint.

Landscape (Visual): The project footprint will be highly visible from within the site itself, as well as all immediately adjacent areas within a radius of 3.1 km this means visual impact will also be high within a radius of between 3.1 km and 6.2 km (Henwood, 2017). The solar facility will be visible from to the railway running to the south of it. This will be visually impacted on for a range of about 0 km to 10 km (in the west) (Henwood, 2017), this means that the landscape (visual) of the Solar PV will be significant if mitigation are not implemented, but will be non-significant with the implementation of mitigations.

In light of the results and findings of the Visual Impact Assessment undertaken for the proposed Solar facility, it is acknowledged that the natural and relatively unspoiled wide-open views adjacent to the solar facility alignment will be transformed for the entire operational lifespan of the infrastructure. The potential visual impact of the infrastructure on users of national, arterial and secondary roads in close proximity to the proposed infrastructure will be of High significance. The anticipated visual impact on residents of settlements and homesteads in close proximity to the proposed infrastructure will be of High significance. Within the greater region, the potential visual impact on sensitive visual receptors (i.e. residents of settlements and homesteads) will be of Low significance. In terms of access roads, the anticipated visual impact will be of Low significance. Similarly, the visual impact of construction is also expected to be of low significance. In terms of secondary visual impacts, the significance of the anticipated impact on the visual character and sense of place of the region will be of Low significance. Potential visual impacts on tourist routes, tourist destinations and tourism potential within the region will be of Moderate significance.

The anticipated visual impacts listed above (i.e., post mitigation impacts) are not considered to be fatal flaws from a visual perspective, especially considering the low occurrence of visual receptors within the 10km offset (VRM, 2023).

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Palaeontology: If development in the footprint occurs without the implementation of mitigation measures, then there is going to be a medium impact significant on palaeontological features in the area (Almond, 2017).

Plant Species: The Solar PV development will have a significant impact on plant species in the footprint, such as habitat destruction and fragmentation as well as alien species invasion (Henning, 2023). The implementation of recommended mitigation will reduce the impact of the Solar PV development on plant species.

Terrestrial biodiversity: The overall impact of the Solar PV development on terrestrial biodiversity is significant without the implementation of mitigations. If the mitigation measures stipulated in the terrestrial biodiversity compliance report are taken into consideration, the impact of the proposed development on the vegetation and fauna habitats can be considered as low and non-significant (Henning, 2023).

2. Impacts and Risks associated with the activities and associated structures and infrastructure on the preferred footprint

(h)*(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;*
(i) *a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity,*
including—

(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and
(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;

(j) *an assessment of each identified potentially significant impact and risk, including—*
(i) cumulative impacts;
(ii) the nature, significance and consequences of the impact and risk;
(iii) the extent and duration of the impact and risk;
(iv) the probability of the impact and risk occurring;
(v) the degree to which the impact and risk can be reversed;
(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and
(vii) the degree to which the impact and risk can be mitigated.

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Identification of potential environmental impacts and risks associated with the activities and associated structures and infrastructure on the preferred footprint

The general objective of integrated environmental management is, *inter alia*, to "*identify, predict and evaluate the potential and actual impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management*" – (Section 23(2)(b) of NEMA 107 of 1998).

Ecoleges sets out to identify impacts and suggest mitigations by following the logical sequence of steps illustrated in Figure 49. A clearly defined scope is absolutely critical for creating the mould within which the EMPr shall be cast. Environmental impacts are defined as any change to the environment, whether adverse or beneficial, wholly or partially resulting from those elements of the proposed activities that can interact with the environment. Consequently, the activities need to be identified (step 2) before their impacts (step 3) can be predicted. Step 4 is incorporated as a safety net to capture those elements that are not identified in the previous two steps. Finally, mitigations are sought and tailored to counteract the project-specific impacts and achieve particular goals and objectives in line with environmental best practices.

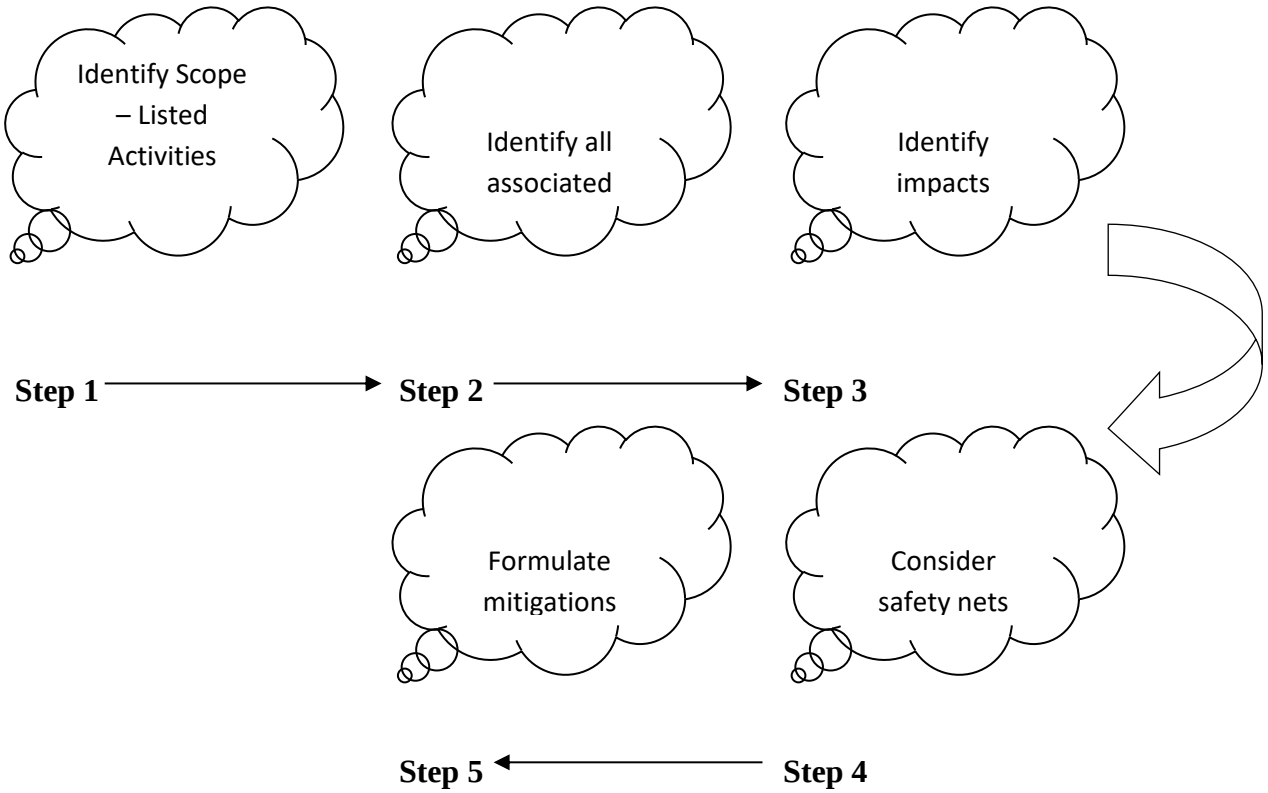

Figure 49: Procedure for identifying the project-specific mitigation of activities.

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Identification of Activities

Table 24 describes all the activities that will be undertaken during the lifespan of this project including the identified listed activities and associated activities that in their own right do not require environmental authorization, but are needed to achieve the desired objective, that is the supply of renewable energy.

Table 24: Typical activities for the construction, operation & decommissioning of a Solar PV Plant.

Activities associated with Solar PV projects at various development phases Several solar cells electrically connected to each other and mounted in a support structure or frame is called a photovoltaic module (solar panel). The facility will include areas used for management, security and control room, maintenance and canteen as well as changing facilities. An on-site substation will be required with the necessary infrastructure to feed the electricity generated, via loop-in and loop-out, into the immediately adjacent 132kv or 400kv Eskom network.	
Planning and Design	
Compliance with legal requirements by acquiring authorisations, permits and/or licenses for activities/uses undertaken during construction and operation.	YES
Sustainable resource requirements (water, energy, etc.) for lifespan of project.	YES
Rezoning (Land use): The current agricultural land-use will be retained for livestock grazing, with the synergistic development of a commercial Solar PV Plant, over a fixed-term.	YES
Layout and design including consideration of alternatives.	YES
Pre-construction	
Surveying and Pegging (all footprints from permanent to temporary access roads).	YES
Construction	
Site establishment.	YES
Access control including fencing of perimeter.	YES
Human influence (staff conduct, movement).	YES
Construction of permanent and temporary access roads.	YES
Transport on site and accommodation of traffic.	YES
Sourcing & management of water (for drinking, sanitation & construction activities).	YES
Sourcing building sand.	YES
Stockpiling and laydown areas (spoil, mulch, building sand, topsoil, windrows, material & equipment).	YES
Clearing and grading (fence line, operations area, access roads, rack foundations, transformers and inverters, cables, substation and pylons).	YES

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Earthworks & excavations (associated with the operations area, road crossings, cabling, transformers and inverters, substation and pylons): The Solar PV plant will feed into the existing overhead ESKOM transmission lines that are located within an expansive drainage system, via newly installed pylons.	YES
Blasting.	NO
Drilling and/or ram piling (the rack foundations for the panel mounting hardware and fence poles).	YES
Erection and construction of the panels arrays and associated infrastructure	YES
Feeding or tying the solar PV plant into existing Eskom grid.	YES
Waste management (solid & liquid waste including 'spoil'/handling, separation, storage and disposal).	YES
Hazardous substance (fuel/oil, cement, bitumen, sewage/grey water) management (handling and storage) at sanitation sites, kitchens, & refuelling areas on site.	YES
Plant management (parking, driving, repair and maintenance, and refuelling).	YES
Building work (concrete work).	YES
Disturbing natural areas.	YES
Construction site closure and rehabilitation.	YES
Operation (including maintenance)	
Human influence.	YES
Consumption (energy, water, and other resources).	YES
Maintenance.	YES
Lighting to create visibility at night.	YES
Waste management	YES
Terrestrial and aquatic ecological management.	YES
PV panels, which convert the sun's radiation to electrical energy. The solar PV installation will be a total of 300MW outside an urban area, on a green fields site.	YES
An inverter, which is a key component in matching panels' output to the grid and converts the panels' direct current (DC) electrical output to alternating current (AC). The overhead ESKOM lines are 400KVA and the loop-in, loop-out from the sub-station to the ESKOM overhead lines may exceed 2 kilometres in length, depending on which of the two 400KVA ESKOM designates for the tie-in.	YES
Substation	YES
Decommissioning	
Disposal of PV panels and other waste.	YES
Human influence (staff conduct, movement)	YES
Roads and access routes	YES

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Rehabilitation of affected footprints.	YES

Identification of Actual and Potential Impacts

The impacts are considered within the scope implicit within the listed activities. The relevant impacts resulting from the listed, actual and associated activities, including environmental, socio-economic and cultural heritage, were determined using a Leipold Matrix (Table 25), comments received from Interested & Affected Parties (Table 26), and, where applicable, the findings contained in specialist studies (Section K of this report).

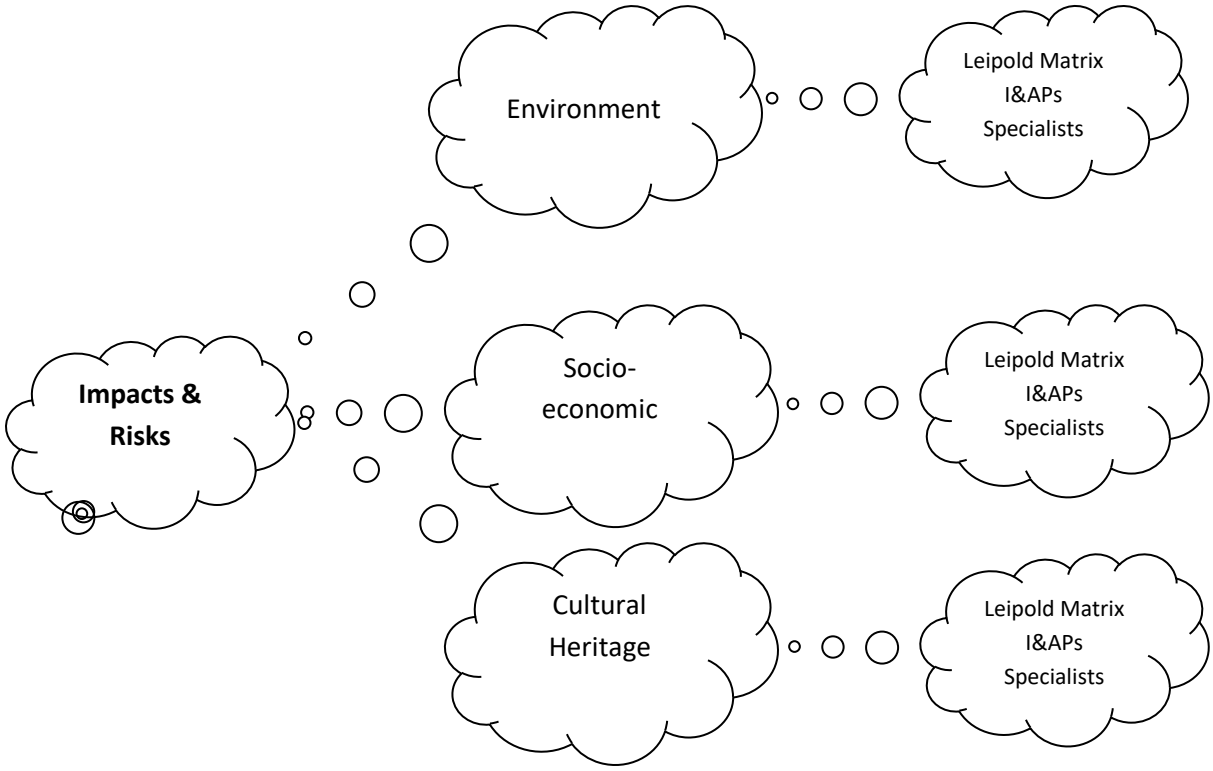

Figure 50. A breakdown of the different types of impacts including the resources used to identify them.

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Table 25: Leipold Matrix used to identify environmental impacts - any change to the natural, socio-economic, and cultural environment resulting from the development's activities during planning, construction, operation and decommissioning.

Environmental medium		Biota	Water			Soil	Air	Land use	Biodiversity			Social	Visual	Economy	Traffic	Heritage	
Environmental impact		**Flora & Fauna**	**Surface water pollution**	**Groundwater pollution**	**Hydrology**	**Soil pollution & erosion**	**Air pollution**	**Land use potential**	**Habitat transformation**	**Aquatic habitat transformation (sediment loading)**	**Ecological & corridor function**	**Social impacts**	**Visual & aesthetic impacts**	**Economic impacts**	**Traffic impacts**	**Heritage impacts**	Other
Planning & Design	Compliance with legal requirements by acquiring authorisations, permits and/or licenses for activities/uses undertaken during construction and operation	X	X	X	X	X			X	X							X
	Sustainable resource requirements (water, energy, etc.) for lifespan of project				X							X		X			
	Rezoning and land use							X	X								
	Layout and	X	X		X	X			X	X	X		X			X	

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Environmental medium		Biota	Water			Soil	Air	Land use	Biodiversity			Social	Visual	Economy	Traffic	Heritage	Other
	design including consideration of alternatives																
Construction	Site establishment (construction camp, sanitation, temporary accommodation)	X	X		X	X	X	X	X	X			X	X		X	
	Access control including fencing of perimeter	X	X		X	X		X	X		X	X	X	X			
	Hunting Activities											X					
	Contractor's employees (staff conduct, movement)	X	X				X		X			X	X	X			
	Construction of permanent & temporary access roads	X	X		X	X	X	X	X				X	X	X		
	Transport & accommodation of traffic (parking areas)	X	X			X	X				X	X		X	X		

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Environmental medium		Biota	Water			Soil	Air	Land use	Biodiversity			Social	Visual	Economy	Traffic	Heritage	Other
	Sourcing & management of water (for drinking, sanitation & construction activities)		X	X		X						X		X			
	Sourcing & management of building material / sand	X	X		X	X		X	X			X	X	X			
	Stockpiling and material laydown areas (spoil, mulch, building sand, topsoil, windrows, material & equipment)	X	X		X	X	X	X	X		X		X	X			
	Clearing and grubbing (fence line, operations area, access roads, rack foundations, transformers and inverters, cables, substation and pylons)	X	X		X	X	X	X	X		X		X	X		X	

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Environmental medium		Biota	Water			Soil	Air	Land use	Biodiversity			Social	Visual	Economy	Traffic	Heritage	Other
	Earthworks & excavations (associated with the operations area, PV array assemblage, road crossings, cabling, transformers and inverters, substation and pylons)	X	X		X	X						X				X	
	Drilling (associated with the rack foundations for the panel mounting hardware and fence poles)	X			X	X	X									X	
	Feeding or tying the solar PV plant into existing Eskom grid		X		X							X					
	Waste generation (solid waste including ‘spoil’, liquid	X	X			X	X	X	X			X	X	X			

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Environmental medium		Biota	Water			Soil	Air	Land use	Biodiversity			Social	Visual	Economy	Traffic	Heritage	Other
	waste, separation, storage and disposal)																
	Hazardous substance (fuel/oil, cement, bitumen, sewage/ grey water) management (handling and storage) at sanitation sites, kitchens, batching sites, workshops, washbays, refuelling areas and on site.	X	X	X		X	X	X	X			X	X	X			
	Plant management (parking, driving, repair and maintenance, and refuelling)		X	X	X	X	X										
	Building work (concrete work)		X			X								X			
	Disturbing					X		X		X						X	

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Environmental medium		Biota	Water			Soil	Air	Land use	Biodiversity			Social	Visual	Economy	Traffic	Heritage	Other
	natural areas																
	Site closure & rehabilitation	X	X			X			X			X	X	X			
Operation (including maintenance)	Operation employment	X	X										X	X			
	Consumption (energy, water, and other resources)		X	X	X							X		X			
	Maintenance					X						X					
	Lighting to create visibility at night	X					X						X	X			
	Waste management	X	X	X		X	X	X	X			X	X	X			
	Terrestrial and aquatic ecological management	X															
	PV panels and inverter (substation)		X				X						X				
Decommissioning (including rehabilitation)	Disposal of PV panels and other waste	X	X	X		X		X	X			X	X	X			
	Human influence (staff conduct, movement)	X	X				X		X	X			X	X			

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Environmental medium		Biota	Water			Soil	Air	Land use	Biodiversity			Social	Visual	Economy	Traffic	Heritage	Other
	Rehabilitation of affected footprint	X	X		X	X		X	X			X	X	X			

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Table 26: Identification of Impacts & Risks from registered Interested and Affected Parties (I&APs).

I&AP	Source	Comment - Impacts
Jacoline Mans: Designation: Chief Forester Tel: 054 338 5909 Fax: 054 334 0030 Email: JacolineMa@daff.gov.za	Email on 04/10/2016	1. Potential impacts on NFA listed protected trees (if any).
		2. Impact on Riparian vegetation.
		3. Obtain Flora and Fauna Permits where necessary.
	Email on 19/12/2016 (Comments on Draft Scoping Report)	4. Land demarcated as agricultural land cannot be changed to another land use without the supported recommendation under the Sub-Division of Agricultural Land Act 70 of 1970 (SALA).
		5. A local authority cannot change the zoning of demarcated agricultural land to any other zoning without a letter from the Registrar of this Act.
		6. If agricultural land will be leased under a long-term lease agreement of 10 years or longer, submit a long-term lease application to the National Department of Agricultural, Forestry and Fisheries for approval from the Minister under the Act 70 of 1970.
Francois Taljaard: Town Planner Emthanjeni Municipality Cel: 083 959 1157 Fax: 053 6311518 Email: taljaardf@emthanjeni.co.za	Email on 14/10/2016	1. Impact of the shortage of water.
		2. Rezoning of each site where development is to take place.
		3. Approval of building plans before construction work can commence.
		4. The disposal or processing of packaging material must be addressed in the EIA. Packaging material is currently being used in the townships for additions to houses, which is illegal and creates a fire hazard.

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Bonnie Schumann: Senior Field Officer Endangered Wildlife Trust Drylands Conservation Programme W: 053 813068 C: 072 122 4232 Email: bonnies@ewt.org.za	Email on 26/10/2016	1. These are potential areas for Critically Endangered Riverine Rabbits - Riverine Rabbit impacts.
Lunga Dlova: Case Officer DFFE Email: ldlova@dffe.gov.za Tel: (012) 399 8524	Email received 31 March 2023 accepting and commenting on Final Scoping Report dated 30 March 2023.	1. Comments received had no implications on impacts and risks associated with the project.
Mashudu Mudau Biodiversity Officer DFFE: Biodiversity Section Email: mamudau@dffe.gov.za Tel: (012) 399 9945	Email received 09 February 2023 commenting on Draft Scoping Report dated 07 February 2023.	1. Comments received related to the consideration of bird & bat guideline documents, which have been considered by the appointed specialists, and relevant aspects included in their scope of work and reports.

Natasha Higgitt: Development Applications Unit Manager Email: nhiggitt@sahra.org.za Tel: (021) 202 8660	Email received 09 February 2023 commenting on Draft Scoping Report dated 07 February 2023.	1. Interim comment states that SAHRA requires a Heritage Impact Assessment for the proposed development. A Cultural Heritage & Archaeological and Palaeontological Impact Assessment were undertaken with impacts and risks identified and mitigated by the appointed specialists with summaries provided in Section K of the this report, and specialist information considered in the Impact Assessment and EMPr.
Comments from Neighbour	22 March 2022 via telephone call and BID registration form.	1) Safety of the residents and visitors. 2) Theft and burglary due to the development. 3) View impairment – The area designated for the solar panels are visible from Skilpadskuil, which means that the view will no longer be a nature scenery. 4) Land/Farm Value – The value of the land/farm will most likely decrease due to the development, which may have an effect on future buyers (including farmers – looking to buy the land). 5) Road conditions – The condition of the roads will most likely deteriorate as a result of the heavy vehicles using the roads. 6) Risk of veld fires caused by workers during the construction of the plant. 7) Risk of solar panels being damaged during the hunting season (approximately 1/3 of the neighbouring property borders the Phase 2 & Phase 3 development).

The potential impacts identified by I&APs, were designated to the applicable phases of implementation (Table 27) for appropriate consideration and mitigation during the impact assessment phase.

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Table 27: Potential impacts identified by I&APs and Specialist Studies and phases of implementation.

Comments	Description of Impact & Phase of Implementation			
	Planning	Construction	Operation	Decommissioning
Potential impacts on NFA listed protected trees (if any).	Yes	Yes	No	No
Impact on Riparian vegetation.	Yes	Yes	No	No
Obtain Flora and Fauna Permits where necessary.	Yes	Yes	No	No
Impact of the shortage of water.	Yes	Yes	Yes	No
Rezoning of each site where development is to take place.	Yes	No	No	Yes
Approval of building plans before construction work can commence.	Yes	No	No	No
The disposal or processing of packaging material must be addressed in the EIA. Packaging material is currently being used in the townships for additions to houses, which is illegal and creates a fire hazard.	No	Yes	No	Yes
These are potential areas for Critically Endangered Riverine Rabbits - Riverine Rabbit impacts.	Yes	Yes	No	No
The operation of the facility will generate noise and disturbance which may deter some fauna from the area.	No	Yes	Yes	No
The areas inside the facility will require management and if this is not done appropriately, it could impact adjacent intact areas through impacts such as erosion, alien plant invasion and contamination from pollutants, herbicides or pesticides.	No	No	Yes	No
The associated overhead power lines will pose a risk to avifauna susceptible to collisions and electrocution with power line	No	Yes	Yes	No

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infrastructure.				
Human presence and uncontrolled access to the site may result in negative impacts on fauna and flora through poaching of fauna and uncontrolled collection of plants for traditional medicine or other purpose.	Yes	Yes	Yes	No
Site clearing & exploration activities for site establishment would have a negative impact on biodiversity if this was not conducted in a sensitive manner.	No	Yes	No	No
Vegetation clearing for the development, access roads, site fencing etc. could impact listed plant species as well as plant communities.	No	Yes	No	No
Vegetation clearing will also lead to habitat loss for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems.	No	Yes	No	No
Increased erosion risk would occur due to the loss of plant cover and soil disturbance created during the construction phase. This may impact downstream riparian and wetland habitats if a lot of silt enters the drainage systems.	No	Yes	No	No
Presence and operation of construction machinery on site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance at the site.	No	Yes	No	No
Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.	No	Yes	Yes	No
Impacts on vegetation and protected plant species	Yes	Yes	No	Yes
Soil erosion and associated degradation of ecosystems	No	Yes	Yes	Yes

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Direct faunal impacts	No	Yes	Yes	Yes
Impacts on Avifauna	No	Yes	Yes	No
Alien Plant Invasion	No	Yes	Yes	Yes
Reduced ability to meet conservation obligations & targets	Yes	Yes	Yes	No
Impact on broad-scale ecological processes	No	Yes	Yes	Yes
Expectations regarding creation of opportunities (Jobs etc.).	Yes	Yes	Yes	Yes
Establishment of infrastructure to generate renewable energy	Yes	Yes	No	No
Fire hazards (caused by people)	No	Yes	Yes	No
For some stakeholders the sense of place will change	No	Yes	Yes	Yes
Loss of jobs and associated income	No	No	Yes	Yes
Impacts of traffic on people – dust, noise, safety – from a social and nuisance perspective. Impacts on livelihoods – of landowners.	No	Yes	Yes	No
Safety of community – possible increase in crime due to increased number of strangers in community.	No	Yes	Yes	No
Negative community relations due to conduct of contractors/ representatives of Soventix.	No	Yes	Yes	Yes
Impacts of construction camp – HIV/AIDS, movement of people etc. (This impact would only occur if there is a construction camp).	No	Yes	No	No
Influx of people – also possible social disintegration and cultural differentiation, increase in HIV/AIDS etc.	No	Yes	No	No
Creation of jobs and other economic opportunities. For some stakeholders their sense of place may change.	No	Yes	Yes	No
Disturbance to or destruction of roosting sites during construction	No	Yes	No	No

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activities.				
Light pollution during construction and operational phase may alter species composition, foraging patterns, reproductive success and predation rate.	No	Yes	Yes	No
Alteration to commuting routes within the landscape as routes may be altered and some species may avoid the solar arrays all together, particularly the low-flying bat species.	No	Yes	Yes	No
Habitat changes beneath the solar panels and the associated impact on prey insect communities may affect bat foraging patterns and areas.	No	Yes	Yes	No
Changes in bat community, abundance and activity of bat species.	No	Yes	Yes	No
No constructing activities to take place around or next to the aquatic areas.	Yes	Yes	No	No
Maintain the 100 m buffer around aquatic areas.	Yes	Yes	Yes	No
The operation of the facility will generate noise and disturbance which may deter some fauna from the area.	No	No	Yes	No
The areas inside the facility will require management and if this is not done appropriately, it could impact adjacent intact areas through impacts such as erosion, alien plant invasion and contamination from pollutants, herbicides or pesticides.	No	No	Yes	No
The associated overhead power lines will pose a risk to avifauna susceptible to collisions and electrocution with power line infrastructure.	No	Yes	Yes	No
The proximity of operations in a given area could result in	No	Yes	Yes	No

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secondary indirect impacts resulting from the movement of people or vehicles in the immediate or surrounding vicinity.				
The visibility of the facility and ancillary infrastructure to, and potential visual impact on observers residing in rural homesteads and farmsteads within the study area.	No	Yes	Yes	No
The potential visual impact of operational, safety and security lighting of the facility and ancillary infrastructure at night on sensitive visual receptors residing in close proximity.	No	No	Yes	No
The potential visual impact of the construction of the facility and ancillary infrastructure on sensitive visual receptors in close proximity.	No	Yes	No	No
The potential visual impact of the facilities and ancillary infrastructure on the visual character of the landscape and sense of place of the region.	No	Yes	Yes	No

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Methodology for Assessing Environmental Impacts associated with activities, structures and infrastructure on the preferred footprint alternative.

Natural environmental, socio-economic, and cultural heritage impacts were assessed using the approach outlined below.

Natural environmental, socio-economic, and cultural heritage impacts were identified systematically by considering how the site-specific activities for each phase of development will interact with all elements of the receiving environment (Leipold Matrix; Table 25). All impacts, including those identified by I&APs and Specialists, will be measured against the current land-use activity (the no-go option / option of not implementing the activity) and systematically assessed by rating a suite of generic criteria (Table 28) established by the Department of Environmental Affairs and Tourism (DEAT 2002). The criteria are:

- Extent or spatial scale,
- Intensity or severity of the impact,
- Duration of the impact,
- Mitigatory potential,
- Social acceptability,
- Degree of certainty,
- Status of the impact, and
- Legal requirements.

The magnitude and significance of impacts were determined by describing the impacts in terms of the above criteria. The criteria provide a consistent and systematic basis for the comparison and application of judgements.

The suite of criteria was sought for its applicability to EIA, specifically by making provision for the variety of perspectives. Significance is an anthropocentric concept that makes use of value judgements and science-based criteria. Judgement and values are used to greater extent in EIA than science-based criteria and standards (DEAT 2002). Considering value judgements can vary greatly amongst different stakeholders, professional judgement, such as that of the EAP, should ideally be used in conjunction with the different value judgements expressed by various stakeholders. In other words, significance should be communicated from a variety of perspectives other than the professional opinion of a multidisciplinary study team, and include environmental, socio-economic or cultural attributes perceived by society to be significant. Despite the potential variety of perspectives, they can be categorized into three broad forms of recognition for determination of impact significance, namely institutional (laws, plans or policy statements), public and technical (scientific or technical knowledge or judgement of critical resource characteristics) (DEAT 2002). Consequently,

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the magnitude and significance of impacts were as far as possible determined by reference to legal requirements, accepted scientific standards and / or social acceptability.

Significance is relative and must always be set in a context to show whose values they represent. The selected criterion provides such a context, taking all three forms of recognition into account by asking whether impacts are legally, publically and professionally recognized as important. The thresholds, against which significance of a given environmental effect was measured or determined, were provided by a set of ratings for each criterion (Table 28). Thresholds of significance were as far as possible based on / determined by reference to legal requirements, accepted scientific standards or social acceptability. Ratings are High (H- 4), Moderate (M-3), Low (L-2) or No Impact (N-1) and determined according to clearly defined descriptors. The 'No Impact' rating includes reference to 'no impacts beyond prescribed thresholds'. In other words, mitigations that change the ratings of any particular criteria to 'N' do not necessarily infer zero impact, but rather that the impact is restricted to prescribed thresholds as defined in the goal and objective(s) of the proposed mitigation(s). The significance of the impacts of the proposed project was assessed both with and without mitigation action.

Table 28: Impact Evaluation Criteria, Ratings and Descriptors.

Criteria	**Ratings and Descriptors**			
	High (4)	**Moderate (3)**	**Low (2)**	**No Impact (1)**
Spatial Scale / Extent	Provincial, National, or International. Far beyond the site boundaries. Widespread.	Local (within the farm boundary) to Regional (beyond the farm boundary, impact affects neighbours).	Development footprint to within the site boundary.	No area is affected.
Intensity / Magnitude	Functioning of processes will cease. Complete change in species occurrence and variety. Disturbance of pristine areas / plants of conservation concern that have	Modified processes will continue. Moderate change in species occurrence and variety. Disturbance of potential conservation areas or are of use as a	Natural processes are affected, but not modified. Minor change in species occurrence and variety. Disturbance of degraded areas.	Natural processes are not affected.

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	important conservation value. Magnitude of impact exceeds legal limits, scientific standards or social acceptability.	resource.		
Duration	Permanent. Beyond decommissioning. Long term (>2yr).	Temporary. Lifespan of the operational phase. Medium term (>1<2yr).	Immediate, once-off. Lifespan of the construction phase. Short term (<1yr). Restricted to a season.	Project doesn't commence.
Mitigatory Potential	High potential to mitigate and achieve objectives.	There is a moderate potential to mitigate, and achieve objectives.	There is a potential to mitigate, but there remains a risk of the objectives not being met.	No mechanism for mitigation and achieving the objectives.
Acceptability	Unacceptable Abandon project or design.	Manageable with expensive regulatory controls and the project proponent's commitments.	Some risk to public health / environment, but it is easily averted using simple controls / mitigations.	Acceptable. No risk to public health / environment.
	Definite (D- 4)	**Probable (P -3)**	**Improbable (I-2)**	**No Impact (N-1)**
Degree of Certainty / Probability of the impact occurring	Substantial supportive data. Impact will occur regardless of preventive	There is a chance / risk of the impact occurring. Moderate	It is unlikely that the impact will occur. Low	The impact will not occur. 0%.

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	measures. High probability. >95%.	probability. 5-95%.	probability. <5%.	
	Negative	**Neutral**	**Positive**	
Status	Net loss of resource. Adverse.	No net loss or gain.	Net gain of resource. Beneficial.	

Assessment of Impacts

The identified actual and potential Impacts, including the Leipold Matrix (Table 25), comments received from I&APs (Table 26) and findings contained in specialist assessments (Section K of this report), are segregated amongst the different phases of implementation (planning and design, construction, operation and decommissioning) (so that they can be logically managed / mitigated for by the responsible role players at the appropriate time. Apart from the aforementioned impacts, a number of mandatory impacts (for consideration during the planning and design phase) are included for evaluation in all environmental impact assessments, including, *inter alia*, Potential Offences and Consumption of Resources. Furthermore, 'Degradation' is always defined and treated as a potential impact during construction (post-construction rehabilitation & monitoring) and decommissioning.

Planning and Design Phase

Activity Group 1: Potential Offences

Description of potential impacts

- **Protected Species.** Comments received from **Jacoline Mans**, Chief Forester, DAFF (Table 26): investigate potential impacts on NFA listed protected trees & obtain flora and fauna permits where necessary - clearing operations in the PV Solar Plant servitudes will disturb or destroy natural flora and fauna, including protected species. Licenses / permits are required prior to impacting protected species in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)[1], the National Forests Act, 1998 (Act No. 84 of 1998)[2] and any applicable provincial legislation.
- **Water use.** Excavation for the purposes of erecting pylons / poles inside an extensive drainage system will require section 21 (c) & (i) water use entitlements[5].
- **Water use.** The operational phase of the plant will generate wastewater through ablution and wash-up (kitchen) facilities. The effluent will be treated in a package wastewater treatment works (WWTW) (Biorock^{TM} system,) which will discharge into a seep-away site. Incomplete treatment of the effluent poses a risk of contamination to the receiving underground water resource.
- **Water use.** Comments received from **Francois Taljaard**, Town Planner, Emthanjeni Municipality (Table 26): investigate potential impacts on the shortage of water - water

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may be abstracted illegally for use during construction and operation. In terms of section 25(1) of the NWA, 1998[4] the person authorized to use water for irrigation may request a water management institution to use some of that water for a different purpose, such as construction. In terms of section 25(2) of the NWA, 1998[4] a person holding an entitlement to use water may surrender that entitlement or part thereof to facilitate a license application for the use of water from the same resource in respect of other land. A landowner may take water without a water use license but it is subject to the provisions and limitations prescribed in General Authorisation GN No. 538 published in Government Gazette No. 40243 on 2 September 2016[5]. Alternatively, a section 21(a) & (b) water use license will be required to abstract & store during construction and operation.

- **Water use.** A readily available, sustainable and legal source of water will be required for use during construction and operation of the solar PV plant - water will be required to clean the solar PV panels and provide for construction and operational uses (including site management activities & facilities).
- **Water use.** Comments received from **Francois Taljaard**, Town Planner, Emthanjeni Municipality (Table 26) states that the municipality will not be able to supply water to the project as the area's groundwater is already constrained.
- **Borrow Pits.** Material will be required for building purposes & road maintenance. Borrow pit licensing is classified as small-scale mining under the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) and is administered by the Department of Minerals Resources (DMR), through whom any permit applications must be lodged. Exemptions are applicable where the borrowing of material is for the improvement of that same land[3].
- **Access Roads.** The construction or expansion of any access roads will need to be authorised in terms of the NEMA listed activities, 2014 if they exceed certain thresholds[6].
- **Servitudes and Wayleaves.** The construction of the PV Solar Plant will intersect Eskom's servitude / power lines (Distribution and/or Transmission). Construction without permission will constitute an offence in terms of the relevant legislation, such as the Electricity Act, 1987 (Act 41 of 1987), as amended in 1994[7].
- **Servitudes and Wayleaves.** Affecting the overhead Transnet powerlines without permission from Transnet will constitute an offence.
- **Compliance Monitoring.**Construction could commence prior to the appointment of an Environmental Control Officer (ECO), which will be a condition of the EMPr.
- Construction of the solar PV facility including potential **high-level floodlighting** represent a potential obstacle to aviation. All new Solar applications must be lodged to obstacles@atns.co.za.
- **Municipal By-laws.** Comments received from **Francois Taljaard**, Town Planner, Emthanjeni Municipality (Table 26); approval of building plans before construction work can commence - Emthanjeni Local Municipality shall not issue a certificate referred to in section 118(1) of the Local Government: Municipal Systems Act, 2000 (Act No. 32 of

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2000), regarding land, unless, *inter alia*, the Municipality is satisfied that any building erected on the land, in respect of which plans and specifications are to be drawn and submitted to the Municipality for approval in terms of the Act, is properly erected and maintained in accordance with such plans and specifications[8].

- **DFFE: Biodiversity Section:** Concerns addressed through specialist appointments.
- **SAHRA.** Concerns addressed through specialist appointments.

Uncertainties & limitations with predicting this impact

- None known.

Assumptions made when assessing the impact

- Protected plants that need to be searched will be visible at the time.
- The water use authorisations will all be approved within the same timeframes as the EIA under General Authorisation.
- Sand for road improvements will be sourced from on-site borrow pits which do not require licensing as per section 106 of the MPRDA.
- No new roads will be constructed, nor existing roads widened and associated bridges (where and if applicable) more than the permissible thresholds in the Listed Activities of the EIA Regulations (2014).

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred	Without	3	3	3	4	33	3	Negative	H
	With	2	2	2	2	13	2	Neutral	
No-go	N/A	1	1	1	1	3	1	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

References (legal, scientific, social or other criteria):

1. National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
2. The National Forests Act, 1998 (Act No. 84 of 1998), including Schedule in Government Notice No. 1042, dated 10 September 2004.

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3. Northern Cape Nature Conservation Act (Act 9 of 2009).
4. Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002); Exemptions Section 106, sub-section 3.
5. National Water Act, 1998 (Act No. 38 of 1998).
6. Section 21(a & b) - General Authorisation GN No. 538 published in Government Gazette No. 40243 on 2 September 2016.
7. Section 21(c) and (i) - General Authorisation GN No. 509 published in Government Gazette No. 40229 on 26 August 2016.
8. Section 21 (g) – General Authorisation GN No. 665 published in Government Gazette No. 36820 on 6 September 2013.
9. EIA Regulations, GN No. R. 983 & 984, 04th December 2014, as amended.
10. Electricity Act, 1987 (Act 41 of 1987), as amended in 1994.
11. Building Control By-Law, 2008 (By-law No. 4 2008) – "To provide for the control of buildings erected on land in the Emthanjeni municipality; and for matters concerned therewith."

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Section 24G of NEMA allows for the rectification of unlawful commencement or continuation of a listed activity.
- Non-compliance with other legislation may result in criminal prosecution or other actions provided for in the relevant legislation.
- Search & Rescue of protected plants & plants of conservation concern will be necessary to ensure that these plants are transplanted outside the works area, where they will continue to contribute to the biodiversity suite of the area. Should an effective and timeous search & rescue not be carried out, a nett loss in biodiversity is likely to occur.
- Water use must be utilised within the sustainable capacity of the underground resource, so as not to deplete this resource availability to the environment and other land users.

Mitigations

Goal: Achieve compliance.

Objective(s) (including targets):

- Comply with all relevant legislation, regulations, ordinances & by-laws.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Applicant ECO	The applicant shall apply for and obtain the relevant licenses / permits from the appropriate authorities (DFFE and Provincial Authority) prior to disturbing or destroying any

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		protected species. The list of affected plants are contained in the Terrestrial Ecology Specialist Report, the following species will need to be searched & rescued by a qualified ecologist / botanist prior to clearing operations: *Stomatium pluridens* and *Euphorbia crassipes*, which are regional endemics and provincially protected, while other protected species include *Aloe broomii* var. *broomii*, *Aloe claviflora*, *Pachypodium succulentum*, *Ammocharis coranica*, and *Boscia albitrunca*
Avoidance	Applicant	Water required during construction and operation for human consumption (drinking, sanitation and food preparation), building activities (mixing concrete, watering gravel roads), livestock and maintenance (cleaning solar panels) shall be pre-authorised via a General Authorisation or Water Use License for section 21 (a) and (b) water uses.
Avoidance	Applicant	Ensure adequate on-site water can be provided as the Municipality will not be able to supply.
Reduction	Applicant	Abstraction must not exceed the limits prescribed in the GA for this area, and abstraction volumes must be measured and recorded against the sustainable yields of the borehole on a monthly basis to ensure the resource is not being depleted. Do not overproduce from existing or propose boreholes and ensure that water level monitoring of boreholes within a 1.5km radius of the pumping borehole is undertaken. If a decline in water levels is noted in all boreholes, because of pumping, the abstraction rate should be lowered to prevent aquifer depletion.
Avoidance	Applicant	The applicant shall apply for a water use entitlement, i.e. a General Authorization or Water Use License for section 21(c) and (i) water uses, prior to constructing access roads and erecting pylons inside a watercourse.
Avoidance	Applicant	The applicant shall apply for a water use entitlement, i.e. a General Authorization or Water Use License for section 21(g) water uses for the treatment of effluent via a package waste water treatment works (WWTW) e.g. Biorock™ and NewGen Containerized WWTW and/or Conservancy Tank/s for the storage of contaminated water from washing brushes and other tools as well as the dirty water from washing the ready mix concrete trucks, prior to constructing any facilities

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		that will generate and require disposal of waste water.
Avoidance	Contractor	If building or road building sand is required, the contractor shall be permitted to borrow material from the on-site quarries without the need to apply for a permit or license in alignment with section 106 under the MPRDA, dealing with exemptions, as long as the material is used on the same properties from which it was borrowed.
Avoidance	Applicant.	A treated effluent & water sampling protocol for all water uses must be developed which guides and governs the sampling procedures in accordance with guidelines provided by DWAF (2000), Water Research Commission No: TT 117/99.
Avoidance	Applicant Engineer Contractor	Prior to the construction of any new roads, a search & rescue must be conducted by a suitably qualified specialist for protected fauna & flora and that of conservation concern, which must then be transplanted outside the works area in a comparative habitat type. Ascertaining similar habitat types may require soil sampling and analysis over and above above-ground similarities.
Avoidance	Applicant	The applicant shall apply for a wayleave(s) from Eskom prior to commencing with construction within their servitude. The applicant shall comply with the Eskom requirements for work in or near Eskom servitudes and the Renewable Energy Generation Plant Setbacks to Eskom Infrastructure.
Avoidance	Applicant	The applicant shall apply for a wayleave(s) from Transnet prior to affecting any infrastructure within their servitude, including the potential interruption of services to allow for the delivery of large equipment to site (e.g. temporary disconnection of overhead powerlines or improvements to the unguarded level crossing)..
Avoidance	Applicant	An experienced and independent ECO registered with SACNASP & EAPASA) shall be appointed prior to the commencement of construction to monitor and report to the competent authority on compliance with the EA and EMPr, and where necessary oversee or facilitate the identification and permitting / licensing of protected species prior to clearing of any vegetation.
Avoidance	Applicant	Lodge an Obstacle Application for assessment with ATNS to obstacles@atns.co.za at least 120 days before the commencement of construction, preferably during the

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		Planning and design phase once the engineers have determined the specifications of the structures (e.g., dimensions, co-ordinates, etc.) and completed the final layout plan. Refer queries to Yanga Nofuma, Obstacle Administrator | COO - Air Traffic Services, Bruma, T: 011 607 1474 • F: 086 695 2610 • E: obstacles@atns.co.za • W: www.atns.com. The client will have to liaise with SACAA to finalise the "As build" and for any queries with the lighting. Obtain a Specialist Civil Aviation Compliance Statement in support of the application.
Avoidance	Applicant	The plans and specifications for any building, whether of a temporary or permanent nature, to be erected on the land must be submitted to the Emthanjeni Local Municipality for approval in terms of the Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000).

Activity Group 2: Socio-economic considerations

Description of potential impacts

- The local community stands to gain from the suite of professionals that will be utilising local facilities (hospitality and others) that will provide economic benefits to the area during the planning phase.
- Job seekers are likely to begin enquiring about employment as awareness around the proposed project grows. This can become burdensome on the property owner should people arrive at the property owner requesting work and opportunities.
- **Neighbouring landowner concerns.** Concerns included and addressed through specialist studies, mostly notably the Social Impact Assessment.

Uncertainties & limitations with predicting this impact.

- During the assessment, not every individual in the community could be interviewed therefore only key people in the community were approached for discussion. Additional information was obtained using existing data (Aucamp, 2022).
- The social environment constantly changes and adapts to change, and external factors outside the scope of the project can offset social changes, for example changes in local political leadership, droughts or economic conditions. It is therefore difficult to predict all impacts to a high level of accuracy, although care has been taken to identify and address the most likely impacts in the most appropriate way for the current local context within the limitations. In addition, it is also important to manage social impacts for the life of the project, especially in the light of the changing social environment (Aucamp, 2022).
- Social impacts can be felt on an actual or perceptual level, and therefore it is not always straightforward to measure the impacts in a quantitative manner (Aucamp, 2022).

Assumptions made when assessing the impact.

- Social impacts commence when the project enters the public domain. Some of these impacts will occur irrespective of whether the project continues or not, and other impacts have already started. These impacts are difficult to mitigate, and some would require immediate action to minimize the risk (Aucamp, 2022).
- There are different groups with different interests in the community, and what one group may experience as a positive social impact, another group may experience as a negative impact. This duality will be pointed out in the impact assessment section of the report (Aucamp, 2022).
- Social impacts are not site-specific but take place in the communities surrounding the proposed development (Aucamp, 2022).

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Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	Without	3	2	4	3	27	2	Negative	M
	With	2	2	3	2	14	1	Neutral	
No-go	N/A	1	1	1	1	3	1	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

References (legal, scientific, social or other criteria)

1. Aucamp, I. 2022. *Social Impact Assessment Report for the p*roposed *development of 300MW solar PV plant in Northern Cape Province*. Equispectives Research & Consulting Services, Pretoria.

Impact reversibility/The degree to which the impact may cause an irreplaceable loss of resources

- Improper management of job seekers may have a negative impact on the landowner as they seek to address their employment needs.

Mitigations:

Goals:

- Avoid inconveniencing the landowner and adjacent property owners with incessant job seekers.
- Promote the use of local facilities to the professional team.

Objective(s) (including targets):

- Provide a platform for job seekers from the onset of the planning process through to the operational phase.
- Provide a list of accommodation facilities to professional team members, in close proximity to the proposed project.

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Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Applicant	Develop a job seeker database or integrate with an existing service provider in the adjacent towns, to ensure job seekers' details are captured. As positions become available, this database can be searched for suitable skills within the local populous before positions are outsourced. These measures will reduce the potential nuisance factor to the landowner, caused by job seekers reverting to visiting the proposed site of development. Following awarding of Preferred Bidder Status or securing of private offtake agreements, formalised commitments must be made to socio-economic initiatives that will benefit surrounding communities, including the compilation of a Detailed Labour Plan which must include details pertaining to skills development opportunities especially for the Youth and Women, bursary opportunities / learnerships and other educational facilities in the municipal area. The Plan must be supplied to the Local Municipality.
Promotion	Applicant	Furnish all professional team members are provided a list of service providers that they can make use of, when undertaking project & site activities; in close proximity to the proposed project site; to maximise the nett financial benefit to the surrounding community.

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Activity Group 3: Rezoning and landuse practices

Description of potential impacts

- Comments received from **Francois Taljaard**, Town Planner, Emthanjeni Municipality (**Table 12**); investigate rezoning of each site where development is to take place[1-3].
- Comments received from **Jacoline Mans**, Chief Forester, DAFF (**Table 12**); ask for assistance form the National Department of Agricultural, Forestry and Fisheries for approval from the Minister under the Act 70 of 1970, with respect to the land rezoning or leasing.
- Solar facilities may interfere with existing land uses. Unlike wind facilities, there is less opportunity for solar projects to share land with agricultural practices.
- Loss of habitat for agricultural use, if solar developments become exclusion zones for livestock and game.

Uncertainties & limitations with predicting this impact

- A rezoning application (to 'Special' or other appropriate zoning) will only be prepared and submitted to the national, provincial and local authorities if the proposed project attains preferred bidder status or private offtake agreements are secured, and the application to "lease" the land by the Department of Agriculture is declined.
- Land demarcated as agricultural land cannot be changed to another land use or leased without the supported recommendation under the Sub-Division of Agricultural Land Act 70 of 1970 (SALA).

Assumptions made when assessing the impact

- The proposed site and alternative sites are currently zoned as Agriculture and has historically been used as grazing for small game and livestock. It is further assumed that grazing of livestock within the developed footprint can be implemented effectively as a vegetation management tool.
- The developer has agreed to implement the proposed project in synergy with the current land use practices and not at the expense of them.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred	**Without**	3	3	4	3	30	**2**	**Negative**	**M**

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Alternative	**With**	2	2	3	2	14	**1**	**Neutral**	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	**Positive**	**N/A**

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

References (legal, scientific, social or other criteria):

1. Northern Cape Planning and Development Act, 1998.
2. Emthanjeni Local Municipality, Integrated Development Plan (IDP), 2016/2021.
3. Emthanjeni Municipality, Spatial Planning & Land Use, Management By-law, Northern Cape Province, GN No. 192 of 2015, Provincial Gazettes (Northern Cape), No. 1979 of 14th December 2015. Spatial Planning & Land Use Mgt Act No. 16 of 2013 (came into force on 01st July 2015).

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- The developer has agreed to accommodate the normal grazing activities within the solar PV footprints, by increasing the installation heights of the solar arrays. In turn, the livestock will act in a mutually beneficial role to manage vegetation growth beneath the panels. Hence, the vegetation community both within and outside the solar PV footprint should closely mimic one another, except for the exclusion of game, and no substantive loss of resources should occur.
- The fact that limited hard structures will be used, there is a high probability that the area will recover well following decommissioning of the plant.

Mitigations:

Goal: No commercial use of land in the absence of appropriate zoning or lease approval.

Objective(s) (including targets):

- To have the land zoned or leased for the multiple land use practices prior to commencement of the project.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Applicant	Submit a long-term lease application to the National Department of Agricultural, Forestry and Fisheries for approval from the Minister under the SALA (Act 70 of 1970).

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Avoidance	Applicant	A rezoning application (to 'Special' or other appropriate zoning) will be submitted to the national, provincial and local authorities if the proposed project attains preferred bidder status, and the lease application is declined.
Reduction	Applicant	To avoid penalties and / or fines the applicant must not commence with construction until the rezoning application has received a successful and / or positive status.
Avoidance	Applicant	Obtain the supported recommendation under the Sub-Division of Agricultural Land Act 70 of 1970 (SALA) land demarcated as agricultural land to another land use.
Reduction	Applicant	Ensure the grazing of livestock within the solar PV footprints is within the established grazing capacity of the area.

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Activity Group 4: Layout and design including consideration of alternatives

Description of potential impacts

- Comments received from **Jacoline Mans**, Chief Forester, DAFF (**Table 12**); investigate impact on riparian vegetation - permanent footprints can destroy sensitive habitats, including Riparian vegetation.
- Comments received from **Bonnie Schumann**, Senior Field Officer, Endangered Wildlife Trust (**Table 12**); these are potential areas for Critically Endangered Riverine Rabbits, investigate Riverine Rabbit impacts - permanent footprints can destroy sensitive habitats, including Riverine Rabbit habitat.
- The following concerns were identified by Barend Johannes Henning (De Aar Solar PV Project Phase 2 - Terrestrial Biodiversity Compliance Statement):
    - Human presence and uncontrolled access to the site may result in negative impacts on fauna and flora through poaching of fauna and uncontrolled collection of plants for traditional medicine or other purpose.
    - Site clearing & exploration activities for site establishment would have a negative impact on biodiversity if this was not conducted in a sensitive manner.
    - Permanent footprints or the construction of new service tracks can disturb immovable flora, especially plants of conservation concern., i.e. fence line, operations area, access roads, rack foundations, transformers and inverters, cables, substation and pylons.
    - Placement of high risk (pollution generating) activities within close proximity to a watercourse can cause water pollution.
    - Poor alignment of linear activities like roads, fences, pipelines or other cleared servitudes can increase runoff, cause erosion and sedimentation of aquatic habitats.
    - Changes in bat community, abundance and activity of bat species.
    - Alteration to commuting routes within the landscape as routes may be altered and some species may avoid the solar arrays all together, particularly the low-flying bat species.
    - Layout, alignments and design of permanent structures and roads can influence or redistribute surface water flow patterns.
    - Layout and designs can be disruptive to local migration by causing fragmentation.
    - Placement can be visually intrusive to sensitive receptors.
- Permanent footprints can disturb sites of historical significance, including graves.
- It has been suggested by Visser (2016) that collision mortality could be reduced at solar facilities by using 28 cm-spaced contrasting bands or 10 cm spatial gaps between solar panels. This enables birds, particularly waterbirds, to differentiate the expansive layout of panels as a solid structure, reducing the likelihood that they may try to land and collide with the panels. These recommendations should therefore be incorporated into new solar facilities until further research into panel design and layout suggests otherwise.

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- The layout of solar arrays should be placed to avoid bird flight paths between focal points such as water bodies, foraging and roosting sites.

Uncertainties & limitations with predicting this impact

- Maintaining due cognisance of the integrity and accuracy of the ecological survey, it should be stated that the ecological resources identified during the study do not necessarily represent all the ecological resources present on the property (Henning, 2023).
- To obtain a comprehensive understanding of the dynamics of communities and the status of endemic, rare or threatened species in an area, ecological studies should ideally be replicated over several seasons and over a few years. However, due to project time constraints such long-term studies are not feasible (Henning, 2023).
- Most threatened plant species are extremely seasonal and only flower during specific periods of the year (Henning, 2023).
- Most threatened faunal species are extremely secretive and difficult to survey even during thorough field surveys conducted over several seasons (Henning, 2023).

Assumptions made when assessing the impact

- The no-go areas defined by the specialists will effectively mitigate impacts to the environment, when the development footprints are located outside their boundaries.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	**Mitigation Action**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Acceptability**	**Status**	**Mitigation potential (to meet objectives)**
Preferred Alternative	**Without**	3	4	4	4	44	4	Negative	M
	With	2	2	3	3	21	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

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References (legal, scientific, social or other criteria):

1. Barend Johannes Henning. 2023. De Aar Solar PV Project Phase 2 - Terrestrial Biodiversity Compliance Statement– *Environmental Impact Assessment for the proposed Soventix Solar PV project: De Aar, Northern Cape Province.*

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Improper planning of the layout to accommodate sensitive receptors is likely to result in a significant reduction in biodiversity within the development footprints. Mobile species may be able to re-occupy the areas following decommissioning, but flora will be affected for a much longer time period.

Mitigations:

Goal: Avoid layouts & designs that will have negative impacts on the environment by avoiding identified sensitive receptors.

Objective(s) (including targets):

- To have preference given to those layouts and designs with the least negative impacts to the environment and that pose the most practicable option financially and technically.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Contractor Applicant	Ensure that the preferred environmentally friendly layout and design is inclusive of all environmental aspects and impacts and employs the necessary mitigations.
Reduction	Applicant	Special attention must be given to habitat of the Riverine Rabbit and layouts adapted accordingly.
Rectification	Contractor Applicant	Prior to the construction of any new roads, a search & rescue must be conducted by a suitably qualified specialist for protected fauna & flora and that of conservation concern, which must then be transplanted outside the works area in a comparative habitat type. Ascertaining similar habitat types may require soil sampling and analysis over and above above-ground similarities. High visibility flags must be placed near endemic, threatened, or protected plants that will not be translocated to avoid any damage or destruction of these species. Apply for the applicable permit(s) and or license to

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		translocate any protected, specially protected or indigenous plants. Any subsequent restricted activity involving, or picking, or cutting, disturbing, damaging or destroying any protected, specially protected or indigenous plants must comply with the applicable permit and/or license conditions. ECO to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near drainage areas. Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes. awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas, fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition etc.
Avoidance	Contractor Applicant	Ensure that suitable measures are employed to manage job-seekers, to avoid inadvertent impacts by trespassers on fauna & flora and affected landowners.
Avoidance	Applicant Contractor	Permanent and temporary construction footprints (including fences) must be designated and positioned away from the bat populations, where possible, as per bat baseline assessment. No activities within the Brak River – high bat activity zone (except for pylon construction) and other incidental roosting sites discovered prior to and during construction.
Manage	Applicant Contractor	The applicant is to investigate available and updated technologies to mitigate impacts on bats and avifauna, including but not limited to: use non-reflective material for the PV panels.
Avoidance	Engineer Applicant	Avoid placing high risk (pollution generating) activities within close proximity to a watercourse as they can cause water pollution.
Avoidance	Engineer Applicant	Layout, alignments and design (including poor alignment) of permanent structures and roads should not influence or redistribute surface water flow patterns, increase runoff,

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		cause erosion and/or sedimentation of aquatic habitats.
Avoidance	Engineer Applicant	Have more than one layout and design, and assess each alternative objectively, so as to avoid disruption to local migration through fragmentation.
Avoidance	Engineer Applicant	Ensure that none of the layout & designs of permanent footprints will disturb sites of historical significance, including graves.
Reduction	Contractor Applicant	Have minimal placements that can be visually intrusive to sensitive receptors.

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Construction Phase

Activity Group 1: Site establishment

Description of potential impacts

- Light pollution impacts both negatively and positively on bats and can alter species composition, foraging patterns, reproductive success and predation rate (Stone *et al*. 2015). Research has shown that there are open-area foraging bat populations that may benefit from feeding on insects attracted to artificial light sources (Jones *et al*. 2009, Voigt *et al.* 2016). Conversely, if artificial lighting is located close to roosting sites, the foraging emergence times of the bats can be delayed (Toussaint, 2023).
- Construction activities (i.e. clearing and grading) have the potential to directly impact, that is damage / injure and destroy / kill, local fauna and flora. (The impacts are exacerbated when the species affected are classified as protected, sensitive, rare, or threatened and endangered). They also lead to habitat loss if fauna.
- Increased risk of alien plant invasion to the detriment of the local ecology and agricultural potential.
- Harvesting of indigenous plants for muthi firewood; and poaching of animals.
- Placement of high risk (pollution generating) construction activities within close proximity to a watercourse can cause pollution.
- Poor placement or alignment: Sedimentation of the watercourse can result from the erosion of exposed areas adjacent to or within the watercourse, including linear activities like pipelines or other cleared servitudes.
- Incorrect placement of structures can influence or redistribute surface water flow patterns, cause erosion and sedimentation.
- Placement of construction areas including toilets can be visually intrusive to sensitive receptors.
- Construction footprints can disturb sites of historical significance, i.e. Graves.

Uncertainties & limitations with predicting this impact

- The exact position of immovable flora is not known, and the successful identification and positioning of affected species and specimens will be dependent on the competence and thoroughness of the appointed botanist at the time of clearing & grubbing.

Assumptions made when assessing the impact

- The defined sensitive areas and delineated watercourses are accurate and relatively exhaustive, which has informed decision-making on the best site alternative and layout extent.
- The actual placement of infrastructure and laydown areas will confirm to the generated layout map.

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Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
2	**Without**	3	4	4	4	44	3	Negative	M
	With	2	2	2	3	18	2	Neutral	
No-go	**N/A**	1	1	1	1	3	1	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

References (legal, scientific, social or other criteria)

1. Cory Toussaint, D. 2023. Chiropteran Specialist Report for the Proposed Soventix Solar Power Plant, Hanover, Northern Cape.
2. Barend Johannes Henning. 2023. De Aar Solar PV Project Phase 2 - Terrestrial Biodiversity Compliance Statement – Environmental Impact Assessment for the proposed Soventix Solar PV project: De Aar, Northern Cape Province.

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Incorrect placement of development footprints in sensitive habitats can affect flora & fauna over lengthy time frames, even altering the species assemblages.

Mitigations

Goal:

- No nett loss in biodiversity through site establishment activities.
- No degradation of watercourses, directly or indirectly.

Objective(s) (including targets):

- To select the most environmentally suitable site establishment footprint within technical capabilities.
- To reduce in situ losses of protected flora & fauna and of conservation importance.
- To reduce artificial lighting impacts.
- To ensure that infrastructure that impedes surface water flows does not negatively affect the area's hydrological patterns leading to erosion and / or sedimentation of receiving watercourses.

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- To reduce the visual impact of all structures as far as practicable.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Contractor	Utilise down lighting, with a bulb type that has a lower insect attractant value. If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), and the use of lighting at night should be kept to a minimum, so as not to unnecessarily attract invertebrates to the solar facility and possibly their avian predators, and to minimise disturbance to birds flying over the facility at night. Anthropogenic impacts must be minimized to reduce impacts on nocturnal species, including but not limited to reduced lighting that may influence bat foraging behaviour.
Reduction	Contractor	A search and rescue must be undertaken of any and all footprints that will be temporarily or permanently affected during construction of the development footprint. All fauna and flora that are protected or of conservation importance must either be cordoned off and protected or translocated outside of the site establishment and solar PV footprint, into habitats of a similar nature. Avoid direct contact with fauna, through clearing. and grading as it can cause injury or death. Any fauna threatened by the construction activities should be removed to safety by an appropriately qualified individual following the procurement of any relevant permits (where applicable). The destruction of habitat during construction should also be strictly contained within the direct footprint of the development. Water bodies and nests should be buffered by 1km radius or buffer zones recommended by relevant specialists.

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		The use of lay-down areas within the footprint of the development should be used where feasible during construction, to avoid habitat loss and disturbance to adjoining areas. No construction activity should occur near to active raptor nests. If there are active nests near construction areas, they should be monitored until the birds have finished nesting and the fledglings left the nest.
Reduction	Applicant Contractor	A plan should be developed for control of noxious weeds and invasive plants that could occur because of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the way weeds spread, and methods for treating infestations. Require the use of certified weed-free mulching. Prohibit the use of fill materials from areas with known invasive vegetation problems. The spread of invasive non-native plants should be avoided by keeping vehicles and equipment clean and reseeding disturbed areas with native plants. Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish. Alien invasive vegetation recruitment must be controlled within and along the fence lines of the solar PV footprints. Manual control measures are preferred, but where herbicides are used, they must be those endorsed & selective for the target species with the lowest environmental toxicity. Applicant shall collect and destroy all seeds of weed, invader and alien plant species occurring within disturbed and/or rehabilitated areas. Applicant shall immediately uproot, cut, or debark weed, invader and alien plant species upon being identified. Areas disturbed during construction shall be monitored for the recruitment of weed, invader and alien plant species and controlled immediately upon being found to occur.

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		Recruitment of alien and invasive plants must be controlled to ensure they do not seed and propagate (both declared weeds and those that are outside of their natural distribution).
Avoidance	Applicant or contractor	The harvesting or collection of any natural product(s) from the environment is strictly forbidden. Soventix must have a zero-tolerance policy regarding poaching, and make it clear what the punishment and consequences would be. All poaching incidences must be reported to the local police. "Problem" animals must be handled with assistance from the provincial conservation authority including the implementation of the Norms and Standards for the management of damage-causing animals in South Africa GN 749 of 2016). Any potentially dangerous fauna such as snakes or fauna threatened by the construction activities should be removed to a safe location by an experienced and qualified handler. Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist or certified pest control officer specialising in environmentally friendly products. With the exception of search and rescue operations no mammal, bird, reptile, invertebrate or fish shall be intentionally caught, hunted or poached, within the development footprint and no-go areas.
Avoidance	Contractor Applicant	A construction site layout plan must be developed by the contractor and approved by the SEO to ensure that all construction related sites are located outside sensitive environments, including no-go areas and buffer zones. Furthermore, those construction related sites or activities

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		with the greater risk or potential for causing pollution or harm to the receiving environment, including but not necessarily limited to laydown areas, material stockpiles, toilets, waste skips and stores, must not be within close proximity to the aforesaid sensitive environments, i.e. these construction related sites or activities must not, as far as is practical, be located on the watercourse-side of any construction camp or area demarcated for construction activities. The duration of construction activities at each pylon site should be minimised as far as is practical.
Avoidance	Contractor	The site establishment footprint must be clearly demarcated on the ground to ensure that no construction creep results toward any watercourses or defined sensitive areas. Permanent and temporary construction footprints must be designated, and sensitive terrestrial & aquatic habitats demarcated as no-go areas during construction,
Avoidance	Contractor	Defined sensitive areas must be demarcated as no-go areas that must be strictly enforced.
Avoidance	Contractor	Activities with high pollution potential must not be located on the watercourse-side of established footprints, and adequate provision must be made to contain any waste streams from these activities.
Avoidance	Contractor	Placement of infrastructure and laydown & stockpile areas must be done so as not to negatively affect surface water runoff in a way that leads to erosion and export of material to be deposited in any watercourses. All electrical connectors and other items vulnerable to floodwater should be located at a minimum level of the maximum flood depth plus a 0.3m freeboard above ground level to ensure that they are protected from the design flood event.
Avoidance	Contractor	Ensure adequate ablution facilities are provided and are screened-off to reduce visual obtrusiveness.
Avoidance	Contractor	No site establishment must be undertaken close to any identified heritage sites. These sites must be cordoned off and protected to avoid accidental damage.
Avoidance	Contractor	A Storm water management plan must be developed to *inter*

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		alia limit contact with contaminated areas, laydown areas and areas prone to erosion.
Avoidance	Contractor	The Contractor shall locate the construction camp on existing disturbed or the least sensitive sites above the 1:100 year flood line or further than 100m from the edge of a watercourse, whichever is greatest.
Avoidance	Contractor	The contractor shall restrict the following activities to the construction camp: - Sanitation, - Waste storage, - Parking, - Storing hazardous materials, - Emergency vehicle & plant repair & maintenance as far as practicable, - Re-fuelling, - Ready-mix concrete truck cleaning area - Material stockpiles (excluding works within the Brak River for the construction of the pylon), and - Lay down areas.
Reduction	Contractor	Establish and implement an Integrated Waste Management Strategy including avoidance, reduction, re-using, recycling and disposal, i.e. the production of hazardous waste can be **avoided** by providing drip trays, **reduce** waste by using the correct quantities, **re-use** concrete rubble as back fill or **recycle** steel off-cuts and **dispose** of non-hazardous solid waste at a registered municipal dump site. Keep accurate records of waste generated by type.
Reduction	Contractor	Induct all labourers on the waste management strategy and enforce it through regular (at least weekly) toolbox talks.
Reduction	Contractor	Separate general, recyclable, natural (vegetation and soil/rock) and hazardous waste, and demarcate different containers for different waste types using colour codes.
Avoidance	Contractor	Do not litter, burn or bury waste on any property.
Avoidance	Contractor	A dustbin shall be available at each work front during working hours.
Avoidance	Contractor	The contractor shall dispose of general waste at a registered municipal dump site.
Avoidance	Contractor	The contractor shall return used oil to the supplier or an oil recycling company.
Avoidance	Contractor	Washing of construction plant and mechanical equipment

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		including brushes shall not occur on site or in a watercourse but shall be restricted to the main construction camp where adequate containment measures are in place.
Avoidance	Contractor	The contractor shall contain contaminated water from washing brushes in a conservancy tank until sufficient volume warrants disposal by a registered hazardous waste management company.
Reduction	Contractor	Remove ineffective danger tape/netting that has begun to litter the site or surrounding areas.
Avoidance	Contractor	Designate a temporary waste storage area, enclose it in a fence that cannot be breached by fauna, and provide sufficient scavenger proof dust bins with black bags inside the construction camp.
Reduction	Contractor	Imported material stockpiles shall be located outside (to also avoid driving on top of them) the demarcated disturbed wetland system and on a disturbed site or other site approved by the ECO as a stockpile area.
Avoidance	Contractor	The contractor shall provide sufficient (1:10) chemical toilets, unless existing facilities can be used.
Avoidance	Contractor	Chemical toilets shall be located in the shade further from any watercourse, at least 100m from any watercourse.
Avoidance	Contractor	Use chemical toilets that contain the sewerage in a closed and removable 'tank', i.e. do not use open drums. Environmentally friendly toilets should also be considered e.g. E-loo's.
Avoidance	Contractor	All persons shall use only the provided facilities for sanitation.
Avoidance	Contractor	Chemical toilets shall be kept hygienic and cleaned daily.
Avoidance	Contractor	The contractor is prohibited from discharging wastewater, including domestic water from sanitation facilities, and grey water from washing equipment or plant into a watercourse.
Reduction	Contractor	Re-fuelling with a mobile fuel bowser shall take place outside any watercourse.
Avoidance	Contractor	The contractor shall store hazardous material within a secure, safe and bunded facility at the construction camp to ensure spillages do not enter any aquatic environments.
Avoidance	Contractor	Use drip trays for refuelling, repair/maintenance work and all stationary construction plant and equipment that can leak, such as TLBs, compressors and generators.
Reduction	Contractor	Construction plant and equipment shall be kept in a good

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		state of repair to reduce hydrocarbon leakages and emissions.
Reduction	Contractor	Emergency repairs or maintenance shall include procedures to minimize contamination of the ground.
Avoidance	Contractor	Remove topsoil from the area within the perimeter of the construction camp and stockpile separately for use during rehabilitation of the site. Any topsoil removed during the establishment of parking areas, temporary roads, during excavation, or any other cleared areas, should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
Avoidance	Contractor	Do not cover spills with virgin soil. It merely increases the disposal cost for a greater volume of hazardous waste.
Rectification	Contractor	Immediately remove contaminated soil to the depth of penetration and temporarily store in a designated solid hazardous waste container until sufficient volume warrants disposal at a registered hazardous waste dump site. Alternatively, onsite treatment of contaminated soil should be considered with a registered hazardous waste management company.

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Activity Group 2: Access control including fencing of perimeter

Description of potential impacts

- Electric fences can cause death or injury to mammals.
- Fences and walls aligned perpendicular to the contour can increase surface water runoff, cause erosion and sedimentation of a watercourse.
- Restricted access can deny the practice of similar, neighbouring agricultural land uses like grazing.
- Fencing around solar power plants limit the movement of wildlife and also has a resulting impact on the change in habitat of the land particularly if it excludes herbivores that would have previously grazed and browsed the vegetation (Toussaint, 2023).
- Damage to farm infrastructure: If fences are not kept clear of debris, there is a risk that it can affect the waterflow into dams in the area, which is critical in a dry area like the Karoo (Aucamp, 2022)
- Restricted access and management can prevent natural drivers, such as selective grazing pressures and fire from influencing species composition within the local plant community.
- Fences can cause habitat fragmentation.
- High walls and fences can be visually intrusive by visibly altering the natural landscape.
- Increased security can protect the assets from theft.

Uncertainties & limitations with predicting this impact

- The long-term impacts associated with fencing the solar PV footprint off, and only allowing grazing pressure from sheep and not the full suite of wildlife, as on the remainder of the property, is unknown.

Assumptions made when assessing the impact

- A wire mesh security fence, such as Clearvu^{TM} fencing will not significantly alter existing surface water (rainfall runoff) flow patterns if accumulating debris is removed regularly.
- The fencing will only be electrified at the top as a security measure against human theft and trespassing and is unlikely to pose a significant threat to wildlife (birds sitting on the wire are not earther and hence, not at risk of electrocution).
- The Clearvu^{TM} or similar is designed as such so as not to create a visual intrusion and allows almost unabated views through the fence.

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Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	3	3	3	3	27	2	Negative	H
	With	2	3	3	2	16	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Reference (legal, scientific, social or other criteria)

1. Cory Toussaint, D. 2023. Chiropteran Specialist Report for the Proposed Soventix Solar Power Plant, Hanover, Northern Cape.
2. Barend Johannes Henning. 2023. De Aar Solar PV Project Phase 2 - Terrestrial Biodiversity Compliance Statement – Environmental Impact Assessment for the proposed Soventix Solar PV project: De Aar, Northern Cape Province.

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Fencing creates an exclusion zone, other than for the farmed livestock, that can be manually manipulated in and out of the fenced areas, as a vegetation management tool. Other large non-flying or burrowing species will have limited utilisation of this habitat until the plant is decommissioned.

Mitigations

Goal:

- Maintain the current agricultural potential of the fenced areas.
- Ensure the fence installation does not cause mortality of indigenous wildlife.
- Ensure fencing does not affect the surface hydrology of the area, nor cause erosion.

Objective(s) (including targets):

- To utilise the fenced areas as controlled grazing areas for livestock.
- To install electric fencing high enough above ground that mammals are not at risk.
- To regularly maintain and monitor fence lines to reduce impacts on surface hydrology flow patterns.

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Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Applicant Operator	Ensure electric strands are only installed along the top of the fence line to mitigate unauthorised human access to the area, without posing a threat to fauna. If the road reserve is to be fenced, then the live strands should be on the inside of the fence or more than 30cm from the ground. Fencing options must be utilised that provide adequate security to the plant but will not result in animal mortality or require onerous vegetation clearing. ClearvuTM type fencing is preferred over electric fencing.
Reduction	Contractor	Avoid using fences aligned perpendicular to the contour as well as dirt roads which increase surface water runoff, cause erosion and/or sedimentation of a watercourse.
Reduction	Contractor	Fence lines must be regularly cleared of accumulating debris, to allow surface water to flow uninhibited across the development footprint.
Reduction	Contractor / Landowner	Allow the landowners sheep to access the fenced-off footprint at the calculated grazing capacity (see Grazing Capacity report by F. de Wet, 2017) and return periods.

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Activity Group 3: Hunting Activities

Description of potential impacts

- There is a risk of workers being in danger from stray bullet or hunting incidents during hunting activities on the farm (Aucamp, 2022).

Uncertainties & limitations with predicting this impact.

- None Known.

Assumptions made when assessing the impact.

- Active hunting takes place on the property.

Assessment ((Extent + Magnitude+ Duration) x Probability = Significance):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	3	3	4	3	30	3	Negative	M
	With	3	2	4	2	18	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources.

- Soventix must obtain a schedule of hunting activities that might occurring on the farm to keep the workers on site alert.

Mitigations

Goal: To ensure safety of workers on site.

Objective(s) (including targets):

- Zero hunting incidents on the incidence register.
- Appointment of a suitably qualified HSO and compliance monitoring against the OHSA (Act 85 of 1993).

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**

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Reduction	Applicant/Contractor (HSO)	Soventix must develop a protocol regarding hunting activities on neighbouring properties together with the owners. Soventix must be informed about any planned hunting activities at least 48 hours before it commences, this means that Soventix should invest in its relationship with its neighbours to ensure communication channels remains open.

Activity Group 4: Contractor's employees (staff conduct, movement)

Description of potential impacts

- Employees can harvest indigenous plants for muthi, firewood and poach animals.
- Littering can pose a risk of suffocation to wild animals (littering is likely to be more prevalent at designated eating / rest areas).
- Employees can burn fires to keep warm and runaway fires can destroy fauna and flora.
- Excessive open-air ablutions can kill plants & cause unpleasant odours.
- Litter can get washed into storm water drains and watercourses.
- Contamination of the watercourse from improper sanitation (bathing).
- Noise from Contractor's employees (when communicating verbally and / or when playing radios / watching TV, etc.) can be a nuisance.
- Work related activities extending beyond the footprint - called construction creep - can disturb habitats.
- New employment opportunities and influx of workers could disrupt public transport.
- There may not be enough local accommodation.
- Littering is visually intrusive.
- Daily transporting of employees, materials and equipment will have an impact on existing road users (Neethling, 2022).
- There are concerns that poaching incidents may increase.
- Concerns about social disturbance and community safety (including loitering at construction site).
- Potential social pathologies (social unrest).

Uncertainties & limitations with predicting this impact

- Availability of accommodation in the adjacent towns to accommodate staff is unknown.

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Assumptions made when assessing the impact

- It is assumed that the staff related impacts can be effectively managed and mitigated by appointing a full-time Health & Safety and Environmental Officer for the duration of construction.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	3	3	2	4	32	3	Negative	H
	With	2	2	2	2	12	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility/The degree to which the impact may cause an irreplaceable loss of resources

- Effective human resource management will help ensure impacts of a significant nature do not occur ensuring no irreplaceable loss of resources.

Mitigations

Goal: Reduce human induced impacts and nuisance factors.

Objective(s) (including targets):

- To enforce sound housekeeping practices throughout the construction process.
- To ensure use is made of the supplied facilities for sanitation and waste management.
- To ensure that construction only takes place within the designated footprint.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Zero tolerance policy must be implemented toward harvesting any natural products from the veld.
Avoidance	Contractor	Adequate waste receptacles must be available, including

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		those that track with the active work fronts, to ensure effective waste management. Follow housekeeping rules in order to avoid littering (littering is likely to be more prevalent at designated eating / rest areas).
Avoidance	Contractor	A no fire policy must be instituted to avoid the creation of runaway fires.
Avoidance	Contractor	Adequate toilets must be available, including tracking active construction areas. Chemical or E-loo toilets shall be kept hygienic and cleaned daily to avoid unpleasant odours.
Avoidance	Contractor	No staff must be permitted outside the designated construction area, to avoid contamination of watercourses and littering.
Avoidance	Contractor	Noise generation must be managed, including the use of radios and other music playing appliances. Noise generation must be managed, including the use of radios and other music playing appliances. Vehicles and plant must be in a good state of repair to limit noisy operations. All equipment must not emit nuisance or disturbance causing noise.
Avoidance	Applicant Contractor Operator.	A suitable off-site platform must be created to accommodate job seekers, that will avoid them coming to site in search of employment.
Avoidance	Applicant Contractor Operator.	Security must be appointed throughout construction to discourage criminal elements from site. Soventix should work with existing farmers' security groups and farmers' associations to create a farm access protocol for everybody that need to access the properties, and a safety plan. Soventix should also become a member of these forums. All contractors and employees need to wear photo identification cards.

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		Soventix and its contractors must develop an induction programme that includes a Code of Conduct for all workers (including sub-contractors). Any person that does any work on site must sign the Code of Conduct and presented with a copy. The Code of Conduct must include the following aspects: • Respect for local residents, their customs and property. • Respect for farm infrastructure and agricultural activities. • No hunting or un-authorised taking of products or livestock. • Zero tolerance of illegal activities by construction personnel including: prostitution; illegal sale or purchase of alcohol; sale, purchase or consumption of drugs; illegal gambling or fighting. • Compliance with the Traffic Management Plan and all road regulations; and • Description of disciplinary measures for violation of the Code of Conduct and company rules. If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the beginning of their contract, they will face disciplinary procedures that could result in dismissal. Vehicles should be marked as construction vehicles and should have Soventix or the contractor's logo clearly exhibited. Entry and exit points of the site should be controlled. If a security company is used, their schedules should be communicated to the landowners.
Reduction	Contractor	Adequate accommodation and transport must be provided for all staff to reduce impact on the local towns and road networks.
Reduction	Applicant / Contractor / Operator (CLO).	Ensure effective communication and engagement with staff and surrounding community via *inter alia* the appointment of a suitably qualified CLO.

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Activity Group 4: Construction of permanent & temporary access roads

Description of potential impacts

- A formalised road network (including prioritisation of existing roads) will protect flora and fauna from off-road driving, and improves the visibility of fauna to drivers.
- Dirt roads can increase surface water runoff, cause erosion and sedimentation of a watercourse.
- The linear alignment of all roads can redistribute surface water flow patterns.
- Storm water outlets and culverts, if improperly or inadequately protected, can cause erosion to the receiving environment.
- Dust entrainment from unsurfaced roads can result in unacceptably high dust fallout.
- Construction of new roads reduces the grazing potential of the land.
- Roads can act as firebreaks and prevent natural drivers, such as fire from influencing species composition within the local plant community.
- Roads that alter surface water flow patterns within the local landscape will redistribute the availability of run-off as a source of water to plants - this impact is more significant in arid areas.
- Additional roads add a visual impact to the landscape.
- Access to site is required for construction purposes.
- Roads with storm water outlets can channel litter, oil and fuel spills into a watercourse, causing water pollution.
- Expansive, cleared areas are vulnerable to soil erosion.
- Water used to control dust on dirt roads can cause erosion if too much water is sprayed.
- Cleared and compacted areas without grass tussocks to impede surface water run-off, can erode.
- Rehabilitated sites are susceptible to erosion.
- Topsoil can be mixed with cement, subsoil or pulverised by trucks.
- Soil will be required for road maintenance.
- During the construction phase and maintenance of power lines, substations and service roads, some habitat destruction and alteration inevitably takes place. These activities have an impact on birds breeding, foraging and roosting in close proximity to the servitude through the modification of habitats and disturbance, particularly during breeding activities.
- It is anticipated that only the delivery of the solar panels and the personnel trips will influence the existing traffic operations on the affected road. The construction machinery will only have a traffic impact on delivery to and collection from the site and are therefore regarded as negligible.

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Uncertainties & limitations with predicting this impact

- The preferred footprints have pre-existing roads, the number of additional tracks is uncertain.

Assumptions made when assessing the impact

- Irrespective of the number of additional tracks required for construction, existing roads will be used and the creation of new tracks will be below the listed activity thresholds.
- Limited temporary access roads will be constructed and maintained as two-tracks and not graded or paved.
- Erosion is a natural phenomenon and cannot be prevented without permanent and / or hard structures. It can, however, be controlled and reduced.

Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	**Mitigation Action**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Acceptability**	**Status**	**Mitigation potential (to meet objectives)**
Preferred alternative	**Without**	3	4	4	4	44	2	Negative	H
	With	2	2	2	3	18	2	Neutral	
	With	2	2	2	3	18	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

.High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Lost topsoil cannot be replaced, given the geological time scale required for its creation through the weathering of parent material / rock, unless imported from elsewhere.
- In the case of degraded or lost soil, organic modifications to in situ material will need to be undertaken to return fertility to the affected areas and promote vegetation growth.
- Grading of existing farm tracks will increase the construction footprint / impact and increase exposure to dust emissions and surface water runoff induced erosion; effects of which if not remediated will persist indefinitely.

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- The extent of reversibility is dependent on the severity of the erosion, including the nature of the remaining *in situ* material, the amount of soil that has been exported from a site and whether or not the exported soil is recoverable. For example, soil washed from a gravel road into a mitre drain can be graded back onto the surface of the road, whereas soil that is washed from a gully into a water course is not recoverable and the source cannot be re-instated without significant intervention and cost. Although erosion has the potential to irreversibly change the relief, eroded sites can be stabilized through rehabilitation measures.

Mitigations

Goal:

- Reduce the creation of new roads and ensure the stability of existing roads.
- Existing roads to be utilised.

Objective(s) (including targets):

- To prioritise the use of existing road networks.
- To discourage the creation of new tracks.
- To manage dust entrainment on access roads which may not exceed the thresholds stipulated in the National Dust Control Regulations.
- To mitigate incidental impacts associated with road and road usage.
- To reduce any deleterious effects to existing road users.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Existing roads must be used to avoid additional impacts on the fauna & flora of the area.
Control	Applicant Contractor.	The alignment of fences or roads and the placement of potential impediments, such as walls, laydown & material stockpile areas must not alter surface water runoff patterns (i.e. impede or increase surface water runoff) in a way that will cause ponding or erosion and sedimentation of a watercourse.
Reduction	Contractor	Protect all areas (including rehabilitated areas) susceptible to erosion by installing all the necessary, temporary and / or permanent mechanisms for controlling / diverting storm water run-off, dissipating water energy and encouraging infiltration as soon as possible. All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any

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		energy in the water which may pose an erosion risk. Ensure storm water run-off is adequately controlled on disturbed sites before rehabilitating them (ripping, replacing the topsoil and mulching/brush packing), i.e. cut-off berms.
Reduction	Contractor	Grading of existing farm roads must not be promoted, but farm tracks must be utilised as far as possible. Sediment traps may be necessary to prevent erosion and soil movement if there are topsoil or other waste heaps present during the wet season. The Contractor shall monitor the rehabilitated servitudes for the duration of the contract defects and liability period for signs of erosion.
Rectification	Contractor	Correct any cause of erosion at the onset thereof by controlling / diverting storm water run-off, immediately repairing and stabilizing / rehabilitating impacted areas in the most appropriate manner.
Reduction Avoidance	Contractor	Dust suppression must be carried out on access roads where high dust entrainment is evident. To reduce water usage, a suitable soil binder must be used in dust suppression activities. Excessive water usage to control dust on dirt roads can cause erosion and lead to hazardous conditions for road users.
Avoidance	Contractor	The contractor shall obtain material from the on-site approved borrow pits or from a licensed, commercial borrow pit, if the quality of material sourced from on-site borrow pits is unsuitable.
Avoidance	Contractor	The Contractor is prohibited from driving on topsoil stockpiles and windrows. Any topsoil removed during the establishment of parking areas, temporary roads, during excavation, or any other cleared areas, should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species. It must also be protected from vehicular and construction impacts.

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		All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.
Avoidance	Contractor	Topsoil is to be used for rehabilitation only.
Avoidance	Contractor	Topsoil shall be windrowed separately from the subsoil and opposite the working side of the works area.
Avoidance	Contractor	Do not mix topsoil with cement and / or subsoil or let it be pulverised by trucks.
Avoidance	Contractor	Do not use too much water straight from the nozzles to control dust on dirt roads as it can cause erosion.

Activity Group 5: Transport on site & accommodation of traffic (including parking areas)

Description of potential impacts

- Parking and driving carelessly can increase collisions with mammals, birds, reptiles, amphibians and insects – roadkill as well as potential impact on traffic safety and increase in accidents with other vehicles or animals.
- Potential congestion and delays on the surrounding road network.
- Designated parking areas will protect local flora and fauna by reducing construction creep.
- Hardened surfaces in parking areas with storm water outlets can channel litter, oil and fuel spills into a watercourse, causing water pollution.
- Contamination from spills when refuelling, parking, driving, repairing, washing, and operating plant or equipment nearby or within the watercourse.
- Cleared or dirt parking areas are susceptible to oil and fuel spills from leaking vehicles, causing soil pollution.
- Driving can compact soil stockpiles.
- Topsoil can be pulverised by trucks.
- Driving on dirt roads at speed in dry, windy conditions can generate dust.
- Construction plant can generate noise.
- Dust may be generated when transporting, handling and stockpiling material / cement in windy conditions.
- Dust can smother plants growing on the verge of gravel access roads.

Uncertainties & limitations with predicting this impact

- The amount of construction plant and vehicles is uncertain.

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Assumptions made when assessing the impact

- That the largest impact by vehicles will be the delivery by large trucks of all the infrastructure and equipment.
- Smaller vehicle will have a lower impact and require less space for parking etc.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	4	4	3	4	44	3	Negative	M
	With	4	2	2	3	24	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Injudicious placement of parking areas can result in the removal of protected flora.
- Dust fallout adjacent to haul routes and roads may result in only resilient vegetation persisting – enforcing an "edge effect".

Mitigations

Goal: Reduce impacts associated with transport and parking areas.

Objective(s) (including targets):

- To ensure that dust fallout rates resulting from transport does not exceed legal limits.
- To ensure parking areas are located in suitable areas that do not affect protected flora.
- To reduce contamination of soil from leaking plant and vehicles and upon occurrence is remediated promptly.
- To reduce nuisance impacts from transporting vehicles.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**

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Reduction	Applicant Contractor	Drivers shall adhere to the relevant speed limit(s) (ON the existing road network) at all times and restrict their movements to the existing and / or approved roadway or servitude. The speed limit on the property shall be 40 km/h and 30km/h within the development footprint. A register must be maintained of all animal mortalities recorded on the property and localised access roads. All road kills within the development footprint and directly adjacent properties must be recorded to monitor and target a decreasing trend aiming for zero incidence.
Reduction	Applicant Contractor.	It is anticipated that only the delivery of the solar panels and the personnel trips will influence the existing traffic operations on the affected road. The construction machinery will only have a traffic impact on delivery to and collection from the site and are therefore regarded as negligible. Delivery & collection from the site need to take place in bulk and / or around the same time, in order to minimally affect the existing traffic operations. Stagger delivery trips and schedule deliveries outside of the peak traffic periods. Staff trips should also occur outside of the peak hours where possible.
Reduction	Contractor	Designate parking areas in order to protect local flora and fauna and the injudicious driving off-road.
Remedial	Contractor	Oil & fuel spills on roadways and parking areas must be removed to depth of penetration as soon as possible after their discovery and placed in a designated hazardous container for safe disposal.
Avoidance	Contractor	Drip trays must be placed under all plant that is parked overnight and extended periods not in operation. Construction plant and equipment shall be kept in a good state of repair to reduce hydrocarbon leakages. Ensure vehicles are assigned daily check lists including checks for leaks. Any leaks must be attended to as a matter of

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		urgency. All transport/heavy vehicles standing for prolonged periods need to have suitably sized (surface area and storage capacity)
Avoidance	Contractor	Drip trays can be filled with hydrophobic hydrocarbon absorbent material to avoid content being leached out during rainfall events. The above-ground storage of fuel must be suitably bunded to 110% of its content and covered with a roof to avoid rainwater ingress.
Avoidance	Contractor	No servicing or washing of vehicles or plant may take place in parking bays, and all servicing must be done off-site, no service or wash-bays are to be constructed on site.
Avoidance	Contractor	Emergency breakdowns in the parking areas or along roads, must be addressed after adequate pollution containment measures have been implemented including but not limited to drip trays and spill kits.
Avoidance	Contractor	Refuelling of vehicles and plant may only take place at a designated and permitted (from local Fire Chief) fuel storage tank or mobile fuel bowser, under the guidance of a Specific Operating Procedure (SOP) that limits spillage and addresses remedial actions in the event of a spillage.
Avoidance	Contractor	Excessive vehicle movement, on highly windy days must be avoided and / or additional dust suppression exercised, including transport, and off-loading of dispersive materials. We suggest that the contractor take into consideration predicted wind speeds from the local weather station when planning construction-related activities with a high risk of generating dust. Dust suppressant must be prioritised for the drilling activities
Reduction	Contractor	Vehicles and plant must be in a good state of repair to limit noisy operations.

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Activity Group 6: Sourcing & management of water (for drinking, sanitation & construction activities)

Description of potential impacts

- Uncontrolled abstraction from a watercourse or aquifer (borehole) can reduce the natural reserve required for ecological function and downstream users (including irrigation), such as when the demand for water during construction exceeds the permissible allocation.
- Water required for human consumption and construction can be used excessively / wastefully.
- Water used to control dust on dirt roads can cause erosion if too much water is sprayed from the nozzles.
- Untreated water can cause health problems when drunk by staff.
- Open water in arid and semi-arid environments (such as in the Nama-Karoo) may be an important resource influencing survival, resource use, distribution and activity of insectivorous bats (Korine et al. 2016).
- It is important that areas with low lying depressions where water pools during the autumn and summer rainfall season are not altered as they may be important areas not only for bats to drink and forage but also for socialising.

Uncertainties & limitations with predicting this impact

- None.

Assumptions made when assessing the impact

- It is assumed that the sustainable yield of the boreholes will suffice for the needs of the construction process and potable water requirements.
- The permissible groundwater abstraction limits stipulated in the Geohydrology Assessment are sustainable and will not result in deleterious effects to the aquifer.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	3	4	3	4	40	4	Negative	L
	With	2	2	2	2	12	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

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High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Excessive abstraction of groundwater from the available boreholes can deplete the underground resource affecting other abstraction points on this property and adjacent landowners, limiting water supply to livestock and domestic needs.

Mitigations

Goal: Ensure sustainable water utilisation from existing boreholes.

Objective(s) (including targets):

- To ensure abstraction rates within the determined sustainable yield.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Do not overproduce from existing or propose boreholes and ensure that water level monitoring of boreholes within a 1.5km radius of the pumping borehole is undertaken. Water meters must be installed on all boreholes to ensure that utilisation rates are measured and monitored and do not exceed the permissible limits. If a decline in water levels is noted in all boreholes, as a result of pumping, the abstraction rate should be lowered to prevent aquifer depletion.
Avoidance	Contractor	All water bowsers must maintain logbooks in which quantities used for construction and dust suppression are recorded.
Avoidance	Contractor	Water bowsers implementing dust suppression, must determine optimal rates of application to ensure over-wetting does not occur.
Reduction	Contractor	An environmentally friendly water-soluble dust control additive / binder must be added as an additive to the water used for dust suppression. The additives generally assist with surface stabilization thereby significantly reducing water usage.
Avoidance	Contractor	Sampling of water destined for human consumption must be

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		submitted to a laboratory accredited for the water quality elements specified in SANS 241:2015 and/or a WUL, at the specified time intervals, to ensure compliance with the minimum standards. Should elements of the water not comply, the water must be treated to ensure no acute or chronic health risks.

Activity Group 7: Sourcing & management of building material / sand

Description of potential impacts

- Open excavations and drill holes can trap terrestrial fauna causing injury or death, including snakes.
- Exposed areas from sand mining can erode and cause sedimentation of watercourses.
- Borrow pits can trap surface water runoff or expose the water table.
- Soil mining degrades the landscape, making it unsuitable for certain land uses like agriculture.
- Sand mining destroys natural habitats and creates visibly intrusive scars in the natural landscape.
- Areas that are deprived of their soil through mining, limits ecological function and land capability to generate ecosystem goods and services and tangible economic benefits including income from conservation or farming.

Uncertainties & limitations with predicting this impact

- There is uncertainty as to the actual quantities of sand required for the project (although assumed to be very low) and whether or not the existing borrow pits will meet the quality of material required.

Assumptions made when assessing the impact

- As concrete will likely be purchased as "ready-mix", it is expected that limited sand will be required from the existing borrow pits, other than that required to maintain existing roads and tracks.
- Should the material sourced from the existing borrow pits be deemed technically unsuitable, material will be sourced from licensed commercial sources and no new borrow pits will be opened.

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Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	3	3	3	3	27	2	Negative	H
	With	2	2	2	2	12	1	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- A risk of irreplaceable loss exists if the contractor creates new unauthorised borrow pits with a consequent loss of habitat and legal non-compliance.
- Extensive expansion of existing borrow pits will remove soil and limit the area to another other land use.

Mitigations

Goal: Utilise existing borrow pits or commercial sources.

- To minimise and potentially eliminate incidental injuries and death through open excavations & drilling operations.

Objective(s) (including targets):

- To ensure the existing surface area footprint of the borrow pits does not increase significantly as a consequence of the project.
- To ensure utilisation of the borrow pits does not increase risk of drowning to humans or livestock.
- To ensure that only verified licensed commercial sources for sand & stone are used.
- Zero recorded deaths.
- All incidents to be recorded in incident register, including Corrective Action Reports.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Applicant	Borrow pits, excavations and drill holes should as far as

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	Contractor	possibly have smooth slopes, allowing access and exit points to animals, especially when filled with water. Open excavations of any kind should be regularly monitored (daily) for trapped fauna. Drill holes for the solar arrays and fence, and excavations for underground services.
Avoidance	Contractor	Ensure utilisation of sand from existing borrow pits does not result in storage of rainwater and runoff and that the profile remains free draining.
Avoidance	Contractor	Ensure the free-draining nature of the borrow pits doesn't result in erosion and the export of material into watercourses.
Avoidance	Contractor	No new borrow pits will be permitted.
Avoidance	Contractor Surveyor	The footprint of the borrow pits must be surveyed and clearly demarcated to ensure no construction creep takes place increasing the impact.

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Activity Group 8: Stockpiling and material laydown areas (spoil, mulch, building sand, topsoil, windrows, material & equipment)

Description of potential impacts

- Material stockpiles and lay down areas can be located in undisturbed areas, trampling or smothering tunnelling, burrowing or nesting fauna in / on the ground.
- Rainfall can wash soil stockpiles and windrows into a watercourse and cause sedimentation.
- Stockpiles and windrows can impede and / or redistribute surface water flow patterns.
- Soil stockpiles can erode, resulting in a loss of material for rehabilitation.
- Handling stockpiles in dry, windy conditions can generate dust.
- Spoil, soil, mulch or any other stockpiles, if left on site, will remove natural habitat and will interfere with certain land use practices like agriculture.
- Stockpiles are susceptible to alien and / or invasive plant infestation.
- Alien plants can also be introduced by importing foreign contaminated material including topsoil for construction.
- Unwanted stockpiles can be visually intrusive in the natural landscape.
- Areas that are smothered with stockpiles, cannot retain the ecological functions and land use required to generate ecosystem goods and services and tangible economic benefits including income from conservation or farming.
- Plants of conservation value & protected species can be impacted if not effectively searched & rescued before-hand.

Uncertainties & limitations with predicting this impact

- None known.

Assumptions made when assessing the impact

- Limited trenching and clearing of natural vegetation will be required and stockpiling of topsoil and other in situ material.
- Most cleared areas will constitute temporary laydown areas.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred	**Without**	3	3	2	3	24	2	Negative	H

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Alternative	**With**	2	2	2	2	12	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

References (legal, scientific, social or other criteria)

1. Conservation of Agricultural Resources Act (No 43 of 1983) and the regulations dealing with declared weeds and invader plants as amended from time to time.
2. National Dust Control Regulations. GG No. 36974, GN No. R. 827, 1 November 2013, read in combination with SANS 1929: 2005.
3. National Environmental Management: Biodiversity Act, 2004 (No 10 of 2004), Alien and invasive species lists. GG No. 37885, GN No. 598, 1 August 2014.
4. National Environmental Management: Biodiversity Act, 2004 (No 10 of 2004), Threatened or protected species regulations, GG No. 38600, GN No. 255, 31 March 2015.
5. Northern Cape Nature Conservation Act (Act 9 of 2009).

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Locating of stockpiles in sensitive areas will likely result in the smothering of the associated vegetation and removal of faunal habitat, which depending on the duration and extent of the stockpiling activities, will unlikely recruit in the area again.

Mitigations

Goal: Effectively manage stockpiling activities.

To maintain the biological integrity of disturbed soil.

Objective(s) (including targets):

- To ensure stockpiles are located in the least environmentally sensitive areas.
- To ensure that stockpiles do not provide a platform for the establishment of alien & invasive weeds.
- To ensure that stockpiles do not influence natural drainage patterns.
- The list of plant species, and their relative abundancies, chosen for rehabilitation reflects the natural plant communities that need to be rehabilitated.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Ensure the footprint of intended stockpile & laydown areas

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		are searched for fauna and flora of conservation concern and protected status by a qualified ecologist, prior to allocation.
Avoidance	Contractor	Disturbance near to drainage lines should be avoided and any drainage areas near to the access roads and construction activities should demarcated as no-go areas (excluding areas within the designated working servitudes). Refrain from removing any natural material or structures from the riverine environment, such as rocks, stones, grit, sand, gravel, dead trees or tree trunks. These components act as natural habitat for the ecosystem. Ensure stockpile and laydown areas are not positioned close to watercourses - maintain the 100 m buffer around aquatic areas.
Avoidance	Contractor	Ensure stockpiles and laydown areas do not impede natural surface water drainage, resulting in erosion and export of the stockpiled material. The excavated soil should be placed on the upstream side of construction activities in order to act as a storm water diversion berm. Runoff from roads must be managed to avoid erosion and pollution problems.
Avoidance	Contractor	No residues of stockpiled material must be left on site, that can impede restoration of ecological function and remain a visual intrusion on the landscape.
Avoidance	Contractor	Sediment traps may be necessary to prevent erosion and soil movement if there are topsoil or other soil stockpiles present during the wet season.
Reduction	Contractor	Recruitment of alien and invasive plants must be controlled to ensure they do not seed and propagate (both declared weeds and those that are outside of their natural distribution).

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Activity group 9: Clearing and grubbing (fence line, operations area, access roads, rack foundations, transformers and inverters, cables, substation and pylons)

Description of potential impacts

- Direct contact with fauna and flora, including ground nesting birds and burrowing mammals, can cause injury or death. The impacts are exacerbated when the species affected are classified as protected, sensitive, rare, or threatened and endangered.
- Construction activities, such as clearing, may extend beyond the development footprint, known as construction creep.
- Cleared and compacted areas without grass tussocks to impede surface water run-off, can increase surface water runoff, cause erosion and sedimentation, if adjacent to or within the watercourse, i.e. sand mining areas and linear activities like roads, fences, pipelines or other cleared servitudes.
- Exposed areas are susceptible to wind erosion and the generation of dust.
- Cleared areas that are not rehabilitated are susceptible to degradation and loss of other sustainable land use practices like grazing and conservation.
- Habitat is destroyed by clearing. The disturbance created by clearing activities within plant communities creates favourable habitat for the life history strategies of undesirable plant species - and infestation by alien and / or invasive plants.
- Cleared areas are visibly intrusive in the natural landscape.
- Cleared areas cannot retain the ecological functions and land use required to generate ecosystem goods and services and tangible economic benefits including income from conservation or farming.
- Clearing and other earthmoving activities can reveal and disturb heritage resources, sites of archaeological significance and graves.
- Large scale removal of natural vegetation for the installation and operation of solar power plants can cause a change in prey availability and thus a change in bat activity in the landscape.
- Habitat loss is potentially the most significant avifauna impact, dependent on location and scale of the development, associated with the construction and operation (maintenance) of Solar Energy Facilities (SEFs). Extensive areas of vegetation (habitat) are cleared to accommodate the considerable amount of infrastructure required at these facilities, reducing the amount of habitat available to birds for foraging, roosting and breeding.This impact is likely to affect smaller bird species (e.g., larks) with small home ranges, as entire territories could be removed during construction activities.

Uncertainties & limitations with predicting this impact

- The full extent of clear and grub is unknown, although expected to be limited.

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Assumptions made when assessing the impact

- The developer has committed to minimal clearing, and that vegetation beneath the solar panel arrays will be left intact.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	3	3	3	3	27	2	Negative	H
	With	2	2	3	2	14	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- The extent of clearing and grubbing will determine the level of habitat transformation, as the affected footprint / s post rehabilitation, are unlikely to mimic unaffected areas.

Mitigations

Goal: Reduce clearing of naturally vegetated areas, with associated impacts, to a minimum.
To effectively control the invasion of any alien plants
To reduce in situ losses of protected and conservation important flora & fauna.

Objective(s) (including targets):

- To minimise the impact on affected flora, fauna & heritage resources through clearing & grubbing.
- No new alien plant recruitment (directly or indirectly resulting from construction activities) within the development footprint and neighbouring no-go areas or properties.
- Spatially explicit "Search & Rescue" register indicating the nature & position of all translocated flora & fauna.

Mitigations to potential impacts & risks		
Type of	**Responsible**	**Mitigation**

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mitigation	authority	
Avoidance	Contractor	Search & rescue for protected flora & fauna must be undertaken by a qualified ecologist prior to clear & grub activities. All fauna and flora that are protected or of conservation importance must either be cordoned off and protected or translocated outside of the site establishment and solar PV footprint, into habitats of a similar nature. Avoid direct contact with fauna, through clearing and grading as it can cause injury or death. Any fauna threatened by the construction activities should be removed to safety by an appropriately qualified person.
Avoidance	Contractor	Areas to be cleared must be clearly demarcated to avoid increasing the size unnecessarily.
Avoidance	Contractor	Site layout plans must be developed identifying all areas of activity to ensure clearing only happens in pre-authorised areas and the location of topsoil stockpiles and / or windrows is clearly defined. The destruction of habitat during construction should also be strictly contained within the direct footprint of the development. Water bodies and nests should be buffered by 1km radius.
Avoidance	Contractor	Storm water management measures must be implemented on all cleared surfaces to ensure no erosion and export of material occurs. Storm water must be well managed (in accordance with appended Storm Water Management Plan compiled by Jones & Wagener – October 2017) to avoid erosion and resultant export of in situ soil, into watercourses. Ensure that rainfall does not wash soil from stockpiles and windrows into a watercourse and cause sedimentation. Cover soil stockpiles with a temporary liner to prevent contamination (where required and visually determined).
Reduction	Contractor	Dust entrainment from cleared unvegetated surfaces must

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		be managed.
Reduction	Contractor	A soil binding agent must be used along with the dust suppressant.
Avoidance	Contractor	The undisturbed / natural vegetation units, which fall outside permanent and temporary construction footprints, must be designated and demarcated as no-go areas during construction.
Reduction	Contractor	Once impacted upon, disturbed habitats must be rehabilitated immediately before further disturbance. A low cover of vegetation should be left wherever possible within the construction footprint to bind the soil, prevent erosion, and promote post-disturbance recovery. of an indigenous ground cover. Re-vegetate as soon as possible to establish and maintain good ground cover across the site. Conduct regular inspections and maintenance of the site to ensure that vegetation cover is adequate, and no rivulets are generated.
Rectification	Contractor	All areas of heritage value must be demarcated and avoided. Incidental discoveries during clearing and grubbing must be disclosed to site management with immediate cessation of activities until their significance can be assessed by a qualified heritage specialist.

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Activity Group 10: Earthworks & excavations (associated with the operations area, road crossings, cabling, transformers and inverters, substation and pylons)

Description of potential impacts

- Open excavations can trap terrestrial fauna causing injury or death, including snakes.
- Animals can drown in water-filled excavations.
- Excavations and trenches can trap and channel rainwater, erode and, if adjacent to or within a watercourse, cause sedimentation.
- Prolonged exposure of disturbed areas, including trenches, within a watercourse will increase the risk of seasonal flows, causing erosion and sedimentation.
- Excavating can mix different soil types and horizons (topsoil can be mixed with subsoil).
- Trenches can channel uninterrupted flow, thereby increasing run-off and causing erosion, particularly on steep slopes.
- Excavations can cause injury to people who fall inside.
- Earthworks can unearth artefacts of archaeological significance.
- Alteration of natural drainage lines may lead to ponding or increased runoff patterns (i.e.,may cause stagnant water levels or increase erosion).
- Installation of road culverts or pylons for transmission lines may cause temporary sedimentation after storm events.

Uncertainties & limitations with predicting this impact

- None known.

Assumptions made when assessing the impact

- The need for excavations will be limited and not extensive.

Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	2	2	2	3	18	2	Negative	H
	With	2	2	2	2	12	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

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High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- The extent of the anticipated trenching and earthworks is unlikely to lead to irreplaceable loss of resources.

Mitigations

Goal: To reduce impacts on terrestrial & aquatic environments resulting from earthworks.
No sedimentation of water resources due to construction of project.

Objective(s) (including targets):

- To avoid mortality and injury to humans and animals in and around earthworks.
- To ensure clear separation of soil types to allow for effective rehabilitation.
- No evidence of sedimentation of water resources linked to construction activities.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Open excavations must be secure and cordoned off to avoid accidental injury to humans and animals alike.
Avoidance	Contractor	Ensure that water laden with silt does not exit excavations and cause sedimentation of aquatic and / or terrestrial systems. Where additional gravel is installed on existing road surfaces, and such improvements raise the resulting road surface above surrounding ground levels, pipes and/or other suitable conduits must be installed to reduce impeding surface water flows and limiting aquatic biota movement. All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
Avoidance	Contractor	Soil horizons must be stockpiled or windrowed separately during excavation to ensure they can be reinstated in reverse order and ensure restored soil structure.
Rectification	Contractor	Once impacted upon, disturbed habitats must be rehabilitated immediately before further disturbance.
Rectification	Contractor	Any archaeological artefacts unearthed during excavations

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		must be protected and left in situ. Works must cease until the significance of the finding can be assessed by a qualified archaeological specialist. The ECO should monitor all site clearance and substantial excavations into sedimentary rocks for fossil remains on an on-going basis during the construction phase. Recommended mitigation of chance fossil finds involves safeguarding of the fossils (preferably in situ) by the responsible ECO and reporting of finds to SAHRA for the Northern Cape (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). Where appropriate, judicious sampling and recording of fossil material and associated geological data by a qualified palaeontologist, appointed by the developer, may be necessary, under a Fossil Collection Permit issued by the relevant heritage Resources authority (SAHRA). Any fossil material collected should be curated within an approved repository (museum / university fossil collection) by a qualified palaeontologist.
Avoidance	Contractor	If trenches need to be dug for electrical cabling or other infrastructure, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open should have places where there are soil ramps allowing fauna to escape the trench.

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Activity Group 11: Drilling, ram piling, erection & construction (associated with the rack foundations for the panel mounting hardware and fence poles)

Description of potential impacts

- Drill holes can trap fauna, especially those filled with rainwater or ground water.
- Drilling can mix the different horizons.
- Excess soil will be leftover once the drill holes are filled with the rack foundations and fence poles.
- Drilling & ram piling machines can be noisy.
- Drilling generates dust emissions, especially under windy conditions.
- Drilling can unearth artefacts of archaeological significance.

Uncertainties & limitations with predicting this impact

- The method of drilling & anchoring is a patent and as such the proposed service provider (PiA Solar SA) only provides limited detail, leaving impact predictions to some level of assumption.
- The drilling method & technology selected will depend on the ground conditions (soil vs. rock), and PiA Solar has confirmed their ability to effectively drill and mount within the dolerite sills, in spite of the geotechnical expert's initial misgivings.

Assumptions made when assessing the impact

- The chosen drilling method will be one that will have minimal vibrations, less noise & no unnecessary vegetation clearances, but will require limited amounts of ready-mix concrete in each hole, for stability.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	**Mitigation Action**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Acceptability**	**Status**	**Mitigation potential (to meet objectives)**
Preferred Alternative	**Without**	2	2	2	3	18	2	Negative	M
	With	1	1	1	2	12	1	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

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Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- The removal of the sub-surface concrete is likely to leave multiple depressions in the affected landscape and significant effort will have to go into filling them to mitigate a long-term associated impact.

Mitigations

Goal: To minimise impacts associated with drilling and mounting activities.

Objective(s) (including targets):

- To avoid impacting the wetlands & soils in the area.
- To reduce dust & noise emissions by drilling operations.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Permanent and temporary construction footprints (including fence poles) must be designated, and sensitive terrestrial habitats demarcated as no-go areas during construction, including required buffer zones. A construction site layout plan must be developed by the contractor and approved by the SEO to ensure that all construction related sites are located outside sensitive environments, including no-go areas and buffer zones.
Reduction	Contractor	Drilled holes may not be excavated more than one day prior to installing the panel arrays and wiring. Open holes must be plugged if infrastructure is not installed within 1 day. Drill rigs or working front must not proceed more than one day ahead of the team(s) that install the infrastructure and backfill. Alternatively, plugs must be placed in drill holes for the solar array mounts and fencing posts.
Reduction	Contractor	Once impacted upon, disturbed habitats must be rehabilitated immediately before further disturbance.
Reduction	Contractor	Drilling operations must not be undertaken outside of normal working hours, in order to reduce noise impacts on affected landowners.
Reduction	Contractor	Dust suppressant must be prioritised for the drilling activities.

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Rectification	Contractor	Any archaeological artefacts unearthed during drilling activities must be protected and left in situ. Works must cease until the significance of the finding can be assessed by a qualified archaeological specialist.

Activity Group 12: Erection and construction of the panels arrays and associated infrastructure

Description of potential impacts

- Changes in landscape and habitat conversion can affect bat populations and assemblages on a local and regional scale.
- Invertebrate diversity will be influenced by botanical diversity as plants provide forage, habitat and structure for reproduction and thus in turn may positively influence and possibly increase bat foraging activity.
- The construction of the proposed Solar facility and its associated infrastructure will have a visual impact on the scenic resources of this region.
- Construction of SEFs requires a significant amount of machinery and labour to be present on site for a period of time. For shy, sensitive species or ground-nesting birds resident in the area, construction activities are likely to cause a temporary disturbance or even result in displacement from the site entirely. In addition, species commuting around the site may become disorientated by the reflected light and consequently fly longer distances to avoid the area, potentially resulting in displacement and energy implications.

Uncertainties & limitations with predicting this impact

- None known.

Assumptions made when assessing the impact

- It is assumed that since the development footprint falls outside of the low-lying areas that the bats appear to favour, bat activity will not necessarily be negatively impacted (Toussaint, 2023).

Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	**Mitigation Action**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Acceptability**	**Status**	**Mitigation potential (to meet objectives)**

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Preferred Alternative	**Without**	2	3	3	3	24	2	Negative	H
	With	2	2	3	2	14	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- The impacts may be reversed if during the decommissioning phase, the site is rehabilitated to as close as possible its natural state, through landscaping and vegetation growth enhancers.

Mitigations

Goal: To reduce the changes in landscape and habitats.

Objective(s) (including targets):

- Avoid unnecessary extensions to the construction footprints.
- Ensure that construction is kept to the demarcated authorised area.
- Reduce as much as possible the visual & traffic effects.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Permanent and temporary construction footprints (including fences) must be designated and positioned away from active bat populations, where possible. No activities within the Brak River – high bat activity zone (except for pylon construction) and other incidental roosting sites discovered prior to and during construction. The applicant is to investigate available and updated technologies to mitigate impacts on bats and avifauna, including but not limited to: Use non-reflective material for the PV panels. The layout of solar arrays should be placed to avoid bird flight paths between focal points such as water bodies, foraging and

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		roosting sites. All incidents of collision with panels should be recorded as meticulously as possible, including data related to the species involved, the exact location of collisions within the facility, and suspected cause of death. Operational as well as Post-construction Phase monitoring with the aid of video surveillance should be considered, as this will contribute towards understanding bird interactions with solar panels. It has been suggested by Visser (2016) that collision mortality could be reduced at solar facilities by using 28 cm-spaced contrasting bands or 10 cm spatial gaps between solar panels. This enables birds, particularly waterbirds, to differentiate the expansive layout of panels as a solid structure, reducing the likelihood that they may try to land and collide with the panels. These recommendations should therefore be incorporated into new solar facilities until further research into panel design and layout suggests otherwise.
Reduction	Contractor	It is recommended that if the solar power farm is to be installed near the numerous rocky outcrops in the southwest portion of the farm, it would be preferable for a 100m buffer zone to be extended around the area to limit any potential impact on roosting sites in the rocky outcrops
Reduction	Contractor	Use visual screens to minimise the visual impact on the scenic resources of this region. Have minimal placements that can be visually intrusive to sensitive receptors. Utilise fencing options that do not create a significant visual barrier. Mitigate secondary visual impacts associated with the construction of roads by using existing roads wherever possible. Where new roads are required, these should be planned carefully, taking due cognisance of the topography. Roads should be laid out along the contour wherever possible and should never traverse slopes at 90 degrees. Construction

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		of roads should be undertaken properly, with adequate
Reduction	Contractor	Once impacted upon, disturbed habitats must be rehabilitated immediately before further disturbance.
Reduction	Contractor	It is recommended that during the rehabilitation phase, a seed mix containing a variety of the local floral species is used and that the management practices are focused on biodiversity conservation.
Avoidance	Contractor	Delivery & collection from the site need to take place in bulk and/or around the same time, to minimally affect the existing traffic operations.

Activity Group 13: Electricity distribution & transmission infrastructure

Description of potential impacts

- The distribution line runs across a narrow watercourse but expansive floodplain, necessitating work in the watercourse.
- Pylons will be installed within the floodplain.

Uncertainties & limitations with predicting this impact

- Pylons will not be located within the extent of the watercourse, only within the expansive floodplain.

Assumptions made when assessing the impact

- Eskom will have the capacity to accommodate the energy generates by this facility.
- The majority of impacts will be addressed through the gazetted generic EMPr for distribution and transmission infrastructure (GN No. 42323 of 22 March 2019).

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	2	3	3	3	24	2	Negative	M
	With	2	2	3	2	14	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

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High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Once at the decommissioning phase, the poles that were used to support the distribution line can be demolished and the affected floodplain rehabilitated.

Mitigations

Goal: To reduce transformation and fragmentation of the watercourse and floodplain.

Objective(s) (including targets):

- To preserve the watercourse and floodplain.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Contractor	Only impact an area of the watercourse and fllodplain that will be affected (do not demarcate large areas unnecessarily).
Reduction	Contractor	Ensure that the necessary licenses and / or permits are in place before impeding the watercourse.
Avoidance	Applicant/Contractor	Ensure that the municipality and / or public know of any possible interruptions in electricity supply timeously.
Avoidance	Contractor	Do not place high risk (pollution generating) construction activities within close proximity to a watercourse as it can cause pollution.
Reduction	Contractor	Make means of ensuring that rainfall does not wash soil stockpiles and windrows into a watercourse and cause sedimentation.

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Activity Group 14: Waste generation (solid waste including 'spoil', liquid waste, separation, storage and disposal).

Description of potential impacts

- Solid and liquid waste can be harmful to fauna if swallowed / ingested or if the creature becomes entangled or impaled.
- Improper handling, storage or disposal of waste can cause toxicity – the introduction of toxic or hazardous substances into a watercourse - spills can be washed into the watercourse by storm water run-off.
- Construction activities will produce solid and liquid waste, which can contaminate the ground (litter, spillage) if improperly handled, stored or disposed.
- Drip trays and bunds using sand as an absorbant will contaminate the sand and generate more hazardous waste.
- Spills may be covered with virgin soil.
- Burning waste can generate toxic smoke emissions.
- Illegal dumping will result in the loss of certain land uses like agriculture and conservation.
- Illegal dumping will remove natural habitat.
- Improper handling, storage and disposal of waste can cause toxicity – is the introduction of toxic or hazardous substances into an environment that may adversely affect the health of people.
- Burning waste can cause smoke inhalation.
- Solid waste can be blown away and into the landscape.
- Waste contaminated or storage areas and illegal dumps can be visibly intrusive in a natural landscape.
- Littering is visually intrusive.
- Ensure that rubble, litter and disused construction materials are managed and removed regularly (VIA).
- Excess waste puts a burden on existing landfill sites.
- Hazardous waste, particularly large amounts of it is expensive to dispose of.
- Illegal dumping sites cannot retain the ecological functions and land use required to generate ecosystem goods and services and tangible economic benefits including income from conservation or farming.
- All temporary anthropogenic influences during construction can clutter the site and make it look untidy.

Uncertainties & limitations with predicting this impact.

- The ability of the local municipalities to service the site in terms of waste removal.

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Assumptions made when assessing the impact.

- None known.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	3	2	3	3	24	2	Negative	H
	With	2	1	2	2	10	1	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources.

- The impacts may be reversed if proper disposal methods can be adhered to, i.e., waste hierarchy, waste separation, waste cycle, etc.

Mitigations

Goal: To avoid improper disposal of waste and promote good housekeeping.

Objective(s) (including targets):

- Enforce proper and approved (legal) disposal of waste.
- Implement an effective waste management strategy based on the waste hierarchy.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Contractor	Establish and implement an Integrated Waste Management Strategy including avoidance, reduction, re-using, recycling and disposal, i.e. the production of hazardous waste can be **avoided** by providing drip trays, **reduce** waste by using the correct quantities, **re-use** concrete rubble as back fill or **recycle** steel off-cuts and **dispose** of non-hazardous solid

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		waste at a registered municipal dump site.
Reduction	Contractor	Induct all labourers on the waste management strategy and enforce it through regular (at least weekly) toolbox talks.
Reduction	Contractor	Separate general, recyclable, natural (vegetation and soil/rock) and hazardous waste and demarcate different containers for different waste types using colour codes.
Avoidance	Contractor	Do not litter, burn or bury waste on any property.
Avoidance	Contractor	The contractor shall dispose of general waste at a registered municipal dump site.
Avoidance	Contractor	The contractor shall return used oil to the supplier or an oil recycling company.
Avoidance	Contractor	The contractor shall contain contaminated water from washing brushes in a conservancy tank until sufficient volume warrants disposal by a registered hazardous waste management company. The Wastewater Treatment Package Plant should be constructed at the onset of construction activities, to ensure the reduction of hazardous waste production.
Reduction	Contractor	Remove ineffective danger tape / netting that has begun to litter the site or surrounding areas.
Avoidance	Contractor	Designate a temporary waste storage area, enclose it in a fence that cannot be breached by fauna, and provide sufficient scavenger proof dust bins with black bags inside the construction camp.
Avoidance	Contractor	The contractor is prohibited from discharging wastewater, including domestic water from sanitation facilities, and grey water from washing equipment or plant into a watercourse.
Reduction	Contractor	Re-fuelling with a mobile fuel bowser shall take place outside any watercourse.
Avoidance	Contractor	The contractor shall store hazardous material within a secure, safe and bunded facility at the construction camp.
Avoidance	Contractor	Use drip trays for refuelling, repair / maintenance work and all stationary construction plant and equipment that can leak, such as TLBs, compressors and generators.
Avoidance	Contractor	Do not cover spills with virgin soil. It merely increases the disposal cost for a greater volume of hazardous waste.
Rectification	Contractor	Immediately remove contaminated soil to the depth of penetration and temporarily store in a designated solid hazardous waste container until sufficient volume warrants

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		disposal at a registered hazardous waste dump site. Alternatively, onsite treatment of contaminated soil should be considered with a registered hazardous waste management company.
Avoidance	Contractor	Do not mix concrete on open ground. Mix in a wheelbarrow, a mixing tray or on a level plastic sheet. No concrete batching should take place within the delineated wetlands or within the 100m buffer zone.
Avoidance	Contractor	The contractor shall prevent the run-off of slurry or cement contaminated water from concrete / plaster mixing sites.
Reduction	Contractor	The contractor shall implement appropriate procedures, such as the use of a ground cover, to prevent the contamination of the ground when handling hazardous materials, including re-fuelling.
Reduction	Contractor	As far as possible, commence construction (clearing) at the onset of the dry season in order to prevent erosion, siltation and wash-away of topsoil and sedimentation into the wetlands, seepage areas, drainage lines or rivers.
Reduction	Contractor	Hard-surfaced roads and parking areas with storm water outlets should not channel litter, oil and fuel spills into a watercourse, causing water pollution. No construction materials should be disposed of within the delineated wetlands or within the 100m buffer zone on the watercourse, such as discharging wastewater, including domestic water from sanitation facilities, into a watercourse.
Avoidance	Applicant Operator.	All waste to be removed to a suitable waste disposal facility by a registered service provider

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Activity Group 15: Handling of hazardous substances (fuel/oil, cement, bitumen, sewage/grey water) & management (including storage) at sanitation sites, kitchens, batching sites, workshops, washbays, refuelling areas and on site.

Description of potential impacts

- Improper handling (refuelling, vehicle repairs, mixing cement or bitumen) and storage of hazardous substances (fuel tanks, cement bags, oil & bitumen drums) can cause toxicity – the introduction of toxic or hazardous substances into an environment that may adversely affect the health of animals, humans and / or into a watercourse and can cause spillage and consequential soil & topsoil contamination.
- Discharge or pumping dirty water from the works area, discharge of grey water from washing equipment, plant, or persons, and discharge of sewerage from improper sanitation within the watercourse.
- Cement may incorrectly be mixed with topsoil to make concrete.
- Mixing cement powder in windy conditions can generate hazardous dust emissions.
- Chemical toilets and other organic waste can produce an unpleasant odour.
- Contaminated areas will result in a loss and reduced productivity of certain land uses including agriculture and conservation.
- Contaminated areas including fuel or oil spills will remove natural habitat.
- Inhaling dangerous fumes can be harmful to people.
- Unremediated spills may result in sterile patches that will be unsightly.
- Contamination will disturb the natural habitat, diluting or interfering with the overall ecological functioning that sustains ecosystem goods and services.
- It is very expensive to rehabilitate contaminated areas.

Uncertainties & limitations with predicting this impact

- The magnitude of the impact, specifically the extent and severity of the soil and water pollution, is not known.
- The volumes and types of different waste produced by individuals, construction and plant are unknown.

Assumptions made when assessing the impact

- Mobile fuel bowsers, including their bunds as well as chemical toilets will not be located within 100m from the edge of the watercourse / wetland.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to

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									meet objectives)
Preferred Alternative	**Without**	3	3	4	4	40	3	Negative	H
	With	2	2	2	3	18	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources.

- The reversibility of the impact is dependent on the nature and extent of the pollution caused.

Mitigations

Goal: To control soil, surface, and watercourse pollution.

Objective(s) (including targets):

- To prevent all manner of waste from entering the pristine environment.
- To reduce soil and water contamination, including *inter alia* sedimentation, associated with construction activities.
- No evidence of contaminating activities on unprotected ground, or in the case of accidental spills, documented evidence of rapid remediation.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	The Contractor shall locate the construction activities on existing disturbed or the least sensitive sites & further than 100m from the edge of a watercourse. No pylons should be located within an area that would be expected to become inundated during a 1:100 flood event.
Avoidance	Contractor	The contractor shall restrict the following activities to the construction camp: Sanitation, Waste storage, Parking,

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		Storing hazardous materials, Emergency vehicle & plant repair & maintenance Re-fuelling, Ready-mix concrete truck cleaning area Material stockpiles, and Lay down areas.
Avoidance	Contractor	Washing of construction plant and mechanical equipment including brushes shall not occur on site or in a watercourse, but shall be restricted to the main construction camp where adequate containment measures are in place.
Avoidance	Contractor	The contractor shall contain contaminated water from washing brushes in a conservancy tank until sufficient volume warrants disposal by a registered hazardous waste management company.
Avoidance	Contractor	Chemical toilets shall be in the shade, at least 100m from any watercourse.
Avoidance	Contractor	Use chemical toilets that contain the sewerage in a closed and removable 'tank', i.e. do not use open drums. Environmentally friendly toilets should also be considered e.g. E-loo's.
Avoidance	Contractor	The contractor is prohibited from discharging wastewater, including domestic water from sanitation facilities, and grey water from washing equipment or plant into a watercourse.
Reduction	Contractor	Re-fuelling with a mobile fuel bowser shall take place outside any watercourse. When handling hazardous materials, such as when refuelling vehicles or generators, the contractor shall implement appropriate precautionary measures, such as a ground cover or drip trays, to prevent spills from contaminating the ground.
Avoidance	Contractor	The contractor shall store hazardous material within a secure, safe and bunded facility at the construction camp.
Avoidance	Contractor	Use drip trays for refuelling, emergency repair & maintenance work and all stationary construction plant and equipment that can leak, such as TLBs, compressors and generators.
Reduction	Contractor	Construction plant and equipment shall be kept in a good state of repair to reduce hydrocarbon leakages and emissions.
Avoidance	Contractor	Do not cover spills with virgin soil. It merely increases the

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		disposal cost for a greater volume of hazardous waste.
Rectification	Contractor	Immediately remove contaminated soil to the depth of penetration and temporarily store in a designated solid hazardous waste container until sufficient volume warrants disposal at a registered hazardous waste dump site. Alternatively, onsite treatment of contaminated soil should be considered with a registered hazardous waste management company.
Avoidance	Contractor	Do not mix concrete on open ground. Mix in a wheel barrow, a mixing tray or on a level plastic sheet.
Avoidance	Contractor	The contractor shall prevent the run-off of slurry or cement contaminated water from concrete / plaster mixing sites.
Rectification	Contractor	Break up all concrete hard pan layers and dispose of appropriately (at a legitimate dump site) or re-use the concrete.
Reduction	Contractor	The contractor shall implement appropriate procedures, such as the use of a ground cover, to prevent the contamination of the ground when handling hazardous materials, including re-fuelling.
Avoidance	Contractor	Do not place high risk (pollution generating) construction activities within close proximity to a watercourse as it can cause pollution.
Avoidance	Contractor	A dedicated, lined facility must be provided for ready-mix concrete trucks to wash their chutes, before leaving site. Once no longer needed this dry, inert waste can be disposed of at a local registered municipal landfill site.
Reduction	Contractor / Proponent	The Waste Water Treatment Package Plant should be constructed at the onset of construction activities, to ensure the reduction of hazardous effluent production.

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Activity Group 16: Plant management (parking, driving, repair and maintenance, and refuelling)

Description of potential impacts

- Oil spillages resulting in fauna & flora mortality.
- Parking, driving, repair and maintenance, and refuelling can cause toxicity – the introduction of toxic or hazardous substances into an environment that may adversely affect the health of animals and/or into a watercourse.
- Parking, driving, repair and maintenance, and refuelling can cause spillage and consequential soil & topsoil contamination

Uncertainties & limitations with predicting this impact

- None known.

Assumptions made when assessing the impact

- All parking, emergency repair and maintenance, and refuelling will take place at the designated construction camp, if on site.
- All scheduled servicing of plant will take place off-site at an appropriate service centre.

Assessment ((*Extent* + *Magnitude*+ *Duration*) *x Probability* = *Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	2	2	3	3	21	2	Negative	H
	With	2	1	2	2	10	1	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- The reversibility of the impact is dependent on the nature and extent of the pollution caused.

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Mitigations

Goal:

- To control soil, surface and watercourse pollution.
- To reduce contamination of the soil through improper management of waste.
- To minimise the risk of impacts to water resources in and around the project footprint.

Objective(s) (including targets):

- To reduce soil and water contamination, including *inter alia* sedimentation, associated with plant & equipment.
- Low incidence of waste induced ground contamination, with a trend indicating constant improvement over time (not just quantities but procedural. improvements too). Suitable close-out documentation and reviews of SOPs & MS following significant contamination events.
- No high-risk activities located within close proximity to water resources.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Use drip trays for refuelling, repair / maintenance work and all stationary construction plant and equipment that can leak, such as TLBs, compressors and generators. No washing, other than ready-mix concrete trucks at a designated area within the construction camp, and no repairs or servicing of construction plant, equipment or other vehicles, except for emergency breakdowns, are permitted within the preferred or approved development footprint, construction-related areas, no-go areas and on neighbouring properties.
Reduction	Contractor	Construction plant and equipment shall be kept in a good state of repair to reduce hydrocarbon leakages and emissions.
Avoidance	Contractor	The contractor is prohibited from discharging wastewater and grey water from washing equipment or plant into a watercourse.
Reduction	Contractor	Re-fuelling with a mobile fuel bowser shall take place outside any watercourse, and with the appropriate pollution containment measures.

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Activity Group17: Building work (concrete work)

Description of potential impacts

- Soil quality deterioration due to concrete hard pans.
- Transformation of areas due to hardened surfaces.

Uncertainties & limitations with predicting this impact

- The amount of concrete work is expected to be low, but undefined.

Assumptions made when assessing the impact

- No unnecessary concrete work will be undertaken.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	2	2	3	3	21	2	Negative	H
	With	2	1	2	2	10	1	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Once all concrete works are broken and the ground rehabilitated, the impacts will be slowly reversed.

Mitigations

Goal:

- To avoid careless use of cement & concrete.
- To avoid and reduce human induced environmental pollution.
- Maintain ecological function and agricultural potential.

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- The reduced generation of hazardous waste and the avoidance of environmental (land and water) contamination.
- To ensure sound waste management practices that do not affect any aquatic environments.

Objective(s) (including targets):

- To reduce soil and water contamination, including *inter alia* sedimentation, associated with construction activities.
- Zero concrete hard pan layers observed on the ground.
- Zero incidence (in the incidence register) of waste induced impacts on aquatic environments.

Mitigations to potential impacts resulting from building work (concrete work)		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Permanent and temporary construction footprints (including fences) must be designated, and sensitive terrestrial habitats demarcated as no-go areas during construction.
Reduction	Contractor	Once impacted upon, disturbed habitats must be rehabilitated immediately before further disturbance.
Avoidance	Contractor	Do not mix concrete on open ground. Mix in a wheelbarrow, a mixing tray or on a level plastic sheet.
Avoidance	Contractor	The cement trucks must be cleaned in a bunded area with a lining to protect the soil.
Avoidance	Contractor	The contractor shall prevent the run-off of slurry or cement contaminated water from concrete/plaster mixing sites.
Rectification	Contractor	Break up all concrete hard pan layers and dispose of appropriately (at a legitimate dump site) or re-use the concrete.
Reduction	Contractor	The contractor shall implement appropriate procedures, such as the use of a ground cover, to prevent the contamination of the ground when handling cement and/or concrete.

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Activity Group 18: Disturbing natural areas

Description of potential impacts

- Disturbance of natural established vegetation will affect the bat populations of the area, as this is where the food base is.
- It is not envisaged that the proposed development will result in major soil erosion or any other degradation of the soils of the focus areas provided that there is proper runoff management from roads and other bare areas (Soils).
- Activities undertaken for the development have the potential to disturb and damage heritage resources within the affected property and footprint.

Uncertainties & limitations with predicting this impact

- None known.

Assumptions made when assessing the impact

- Of all the disturbed natural areas, permanent disturbance will be minimal.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	**Mitigation Action**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Acceptability**	**Status**	**Mitigation potential (to meet objectives)**
Preferred Alternative	**Without**	2	2	3	3	21	2	Negative	H
	With	2	1	2	2	10	1	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources.

- The impacts may be reversed if proper rehabilitation is exercised.

Mitigations

Goal: To avoid transformation and fragmentation of natural habitats.

Objective(s) (including targets):

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- Preserve the natural habitat as far as possible.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Contractor	Once impacted upon, disturbed habitats must be rehabilitated immediately before further disturbance.
Reduction	Contractor	As much of the natural established vegetation is conserved.
Reduction	Contractor	Use pre-existing farm roads during construction. Discourage construction vehicles from driving through the natural vegetation and drainage lines where construction activities are not taking place. Maintain all access routes and roads adequately to minimise erosion and undue surface damage.
Reduction	Contractor	Seed disturbed areas after construction with seeds of the naturally occurring plant species to encourage invertebrate species richness.
Avoidance	Applicant Contractor	It is important that areas with low lying depressions where water pools during the autumn and summer rainfall season, are not altered as they may be important areas not only for bats to drink and forage but also for socialising (Bats).
Reduction	Contractor	If possible, refrain from using herbicides to control the height of vegetation as it can affect insect abundance which in turn may affect bats.
Reduction	Contractor	It is important not to overgraze the vegetation because of loss of precious topsoil, the restoration of these areas will be difficult.

Activity Group 19: Completion of construction & rehabilitation

Description of potential impacts

- New growth on rehabilitated sites can be overgrazed by mammals.
- Rehabilitated sites can cause erosion and, if adjacent to or within a watercourse, sedimentation.
- Disturbed sites will comprise mostly cleared / denuded areas that are vulnerable to degradation, including erosion, leading to a loss of biodiversity and ecosystem functions and processes.

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- Rehabilitation that is not in accordance with the natural plant communities of the area can result in the introduction of non-indigenous plants.
- Disturbed areas, including those recently rehabilitated by the contractor are susceptible to weed, invader and alien plant recruitment and the replacement of indigenous plant communities if not controlled.
- Temporary workers will lose their employment.
- Rehabilitate all disturbed areas, construction areas, road servitudes and cut and fill slopes to acceptable visual standards.
- Rehabilitation can be expensive but will depend on the extent to which the contractor mitigated his impacts during construction.
- The income generation or buying power of local residents employed during construction will return to 'normal'.
- Permanent contracting staff will cease renting accommodation in the area.

Uncertainties & limitations with predicting this impact.

- The magnitude of the impact, specifically the extent and severity of the erosion and sedimentation, is not known.

Assumptions made when assessing the impact.

- The disturbance including areas that are vulnerable to alien plant invasion will be to areas completely devoid of indigenous vegetation.
- Disturbed areas are likely to degrade if left alone.

Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	**Mitigation Action**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Acceptability**	**Status**	**Mitigation potential (to meet objectives)**
Preferred Alternative	**Without**	2	2	3	3	21	2	Negative	H
	With	2	2	2	2	12	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

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Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Disturbed areas can be rehabilitated. The cost thereof will depend on the severity and extent of the degradation.
- The extent of reversibility is dependent on the severity of the erosion, including the nature of the remaining *in situ* material, the amount of soil that has been exported from a site and whether or not the exported soil is recoverable. For example, soil washed from a gravel road into a mitre drain can be graded back onto the surface of the road, whereas soil that is washed from a gully into a water course is not recoverable and the source cannot be re-instated without significant intervention and cost. Although erosion has the potential to irreversibly change the relief, eroded sites can be stabilized through rehabilitation measures.
- If controlled timeously the impact of alien plant species can be negligible. However, if allowed to grow unabated, alien invasive species can replace entire plant communities with homogeneous stands. Biodiversity is significantly reduced and ecosystem function is altered. In the latter case, rehabilitation will require significant intervention and cost.

Mitigations

Goal: Facilitate the natural rehabilitation of disturbed areas and control the replacement of indigenous vegetation by weed, invader and exotic plant species.

Objective(s) (including targets):

- To avoid long-term degradation.
- To reduce erosion of and rehabilitated access roads.
- To prevent the maturation and reproduction of weed, invader and exotic plant species from occurring on any land that is rehabilitated after construction.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Rectification	Contractor	Bulk shape the areas where material is introduced to mimic or blend in with the surrounding, natural topography. Do not fine shape or rake because an uneven surface will impede surface water run-off and facilitate infiltration. Correct any cause of erosion at the onset thereof by controlling / diverting storm water run-off, immediately repairing and stabilizing / rehabilitating impacted areas in the most appropriate manner.
Reduction	Contractor	Ensure storm water run-off is adequately controlled on disturbed sites before rehabilitating them (ripping, replacing

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		the topsoil and mulching/brush packing), i.e. cut-off berms.
Rectification	Contractor	Topsoil shall be returned to the source areas during rehabilitation of the PV Solar Plant servitudes.
Rectification	Contractor	Ensure a quick and adequate cover with indigenous and local grass species on all PV Solar Plant servitudes.
Avoidance	Contractor ECO	Kikuyu grass (*Pennisetum clandestinum*) is a highly invasive plant that threatens wetland habitats and must not be used in areas adjacent to wetland habitats and drainage lines. Non-invasive indigenous grasses such as *Cynodon dactylon* must be used, or species best suited for that environment.
Reduction	Contractor	The Contractor shall monitor the rehabilitated servitudes for the duration of the contract defects and liability period for signs of erosion.
Rectification	Applicant Contractor	If erosion is found to occur during the aforesaid monitoring, the Contractor / Applicant shall immediately correct (the 'source') and repair (the 'symptom') the erosion using method(s) that are an improvement on the mitigations proposed in the EMPr or on the unsuccessful mitigations originally used on site.
Reduction	Contractor Applicant	The rehabilitated solar plant servitudes shall be monitored at least twice during the summer rainfall season for two years following the completion of the PV Solar Plants for the recruitment of weed, invader and alien plant species.
Rectification	Contractor Applicant	The Contractor / Applicant shall immediately uproot, cut or debark weed, invader and alien plant species upon being identified.
Rectification	Contractor Applicant	Alien invasive vegetation recruitment must be controlled within and along the fence lines of the solar PV footprints. Manual control measures are preferred, but where herbicides are used, they must be those endorsed & selective for the target species with the lowest environmental toxicity. The Contractor / Applicant shall collect and destroy all seeds of weed, invader and alien plant species occurring within disturbed and / or rehabilitated areas.
Avoidance	Applicant	The introduction of sheep into the solar panel plant will be done in accordance with the grazing capacity management plan formulated.
Rectification	Contractor Applicant	Rehabilitate all disturbed sites and minimise overgrazing by mammals.

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Rectification	Contractor Applicant	Seed disturbed areas after construction with grass seeds of the naturally occurring plant species to encourage invertebrate species richness (Bats).

Activity Group 20: Social impacts

Description of potential impacts

- Change of land use / livelihoods.
- Traffic and road impacts to local residents and road users.
- Damage to farm infrastructure.
- Safety and security concerns due to an influx of people to the area.
- Concern about social disturbance and community safety.
- Economic impacts.
- Sense of place changes.
- Comments received from **Francois Taljaard**, Town Planner, Emthanjeni Municipality (**Table 8**); investigate potential impacts on the shortage of water - uncontrolled abstraction from a watercourse or an aquifer can reduce the amount of water that is available to downstream users.
- Comments received from **Francois Taljaard**, Town Planner, Emthanjeni Municipality (**Table 8**); the disposal or processing of packaging material must be addressed in the EIA. Packaging material is currently being used in the townships for additions to houses, which is illegal and creates a fire hazard.

Uncertainties & limitations with predicting this impact

- Identified concerns from residents have not been forthcoming thus far in the Public Participation Process.

Assumptions made when assessing the impact

- It is unlikely that any significant impacts on the receiving social environment will result from the proposed development as the area will be minimally disturbed and positive employment & economic opportunities will result.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)

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Preferred Alternative	**Without**	**3**	**4**	**3**	**4**	**37**	**3**	Negative	H
	With	**3**	**3**	**3**	**3**	**28**	**2**	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Following the construction period there will be a loss of employment, followed by the retention of a few operational staff.

Mitigations

Goal: Address social concerns.

Objective(s) (including targets):

- To avoid creating false hope where job creation opportunities are concerned.

Mitigations to potential impacts resulting from social impacts		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Water must be used sparingly to ensure no depletion of water resources take place to the detriment of downstream water users and other ground water users.
Avoidance	Contractor	Adequate provision must be made for employment seekers, to avoid uncontrolled access to the property.
Avoidance	Contractor	Adequate potable water must be supplied to the labour force throughout the construction process.
Avoidance	Contractor	Open borrow pits, excavation and quarries must be fenced-off and / or demarcated when construction activities are taking place, to ensure the safety of unsuspecting public or job seekers.
Avoidance	Contractor	AIDS / HIV awareness training must be undertaken to ensure that the labour force is well informed on the matter.
Avoidance	Contractor	Dangerous fumes, noise, dust and water impacts must be avoided that may affect both the labour force and surrounding landowners and users.
Avoidance	Contractor	Open fires must be prohibited during the construction process for fear of runaway fires.

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Avoidance	Contractor	Waste, especially waste packaging from *inter alia* the solar panels, must be well managed to ensure it does not infiltrate the surrounding environment and / or be used illegitimately for informal housing purposes.
Avoidance	Contractor	All construction activities must be carried out in an environmentally sensitive manner (including clearing of stockpiles) to ensure no deterioration in the agricultural potential of the land results.
Avoidance	Contractor	Increase security to protect trespassers from being electrocuted.
Avoidance	Contractor	Arrange for alternative, private and/ o r additional transport and accommodation for the new employment opportunities and influx of workers.
Avoidance	Contractor	Drivers shall adhere to the relevant speed limit(s) (ON the existing road network) at all times and restrict their movements to the existing and / or approved roadway or servitude. The speed limit on the property shall be 40 km/h and 30km/h within the development footprint.
Reduction	Contractor	Make the terms and conditions of employment known to all employees (temporary & permanent.
Reduction	Contractor	Keep lighting on at night and increasing security will help improve security to prevent theft.
Reduction	Applicant Contractor	Transparent communication through the right channels to communicate with the community as power may need to be turned off when the solar PV plant is connected to the existing Eskom grid, temporarily disrupting the supply of electricity.

Aspect 21: Terrestrial impacts (including fauna & flora)

Description of potential impacts

- Poaching, vehicles, open excavations and runaway fires pose a direct threat to the Riverine Rabbit. Indirect threats include improper handling (refueling, vehicle repairs, mixing cement or bitumen) and storage of hazardous substances (fuel tanks, cement bags, oil & bitumen drums), which can cause toxicity – the introduction of toxic or hazardous substances into an environment that may adversely affect the health of animals.
- Disturbance to or destruction of roosting sites during construction activities. Light pollution during construction and operational phase may alter species composition,

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foraging patterns, reproductive success and predation rate. Alteration to commuting routes within the landscape as routes may be altered and some species may avoid the solar arrays all together, particularly the low-flying bat species. Habitat changes beneath the solar panels and the associated impact on prey insect communities may affect bat foraging patterns and areas. Changes in bat community, abundance and activity of bat species.

- Lighting at night can attract insects and bats but may also discourage foraging by certain bat species – create a preferential habitat for one species at the expense of another.
- Electric fences can cause death or injury to mammals.
- Employees can harvest indigenous plants for muthi, firewood and poach animals.
- Littering can pose a risk of suffocation to wild animals (littering is likely to be more prevalent at designated eating / rest areas).
- Employees can burn fires to keep warm and runaway fires can destroy fauna and flora.
- Use of the existing road network will avert the need for off-road driving and protect flora and fauna that are normally less visible.
- Parking and driving carelessly can increase collisions with mammals, birds, reptiles, amphibians and insects – road kills.
- Designated parking areas will protect local flora and fauna.
- Animals can drown in water-filled borrow pits.
- Material stockpiles and lay down areas can be located in undisturbed areas, trampling or smothering tunneling, burrowing or nesting fauna in/on the ground.
- Clearing and grading (operations area, access roads, rack foundations, transformers and inverters, cables, substation and pylons); direct contact with fauna can cause injury or death. The impacts are exacerbated when the species affected are classified as protected, sensitive, rare, or threatened and endangered.
- Open excavations and drill holes can trap terrestrial fauna causing injury or death, including snakes.
- Animals can drown in water-filled excavations and drill holes.
- Solid and liquid waste can be harmful to fauna if swallowed/ingested or if the creature becomes entangled or impaled.
- Vegetation clearing for the development, access roads, site fencing etc could impact listed plant species as well as plant communities. Vegetation clearing will also lead to habitat loss for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems. Increased erosion risk would occur due to the loss of plant cover and soil disturbance created during the construction phase. This may impact downstream riparian and wetland habitats if a lot of silt enters the drainage systems. Presence and operation of construction machinery on site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance at the site. Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.

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- Disturbance to or destruction of roosting sites during construction activities.
- Light pollution during construction and operational phase may alter species composition, foraging patterns, reproductive success and predation rate.
- Soil erosion & associated degradation of ecosystems:
  - Stockpiles are susceptible to alien and / or invasive plant infestation.
  - Alien plants can also be introduced by importing foreign contaminated material for construction, including topsoil.
  - The disturbance created by clearing activities within plant communities creates favourable habitat for the life history strategies of undesirable plant species. There is an ongoing threat for invasion because alien plants have effective dispersal mechanisms, such as birds. Cleared patches can become invaded and act as sources to colonize other vulnerable areas.

Uncertainties & limitations with predicting this impact

- The proposed development footprints have deliberately been located away from sensitive habitats such as watercourses and rocky ridges, to minimize conflict with local fauna and reduce impact on habitat.
- Most threatened faunal species are extremely secretive and difficult to survey even during thorough field surveys conducted over several seasons (Henning, 2023).
- Most threatened plant species are extremely seasonal and only flower during specific periods of the year (Henning, 2023).

Assumptions made when assessing the impact

- Fauna are highly mobile organisms, which can flee from dangers posed by construction activities. With the exception of smaller tunnelling, burrowing or nesting fauna (in the ground or tree trunks), fauna will instinctively flee, upon an intrusion of their personal space, specifically the 'flight' zone, until the animal has extended the distance to its 'comfort' zone.

Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	**Mitigation Action**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Acceptability**	**Status**	**Mitigation potential (to meet objectives)**
Preferred Alternative	**Without**	2	3	3.5	3.5	30	3	Negative	H
	With	2	2	2.5	2.5	16	2	Negative	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutra	N/A

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High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- With the exception of critically endangered species or populations, the loss of life can be recovered through the reproduction of surviving individuals/populations.
- Effective rehabilitation and remediation can restore ecological function and habitat to affected species.

Mitigations

Goal:

- Control loss of terrestrial and avifauna.
- To reduce in situ losses of protected and conservation important flora & fauna.
- To ensure no harvesting of natural resources within and adjacent to the development footprint.

Objective(s) (including targets):

- To reduce harm to terrestrial and avifauna.
- Spatially explicit "Search & Rescue" register indicating the nature & position of all translocated flora & fauna.
- To restore ecological function of areas affected by construction activities.

Mitigations to potential impacts resulting from terrestrial impacts (including fauna & flora)		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor SEO	With the exception of search and rescue operations authorized by the SEO, no mammal, bird, reptile, invertebrate or fish shall be intentionally caught and / or killed.
Reduction	Contractor	Drivers shall always adhere to the relevant speed limit(s) (ON the existing road network) and restrict their movements to the existing and /or approved roadway or servitude.
Reduction	Contractor	The site will be always kept tidy. All waste shall be picked up daily.
Avoidance	Contractor	Designate a temporary waste storage area, enclose it in a fence that cannot be breached by fauna, and provide

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		sufficient scavenger proof dust bins with black bags inside the construction camp.
Reduction	Contractor	Material stockpiles shall be located on a disturbed site or other site approved by the SEO.
Reduction	Contractor	Anthropogenic impacts must be minimized to reduce impacts on nocturnal species, including but not limited to reduced lighting that may influence bat foraging behaviour.
Avoidance	Applicant	Fencing options must be utilised that provide adequate security to the plant but will not result in animal mortality or require onerous vegetation clearing. Clearvu™ type fencing is preferred over electric fencing.
Avoidance	Contractor	Drilled holes and open excavations should not be left open for extended periods and should be covered at night.
Avoidance	Contractor	No harvesting of natural resources may be permitted by contractor staff. Adequate induction training must be undertaken to sensitise the staff to this matter.
Avoidance	Contractor	Borrow pits, water-filled excavations and drill holes should as far as possible have smooth slopes, allowing access and exit points to animals, especially when filled with water.
Reduction	Contractor	Avoid direct contact with fauna, through clearing and grading as it can cause injury or death.
Reduction	Contractor	Designate parking areas to protect local flora and fauna.
Avoidance	Contractor	Employees must not burn fires to keep warm, because runaway fires can destroy fauna and flora.
Avoidance	Contractor	The undisturbed / natural vegetation units, such as the terrestrial habitats, which fall outside permanent and temporary construction footprints must be designated and demarcated as no-go areas during construction.
Rectification	Contractor	Once impacted upon, disturbed habitats must be rehabilitated immediately before further disturbance.
Avoidance	Contractor	Development of access road and temporary tracks must be limited to those absolutely necessary.
Avoidance	Contractor	Soil may only be obtained from the three already operational borrow pits.
Avoidance	Contractor	Suitable designated areas must be demarcated as laydown and stockpile areas, to reduce impacts on terrestrial habitat.
Avoidance	Contractor	No concrete work may take place directly on the ground or on live vegetation.
Reduction	Contractor	Keep surveying and pegging minimal as it can place footprints in sensitive habitats.

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Reduction	Contractor	Do not leave spoil, soil, mulch, or any other stockpiles on site, because it will degrade natural habitat.
Avoidance	Contractor	Do not clear unnecessarily.

Activity Group 22: Visual impacts

Description of potential impacts

- Impact of construction on visual receptors near the solar facility.
- Impact of access roads on observers in close proximity to the solar facility.
- Placement of construction areas including toilets can be visually intrusive to sensitive receptors.
- Lighting at night can be visibly intrusive in remote areas.
- High walls and fences can be visually intrusive by visibly altering the natural landscape.
- Soil mining creates visibly intrusive scars in the natural landscape.
- Unwanted stockpiles can be visually intrusive in the natural landscape.
- Cleared areas are visibly intrusive in the natural landscape.
- Solid waste can be blown away and into the landscape.
- Waste contaminated or storage areas and illegal dumps can be visibly intrusive in a natural landscape.

Uncertainties & limitations with predicting this impact

- The visual impact assessment was undertaken during the planning stage of the project and is based on information available at that time (Henwood, 2017).

Assumptions made when assessing the impact

- There is no way of totally preventing the visual changes or alterations.

Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	3	3.5	3	3.5	33	2	Neutral	H
	With	3	2.5	3	2	17	1	Neutral	

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No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Until the decommissioning phase, the impacts are irreversible.

Mitigations

Goal: To address visual concerns.

Objective(s) (including targets):

- Keep the visual changes as minimal as possible.
- The mitigation and possible negation of visual impacts associated with the decommissioning of the proposed Solar facility.
- Minimal visual intrusion by construction activities and intact vegetation cover outside of immediate works areas.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	Place construction areas including toilets where they will not be visually intrusive to sensitive receptors.
Avoidance	Contractor	Ensure sound housekeeping practices to ensure litter and waste are not visible features of the landscape.
Reduction	Contractor	Minimise lighting at night as it can be visibly intrusive in remote areas.
Reduction	Contractor	Avoid altering the natural landscape (through soil mining, unwanted stockpiles, cleared areas, etc) as far as possible.
Reduction	Contractor	Utilise fencing options that do not create a significant visual barrier. Access roads which are not required post-construction or later, post decommissioning should be ripped and rehabilitated. After decommissioning, all infrastructures should be

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		removed and all disturbed areas appropriately rehabilitated.
Reduction	Contractor	Reduce the creation of cleared areas to the absolute minimum to lessen the visual scarring of the landscape.
Reduction	Contractor	Mitigate secondary visual impacts associated with the construction of roads by using existing roads wherever possible. Where new roads are required, these should be planned carefully, taking due cognisance of the topography. Roads should be laid out along the contour wherever possible and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.
Reduction	Contractor	Access roads which are not required post-construction or later, post decommissioning should be ripped and rehabilitated.
Reduction	Contractor	Mitigate visual impacts associated with the construction phase, albeit temporary, through proper planning, management and rehabilitation of all construction sites.
Reduction	Applicant Contractor	Retain a buffer (approximately 20m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary. This measure will give some distance between the facility footprint and the visual receptors.
Reduction	Contractor	Retain and maintain natural vegetation in all areas outside of the development footprint.

Aspect 23: Heritage impacts

Description of potential impacts

- Surveying and pegging of temporary footprints can disturb sites of historical significance, i.e. Graves.
- Clearing and other earthmoving activities (such as excavating, drilling) can reveal and disturb heritage resources[1], sites of archaeological significance and graves.

Uncertainties & limitations with predicting this impact

- 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

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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 (Almond, 2017).

Assumptions made when assessing the impact

- It is unlikely that any significant impacts on heritage resources will result from the proposed development, as initial indications are that limited heritage sites are present on the proposed footprints.
- Cultural Resources are all non-physical and physical man-made occurrences, as well as natural occurrences associated with human activity. These include all sites, structure and artifacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development (Pelser A. J., 2022).
- The significance of the sites, structures and artifacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is done with reference to any number of these aspects (Pelser A. J., 2022).

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	**Mitigation Action**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Acceptability**	**Status**	**Mitigation potential (to meet objectives)**
Preferred Alternative	**Without**	**3**	**4**	**4**	**4**	44	**3**	Negative	H
	With	**2**	**2**	**2**	**3**	18	**2**	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Heritage resources are irreplaceable.

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Mitigations

Goal: Address social concerns.

Objective(s) (including targets):

- Zero loss of heritage resources and all finds are to be recorded.
- To ensure construction activities do not disturb know or incidental heritage sites.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Contractor	Include an awareness of heritage resources in the environmental induction. Categories of heritage resources include, *inter alia*: • Evidence of archaeological sites or remains include remnants of stone-made structures, indigenous ceramics, bones, stone artifacts, ostrich eggshell fragments, marine shell and charcoal/ash concentrations. • Archaeological or paleontological sites over 100 years old, • Sites of cultural significance associated with oral histories, • Significant cultural landscapes or viewscapes, • Burial grounds, unmarked human burials, graves of victims of conflict, and/or graves older than 60 years, • Structures older than 60 years, • Fossils, etc. All areas of heritage value must be demarcated and avoided. Or these sites needs to be either fenced-off or a Buffer Zone of at least 30m placed around the perimeter of each site to prevent accidental damage to these sites during the development of and subsequent operation of the Solar PV Facility. Construction must be undertaken in accordance with the developed Cultural Heritage Management Plan.
Avoidance	Applicant Contractor	All formal and informal cemeteries and burials must be left in situ and not be disturbed. If this is not possible, a permit must be applied for in terms of Section 36 of the NHRA (Act 25 of 1999) and is subject to mandatory public consultation. No mitigation work may commence on these sites without a

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		permit issued in this regard. Mitigation such as on-site relocation of the possible rock engravings must be considered or donation to a repository for long term curation, with destruction as a last resort. Information Plaques about the sites of historical significance should be placed at points of interest in and at entry/exist points to the area as indicated by the archaeologists/heritage specialists. The plaques need to be weather-proof, and UV coated, with chromadek suggested as it can be printed on and is fairly durable.
Avoidance	Contractor	Contact a professional archaeologist or palaeontologist, depending on the nature of the finds, as soon as possible to inspect the findings.
Avoidance	Contractor	In the event of discovering a heritage resource, stop reconstruction activities and alert the SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit immediately. Natasha Higgitt, Heritage Officer T: +27 21 462 4502 | F: +27 21 462 4509 | C: +27 82 507 0378. E: nhiggitt@sahra.org.za 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. Ongoing monitoring for chance fossil finds within development footprint during construction phase. The older consolidated fluvial deposits along the Brakrivier be avoided during construction since they do contain fossil wood.

Operational Phase

Activity Group 1: Human influence (staff conduct and movement)

Description of potential impacts

- Litter can get washed into storm water drains and watercourses.

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- Littering can pose a risk of suffocation to wild animals.
- New (permanent) jobs for local residents will increase income and buying power within the local community.
- Littering is visually intrusive.
- Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.
- Increase in traffic due to entering and exiting the site during the operational phase can impact on affected landowners and road users.

Uncertainties & limitations with predicting this impact

- None.

Assumptions made when assessing the impact

- Once construction is over, only operational staff will be on-site, whose impact will be manageable & negligible.

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Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	2	2	3	3	21	2	Negative	H
	With	1	1	2	2	8	1	Positive	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- If staff conduct is managed by a firm policy and adhered to, any impact caused will be reversible.

Mitigations

Goal: To avoid human influence on degrading the socio-environmental balance.

Objective(s) (including targets):

- Minimize human influence on environmental degradation and community structure.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	No dry wood, living plant or part thereof may be harvested from any plant community (including poaching of animals).
Reduction	Contractor	No burning, including of waste for any reason.
Rectification	Contractor	Follow housekeeping rules to avoid littering (littering is likely to be more prevalent at designated eating/rest areas).
Avoidance	Contractor Applicant	Have environmental toolbox / educational talks on at least a fortnightly basis.
Avoidance	Contractor Applicant	All staff must undergo a site induction that outlines the socio-environmental constraints of the site.

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Reduction	Applicant Contractor	If possible, use common transport to get workers on and off the site.
Reduction	Contractor	Have adequate dustbins on and around the site.
Avoidance	Applicant	Monitoring of social mitigation and management measures.
Avoidance	Applicant	Implementation of a community relations strategy until all activities on site cease and rehabilitation is completed.
Avoidance	Applicant	Implement safety plan, access protocols, grievance mechanism and compensation policy.

Activity Group 2: Consumption (energy, water, and other resources)

Description of potential impacts

- Comments received from **Francois Taljaard**, Town Planner, Emthanjeni Municipality (**Table 8**); investigate potential impacts on the shortage of water - uncontrolled abstraction from a watercourse or aquifer (borehole) can reduce the natural reserve required for ecological function, such as when the demand for water during operation exceeds the permissible allocation.
- Solar PV cells do not use water for generating electricity, but they do need to be cleaned. Water will also be required for human consumption (drinking, sanitation and food preparation).
- Water required for human consumption and maintenance of the solar panels can be used excessively / wastefully.
- Uncontrolled abstraction from a watercourse or aquifer (borehole) can reduce the natural reserve required for ecological function, such as when the demand for water during operation exceeds the permissible allocation.
- Increase in the number of people in the area might have an influence on the depletion of resources.

Uncertainties & limitations with predicting this impact

- The underground aquifer / groundwater resource is capable of meeting the water requirements of the project without affecting the landowner nor adjacent landowner's yields.

Assumptions made when assessing the impact

- South Africa is a dry country and water will be used sparingly - without waste.

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- Electricity to the operations building will be required from the Eskom grid and will be duly supplied.

Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	3	2	4	3	27	2	Neutral	H
	With	2	1	3	2	12	1	Positive	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Water required for human consumption and construction that is not used sparingly and within the resource capability can affect yields of the landowner and possibly adjacent landowners too. The quantities deemed necessary for the project are unlikely to result in overutilization or irreversible impacts on the resource.

Mitigations

Goal: Avoid wasteful use of water resources.

Objective(s) (including targets):

- Use resources sparingly and sustainably within the determined sustainable yield of each resource and within promulgated abstraction rates.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Applicant Contractor	Water leaks shall be repaired immediately upon being found.
Avoidance	Applicant Contractor	Water shall be used sparingly even for consumption purposes.

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		Water used for potable (drinking) purposes must be tested to ensure compliance with the minimum standards. Should elements of the water not comply, the water must be treated to ensure no acute or chronic health risks
Avoidance	Contractor	Water taps shall be closed when not in use.
Avoidance	Contractor	Place a cistern displacement device in the toilet cistern. Educate employees on the importance and practices of water efficiency. If practical, consider harvesting rainwater from drainpipes. Use an aerator and / or a water flow-reducing spout on the taps and shower heads.
Reduction	Applicant Contractor	Reuse and recycling of water could be considered.
Avoidance	Applicant Contractor	Water meters will be installed at all abstraction points to ensure the volumes used falls within the resource capacity as well as legal limits.

Activity Group 3: Maintenance activities

Description of potential impacts

- Gravel roads and fences are also sources of erosion if not maintained or managed because they channel uninterrupted flow of surface water runoff.
- Sediment export from uncontrolled runoff-induced erosion depositing into watercourses.
- Monitor rehabilitated areas and implement remedial action as and when required (VIA).
- Any movements by vehicle and personnel should be limited to within the footprint of power lines and other associated infrastructure, especially during routine maintenance procedures. Utmost care should be taken to not disturb nests that may be constructed on power line structures.

Uncertainties & limitations with predicting this impact

- None known.

Assumptions made when assessing the impact

- Due to low fire risk, fence lines and service roads will not be completely devoid of vegetation cover and have stormwater controls installed where necessary.

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Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	2	2	4	3	24	1	Neutral	H
	With	1	1	2	2	8	1	Positive	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Poor stormwater management resulting in erosion can result in large-scale export of in situ soil, leaving inadequate substrate for vegetation growth and ongoing erosion systems.
- Impact of construction on visual receptors in close proximity to the solar facility, including road users and local homesteads.

Mitigations

Goal: To ensure continued environmental sustainability and ecological functionality.

Objective(s) (including targets):

- To avoid long-term degradation.
- To promote ecological function

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Applicant	All fences have to be maintained to ensure continued operational efficiency. Where possible, use visual screens to minimise the visual impact on the scenic resources of this region.

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		Have minimal placements that can be visually intrusive to sensitive receptors.
Avoidance	Applicant	After decommissioning, all infrastructures should be removed and all disturbed areas appropriately rehabilitated. Areas disturbed and rehabilitated during construction shall be monitored for signs of erosion and if found to occur, immediately corrected ('source') and repaired ('symptom').
Avoidance	Applicant	Areas disturbed during construction shall be monitored for the recruitment of weed, invader and alien plant species and controlled immediately upon being found to occur.

Activity Group 4: Lighting to create visibility at night

Description of potential impacts

- Lighting can cause light pollution and be visibly intrusive in remote areas.
- Lighting can help improve security to prevent theft at night.
- If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects.
- The use of lighting at night should be kept to a minimum, so as not to unnecessarily attract invertebrates to the solar facility and possibly their avian predators, and to minimise disturbance to birds flying over the facility at night.

Uncertainties & limitations with predicting this impact

- The level of lighting at night for inter alia security purposes is uncertain.

Assumptions made when assessing the impact

- The main office and security office will be lit at night.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternat	**Without**	3	2	3	2	16	1	Neutral	H
	With	1	1	2	1	4	1	Neutr	

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ive								al	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Effective lighting will limit visibility to surrounding landowners and users.

Mitigations

Goal: To supply adequate lighting to ensure security of assets with limited dispersal to the surrounding area.

Objective(s) (including targets):

- To ensure that the lighting does not disperse beyond the operational footprint.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Contractor	Install lighting that focusses light onto the footprint alone.
Reduction	Contractor	Utilise light sources that are energy efficient with reduced attraction for local insect life.
Reduction	Contractor	If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects.
Reduction	Contractor	The use of lighting at night should be kept to a minimum, so as not to unnecessarily attract invertebrates to the solar facility and possibly their avian predators, and to minimise disturbance to birds flying over the facility at night. Anthropogenic impacts must be minimized to reduce impacts on nocturnal species, including but not limited to reduced lighting that may influence bat foraging behaviour. Utilise down lighting, with a bulb type that has a lower insect attractant value.

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Activity Group 5: Waste generation

Description of potential impacts

- Solid and liquid waste can contaminate the ground (litter, spillage) if improperly handled, stored or disposed.
- Improper handling, storage or disposal of waste can cause toxicity – the introduction of toxic or hazardous substances into a watercourse, i.e. acidification, the increased acidity of waterways through leeching (i.e. acid forming substances).
- Improper handling, storage and disposal of waste can cause toxicity – is the introduction of toxic or hazardous substances into an environment that may adversely affect the health of people.
- Burning waste can cause smoke inhalation.
- Illegal dumping will remove natural habitat and result in the loss of certain land uses like agriculture and conservation.
- Excess waste puts a burden on existing landfill sites.
- Hazardous waste, particularly large amounts of it is expense to dispose of.
- Illegal dumping sites cannot retain the ecological functions and land use required to generate ecosystem goods and services and tangible economic benefits including income from conservation or farming.
- Solid waste can be blown away and into the landscape.
- Waste contaminated or storage areas and illegal dumps can be visibly intrusive in a natural landscape.

Uncertainties & limitations with predicting this impact

- The full suite of waste types generated during the operational phase uncertain.

Assumptions made when assessing the impact

- An appointed service provider will collect waste on a regular (as required) basis and dispose of the waste at a designated landfill site.
- Waste will be largely office waste.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred	**Without**	3	2	3	3	24	2	Negative	H

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Alternative	**With**	2	1	2	2	10	1	Positive	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Poor waste management is unlikely to affect areas outside of the footprint due to secure fencing of perimeter, so no irreplaceable loss of resource expected.

Mitigations

Goal: To ensure sound waste management practices.

Objective(s) (including targets):

- To properly manage, store and dispose of waste.
- To keep accurate records of waste generated by type.
- To endeavour to recycle waste and minimise disposal to landfill.

Mitigations to potential impacts resulting from waste generation		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Contractor	No burning, burying or illegal dumping of waste will be permitted. The site will be kept tidy at all times. All waste shall be picked up daily. Maintain good housekeeping tendencies.
Avoidance	Contractor	Handling, storage and disposal of hazardous waste must ensure not contamination and legal disposal results.
Avoidance	Contractor	An integrated waste management plan must be formulated that holistically manages all waste streams on site.

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Activity Group 6: Working within aquatic and terrestrial ecology systems

Description of potential impacts

- Comments from **Jacoline Mans,** Chief Forester, DAFF (**Table 8**); investigate the impacts on the riparian vegetation - employees can harvest indigenous plants for muthi, firewood and poach animals.
- The operation of the facility will generate noise and disturbance which may deter some fauna from the area. The areas inside the facility will requirement management and if this is not done appropriately, it could impact adjacent intact areas through impacts such as erosion, alien plant invasion and contamination from pollutants, herbicides, or pesticides. The associated overhead power lines will pose a risk to avifauna susceptible to collisions and electrocution with power line infrastructure.

Uncertainties & limitations with predicting this impact

- A full understanding of the receiving terrestrial and aquatic potential impacts is unknown due to a relatively low literature base on the subject.
- The aquatic study specialist indicated that whilst effort have been made to verify that information provided in the report is reliable, accurate and relevant, the report is based on information that could reasonably have been sourced within the time period allocated to the report and is dependent on the information provided by management and/or its representatives (Deacon, 2022).

Assumptions made when assessing the impact

- The preferred development footprint has been effectively located outside of critical terrestrial & aquatic environments, significantly reducing the impact on sensitive biodiversity.
- Project proponents will always strive to avoid and mitigate potentially negative project related impacts on the environment, with impact avoidance being considered the most successful approach, followed by mitigation. It further assumes that the project proponents will seek to enhance potential positive impacts on the environment (Deacon, 2022).

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
2	**Without**	3	3	4	3	30	2	Negative	M

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	With	2	2	3	2	14	1	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**		N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Dependent on the nature and extent of the impact.

Mitigations

Goal: To minimize the impacts on terrestrial & aquatic ecology.

Objective(s) (including targets):

- To have effective terrestrial and aquatic ecological management.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Operator	Do not harvest any of the vegetation for any purposes whatsoever.
Reduction	Operator	Ensure a no fire policy where the risk of runaway fires can occur.
Avoidance	Operator	Do not poach or hunt animals within the footprints. "Problem" animals must be dealt with assistance from the provincial conservation authority.
Reduction	Operator	Noise monitoring must take place following any complaints of a noise generation nature.
Rectification	Operator	It is important that areas with low lying depressions where water pools during the autumn and summer rainfall season, are not altered as they may be important areas not only for bats to drink and forage but also for socialising. A bat specialist must be appointed at the commencement of the operational phase to assess if the mitigations proposed in the EMPr during planning, construction and operation are meeting the desired targets and outcomes; and suggest any additional mitigations or amendments based on his / her findings.

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		Bird kills as a consequence of overhead powerlines, substation or solar panel collision, must be reported to the developer immediately, and corrective actions implemented to mitigate & remedy the casual factors.
Reduction	Operator	Alien invasive vegetation recruitment must be controlled within and along the fence lines of the solar PV footprints. Manual control measures are preferred, but where herbicides are used they must be those endorsed & selective for the target species with the lowest environmental toxicity.

Activity Group 7: Operation of the PV panels, inverters & substation.

Description of potential impacts

- Solar PV panels do not release Greenhouse Gas / Global Warming Emissions, that contribute to climate change.
- The reflection of sunlight off the solar panels can be visibly intrusive in the natural environment.
- The change in the microclimate beneath the solar panels and between the solar panels may provide different ecological conditions which may encourage or provide suitable conditions for botanical diversity.

Uncertainties & limitations with predicting this impact

- The ultimate reflectance effect of the solar PV panels on the surrounding natural environment is unquantified.

Assumptions made when assessing the impact

- Solar PV "farms" are not new to other parts of the world, and significant operational environmental impacts are likely to have been exposed since their inception, if significant deleterious effects were present.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternat	**Without**	2	2	3	3	21	2	Negative	H
	With	1	1	2	2	8	1	Neutra	

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ive								l	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutra l	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- The solar PV plant's operational impact on the receiving environment is expected to be low, other than acting as an exclusion zone to wild life, it is not expected that any irreplaceable loss of resources will occur.

Mitigations

Goal: To minimize the impact of the reflection of sunlight off the solar panels.

Objective(s) (including targets):

- To manage the operation of the plant in a way that minimised its reflectance impacts on the surrounding environment.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Applicant	Use non-reflective material for the PV panels (if possible).
Reduction	Applicant	If birds are nesting on the infrastructure of the facility and cannot be tolerated due to operational risks of fire, electrical short, soiling of panels or other problems, birds should be prevented from accessing nesting sites by using mesh or other manner of excluding them. Birds should not be shot, poisoned or harmed as this is not an effective control method and has negative ecological consequences. Birds already with eggs and chicks should be allowed to fledge their chicks before nests are removed.
Rectification	Proponent	All incidents of collision with panels should be recorded as meticulously as possible, including data related to the species involved, the exact location of collisions within the facility, and suspected cause of death. Post-construction monitoring with the aid of video surveillance should be considered, as this will contribute towards understanding bird interactions with solar panels.

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Decommissioning Phase

Activity Group 1: Disposal of PV panels and other waste

Description of potential impacts

- Illegal dumping of solar PV panels will remove natural habitat.
- Illegal dumping of solar PV panels will result in the loss of certain land uses like agriculture and conservation.
- Excess waste puts a burden on existing landfill sites.
- Illegal dumping sites cannot retain the ecological functions and land use required to generate ecosystem goods and services and tangible economic benefits including income from conservation or farming.
- Waste contaminated areas and illegal dumps can be visibly intrusive in a natural landscape.

Uncertainties & limitations with predicting this impact

- Adequate disposal sites / facilities available for solar PV panels at the termination of the project.

Assumptions made when assessing the impact

- The amount of solar PV plants globally is likely to give rise to new sustainable disposal practices and technologies that will not necessitate disposal to landfill.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	2	2	3	2	14	2	Negative	L
	With	1	1	2	2	8	1	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

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Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- The decommissioning of the site will allow for the restoration of the full property to agriculture and wild life land uses, assuming decommissioning is done in a responsible and environmentally responsible manner.

Mitigations

Goal: To minimize waste and ensure suitable disposal at the end of project life.

Objective(s) (including targets):

- Avoid improper waste disposal.
- No evidence of residual structures relating to the project, unless specifically retained at landowner's request.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Applicant	Properly dispose of waste (including the PV panels). All litter and rubble from decommissioning should be cleaned up and removed from the site. All panels must be sent to PV Cycle (including a potential facility in South Africa at time of decommissioning), a European solar panel recycling association, that developed a mechanical and thermal treatment process that achieves a 96 percent recovery rate for silicon-based photovoltaic panels. Soventix undertakes to adhere to prevailing internationally & nationally recognised protocols and procedures for disposal of solar PV panels and associated technology. Should the Electronic Waste Association of South African (e-WASA) establish a more stringent protocol regarding the recycling and handling of solar panels, Soventix will comply.
Reduction	Applicant	Apply the "reuse, reduce, recycle" waste management model
Reduction	Applicant	If there are active nests at the site at decommissioning, these should be left along until the birds have finished breeding.
Reduction	Applicant	The illegal dumping or disposal of waste generated from the decommissioning of the Solar PV Plant within the development footprint, no-go areas or on adjacent properties

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		is strictly prohibited. All G6 material must be removed to full depth and all waste must be suitably disposed of.

Activity Group 2: Human influences (staff conduct, movement)

Description of potential impacts

- Loud employees can cause a noise nuisance factor.
- Improper sanitation at latrine sites can cause an odour.
- Litter can get washed into watercourses.
- Littering can pose a risk of suffocation to wild animals (littering is likely to be more prevalent at designated eating/rest areas).
- Work related activities extending beyond the footprint - called construction (or decommissioning) creep - can disturb habitats..

Uncertainties & limitations with predicting this impact

- None known.

Assumptions made when assessing the impact

- At time of decommissioning of the plant, a small work force will be required to remove all infrastructure, and necessary facilities (ablution, water etc.) will be left on site, to provide the necessary facilities for the decommissioning teams.
- Since detail mitigation procedures have been presented, it is trusted that the construction team management with the help of the ECO will ensure that these mitigatory measures be implemented where applicable (Deacon, 2022).

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet objectives)
Preferred Alternative	**Without**	2	2	3	3	21	2	Neutral	M
	With	1	1	2	2	8	1	Positive	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

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High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Well managed human resource practices should ensure no further degradation of the footprints during decommissioning.

Mitigations

Goal:

- To avoid human induced environmental pollution, through waste & noise management and human behaviour.
- Healthy animals (wild and domesticated).

Objective(s) (including targets):

- To maintain good housekeeping tendencies.
- Zero incidence (in the incident register) of waste induced harm to wildlife or livestock.
- No litter observed in the development footprint and no-go areas.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Applicant Contractor	Avoid loud noise (i.e. screaming).
Reduction	Applicant Contractor	Chemical toilets shall be kept hygienic and cleaned daily to avoid unpleasant odours.
Rectification	Applicant Contractor	Follow housekeeping rules to avoid littering. All litter and rubble from decommissioning should be cleaned up and removed from the site.
Reduction	Applicant Contractor	Designate a temporary waste storage area, enclose it in a fence that cannot be breached by fauna, and provide sufficient scavenger proof dust bins with black bags inside the construction camp
Reduction	Employees Contractor	Clearly demarcate the construction / decommissioning footprint.

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Activity Group 3: Rehabilitation of affected footprints

Description of potential impacts

- Rehabilitated sites can cause erosion and, if adjacent to or within a watercourse, sedimentation.
- New growth on rehabilitated sites can be overgrazed by mammals.
- Rehabilitation that is not in accordance with the natural plant communities of the area can result in the introduction of non-indigenous plants.
- Disturbed areas, including those recently rehabilitated by the contractor are susceptible to weed, invader and alien plant[1] recruitment and the replacement of indigenous plant communities if not controlled.
- If shaped or sloped incorrectly, such as when the rehabilitated areas are not returned to their original morphology, the resulting landscape can change surface water flow patterns and so too plant communities, more so in arid environments.
- Reinstate ecological function by recreating an open system.
- Comments received from **Francois Taljaard**, Town Planner, Emthanjeni Municipality (**Table 8**); investigate rezoning of each site where development is to take place[7-9] - the zoning associated with the operation of a solar PV plant may hinder the successful implementation of the original land use.
- Disturbed sites will comprise mostly cleared / denuded areas that are vulnerable to degradation, including erosion, alien invasive, leading to a loss of biodiversity and ecosystem functions and processes.
- Rehabilitation can be expensive.
- All anthropogenic influences required during operation can be visibly intrusive in the natural landscape.

Uncertainties & limitations with predicting this impact

- The magnitude of the impact, specifically the extent and severity of the erosion and sedimentation at time of decommissioning, was not known.
- The magnitude of the impact, specifically the extent of alien plant invasion onto rehabilitated areas at time of decommissioning, was not known.

Assumptions made when assessing the impact

- Disturbed areas will degrade if left alone.

Assessment ((*Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	Mitigation Action	Extent	Magnitude	Duration	Probability	Significance	Acceptability	Status	Mitigation potential (to meet

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									objectives)
Preferred Alternative	**Without**	2	2	3	4	28	2	Negative	h
	With	2	1	2	2	10	1	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Positive	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility/The degree to which the impact may cause an irreplaceable loss of resources

- Disturbed areas can be rehabilitated. The cost thereof will depend on the severity and extent of the degradation.
- The extent of reversibility is dependent on the severity of the erosion, including the nature of the remaining *in situ* material, the amount of soil that has been exported from a site and whether the exported soil is recoverable. For example, soil washed from a gravel road into a mitre drain can be graded back onto the surface of the road, whereas soil that is washed from a gully into a water course is not recoverable and the source cannot be re-instated without significant intervention and cost. Although erosion has the potential to irreversibly change the relief, eroded sites can be stabilized through rehabilitation measures.
- If controlled timeously the impact of alien plant species can be negligible. However, if allowed to grow unabated, alien invasive species can replace entire plant communities with homogeneous stands. Biodiversity is significantly reduced and ecosystem function is altered. In the latter case, rehabilitation will require significant intervention and cost.

Mitigations

Goal:

Facilitate the natural rehabilitation of disturbed areas and control the replacement of indigenous vegetation by weed, invader and exotic plant species.

Objective(s) (including targets):

- To avoid long-term degradation.
- To reduce erosion of and rehabilitated access roads.
- To prevent the maturation and reproduction of weed, invader and exotic plant species from occurring on any land that is rehabilitated after construction.

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Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Avoidance	Applicant	Reinstate the original land use – rezoning
Reduction	Applicant	Disturbed habitats resulting from construction-related activities must be rehabilitated immediately after the cessation of those activities on or near the disturbed habitats. The rehabilitated servitudes shall be monitored following the completion of decommissioning of the Solar PV plant for the recruitment and subsequent control of weed, invader, and alien plant species.
Rectification	Applicant	If erosion is found to occur during the aforesaid monitoring, the Applicant shall immediately correct (the 'source') and repair (the 'symptom') the erosion using method(s) that are an improvement on the mitigations proposed in the EMPr or on the unsuccessful mitigations originally used on site.
Reduction	Applicant	The rehabilitated plant servitudes shall be monitored following the completion of the construction of the Solar PV plant for the recruitment of weed, invader, and alien plant species.
Rectification	Applicant	Applicant shall immediately uproot, cut, or debark weed, invader and alien plant species upon being identified.
Rectification	Applicant	Applicant shall collect and destroy all seeds of weed, invader and alien plant species occurring within disturbed and/or rehabilitated areas.
Rectification	Applicant	Following the layered reinstatement of subsoil and topsoil, seeding of the disturbed footprint must make use of indigenous, locally occurring species. Additionally, the footprint should be covered with a light mulch e.g. loosely distributed hay bales, to create a suitable microclimate for recruitment. Constant monitoring must be undertaken for the recruitment of alien invasive vegetation and suitable controls implemented. Rehabilitation must be in accordance with the natural plant communities of the area.
Rectification	Applicant	Reinstate ecological function by recreating an open system.
Rectification	Applicant	All anthropogenic influences required during operation must not be visibly intrusive in the natural landscape.

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Activity Group 4: Loss of employment

Description of potential impacts

- Change of land use / livelihoods.
- Decline in economic state.
- Economic impacts.
- Increased unemployment after construction & operation ends.

Uncertainties & limitations with predicting this impact

- Identified concerns from local residents have not been forthcoming thus far in the Public Participation Process.
- It is uncertain if the proponent will sign an additional Power Purchase Agreement with the utility for an additional term.

Assumptions made when assessing the impact

- None known.

Assessment (*(Extent + Magnitude+ Duration) x Probability = Significance*):

Alternative	**Mitigation Action**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**	**Acceptability**	**Status**	**Mitigation potential (to meet objectives)**
2	**Without**	3	3	4	3	30	3	Negative	M
	With	2	2	4	3	24	2	Neutral	
No-go	**N/A**	**1**	**1**	**1**	**1**	**3**	**1**	Neutral	N/A

High Significance: 30 - 40	Medium Significance: 20 - 29	Low Significance: 1 - 19

Impact reversibility / The degree to which the impact may cause an irreplaceable loss of resources

- Following the operation period there will be a loss of employment opportunities.

Mitigations

Goal: To minimize the negative social impacts at the end of each phase of the project.
Objective(s) (including targets):

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- To avoid creating false hope where job creation opportunities are concerned.
- Develop & effective implementation of an Exit Strategy.

Mitigations to potential impacts & risks		
Type of mitigation	**Responsible authority**	**Mitigation**
Reduction	Applicant Contractor	Transparent communication through the right channels to communicate with the community as to when and how their contracts will come to an end.
Reduction	Applicant Contractor	Implement safety plan, access protocols, grievance mechanism and compensation policy.
Reduction	Applicant Contractor	Continue community relations strategy until all activities on site cease and rehabilitation is completed.
Reduction	Applicant Contractor	Implement social mitigation for closure.
Reduction	Applicant	Develop and implement a holistic Exit Strategy that adequately and timeously communicates and buffers staff lay-offs and mitigates losses in employment and income through formalised and structured skills development programmes. Clearly make the terms and conditions of employment known to all employees (temporary & permanent) including anticipated duration of each phase.

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(VI) THE METHODOLOGY USED IN IDENTIFYING AND RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCES EXTENT, DURATION AND PROBABILITY OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

See Section V for impact assessment methodology for assessing the preferred development footprint against the No-Go option, as well as the methodology for assessing the impacts and risks associated with the activities, structures and infrastructure undertaken on the preferred development footprint.

(VII) POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND ON THE COMMUNITY THAT MAY BE AFFECTED FOCUSING ON THE GEOGRAPHICAL, PHYSICAL, BIOLOGICAL, SOCIAL, ECONOMIC, HERITAGE AND CULTURAL ASPECTS; AND

See Section V for details.

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(VIII) THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND LEVEL OF RESIDUAL RISK.

See Section V for details.

(IX) THE OUTCOME OF THE SITE SELECTION MATRIX

The Environmental Scoping Study identified the potential positive and negative environmental (biophysical and social) impacts associated with the proposed establishment of a Solar PV Plant and associated infrastructure. A number of issues for consideration were identified by the EAP and appointed Specialists during the scoping process. This following site selection matrix below serves to outline the approach utilised to evaluate the suitability of the site and development footprint for the establishment of the proposed Solar PV Plant.

Definition of impact magnitude and significance using systematic generic and judgemental criteria (DEAT, 2002)

Significance (significant impacts) can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e. biophysical, social and economic). Such judgement reflects the political reality of impact assessment in which significance is translated into public acceptability of impacts.

Low magnitude & significance: Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural and economic activities of communities can continue unchanged.

Medium magnitude & significance: Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly easily possible. Social, cultural and economic activities of communities are changed, but can be continued (albeit in a different form). Modification of the project design or alternative action may be required.

High/Very High magnitude & significance: Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt.

Scoring Index

1 = Low Impact	**2 = Medium**	**3 = High Impact**	**4 = Very High Impact**

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	Impact		
Ideal site for development, or *positive* impact	Acceptable (impact of moderate significance - *negative*)	Not preferred (impact of high significance - *negative*)	Not suitable for development (impact of very high significance - *negative*)

Table 29: Site Selection Matrix comparing impacts to the potential development site versus the proposed development footprint (additional selection matrices were also used in Section V of the Impact & Risk Assessment process).

Criteria	**Site & Development Footprint selection**	
	Site	**Footprint**
Topography		
Gradients & Slope (i.e. Flat or steep)	**2**	**1**
	Slope analysis indicates that the property overall is flat (<8%) but has several dolerite dykes & sandstone outcrops (koppies) with a slope exceeding 18%, making certain areas not suitable for solar PV development.	The development footprint is very flat (<8%) with dolerite dykes excluded from the footprint (Figure 31).
Soil Type	**3**	**2**
	Twelve soil types were identified on the property including additional watercourses and permanent (artificial) and temporary wetland soils (fifteen in total) (Figure 32).	Ten of the fifteen soil types are represented on the footprint. No temporary wetland or watercourse soils are represented, with deep clay soils largely excluded from the footprint (Figure 33). The 132 kV distribution powerline, connecting the solar PV park to the Main Transmission Station (MTS) will cross a watercourse and run alongside a dolerite ridgeline.
Drainage	**3**	**2**
	The property is intersected by an expansive floodplain associated with the Brak River and tributaries.	No watercourses are directly affected by the footprint, but areas of high stormwater runoff have been identified on a section of the footprint (under high rainfall conditions) (Figures 34, 35 & 36.

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		A watercourse will be affected by the connecting 132 kV distribution powerline.
Sensitive Receptors		
Wetlands, water resources & flood plains	**3**	**2**
	The Brak River and associated floodplain and tributaries run through the property. The Brak River extent is a Critical Biodiversity Area in terms of the Northern Cape Biodiversity Conservation Plan.	No natural watercourses are affected by the footprint, only artificial wetlands associated with groundwater abstraction points. A watercourse will be affected by the 132 kV distribution powerline.
Landscape character	**3**	**2**
	Landscape strongly associated with agriculture (livestock production) and open natural karoo landscapes, with various sections of the property more visible to surrounding land users.	Landscape strongly associated with agriculture (livestock production) and open natural karoo landscapes, with the footprint less visible to surrounding land users.
Zone of Visual Influence	**3**	**2**
	Viewshed analysis & Zone of Visual Influence indicates that ill located development, especially on high-lying ground, would have a far stretching visual impact on surrounding land users.	Viewshed analysis & Zone of Visual Influence indicates that the development will have a visual impact up to 9km from the footprint, with limited impact up to 10km (Figures 37 & 38).
Heritage features	**3**	**2**
	Multiple cultural heritage, archaeology & palaeontology sites were identified on the site.	The footprint has been delineated to reduce impact on cultural heritage, archaeology & palaeontology sites as far as possible, with the significant cultural heritage sites associated with outcrops which have been excluded from the footprint (Figure 39).
Terrestrial and Aquatic Sensitivities		
Flora	**2**	**2**
	The full extent of the property is classed as having a "low" plant species significance according to the screening report. According to the	The footprint has been positioned to avoid more sensitive vegetation communities.

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	national vegetation map, the entire site falls within a single vegetation type, Northern Upper Karoo. Northern Upper Karoo is one of the most extensive vegetation types in the country and occupies over 40 000km^2 of the interior Karoo. Northern Upper Karoo has not been significantly affected by transformation and is still approximately 96% intact and is classified as Least Threatened (Mucina & Rutherford 2006). From the presence of the Brak River on the site, which clearly has a large floodplain area, it is evident that the VegMap provides an oversimplification of the vegetation of the site and there are at least three distinct vegetation types present on the site. The open plains of the site correspond with the Northern Upper Karoo vegetation type, but the dolerite hills and koppies present have vegetation more closely allied with Upper Karoo Hardeveld, while the floodplain of the Brak River is clearly characterised by an azonal vegetation type, allied with Upper Gariep Alluvial Vegetation (Todd, 2017).	One red data species was identified and confirmed on the property (not necessarily the footprint) of unknown location namely; *Chasmatophyllum maninum* which are associated with rocky flats and areas of exposed bedrock. Other species of significance observed at the site (not necessarily on the footprint) include *Stomatium pluridens* and *Euphorbia crassipes*, which are regional endemics and provincially protected, while other protected species include *Aloe broomii* var. *broomii, Aloe claviflora, Pachypodium succulentum, Ammocharis coranica,* and *Boscia albitrunca.* Alluvial vegetation will be affected by the installation of the 132 kV distribution powerline.
Fauna	**3**	**2**
	Mammals The site lies within the range of 63 terrestrial mammals, including five listed species namely, the Brown Hyaena *Hyaena brunnea* (NT), South African Hedgehog *Atelerix frontalis* (NT), the African White-tailed Rat *Mystromys albicaudatus* (VU), the Blackfooted Cat *Felis nigripes* (VU) and the Serval *Leptailrus serval*	**Mammals** All of the identified listed species have relatively wide ranges across South Africa and the development would not be likely to result in a significant overall decline in the available habitat for these species, especially seeing the footprint is outside outcrops and watercourses. In terms of specific habitats and

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	(NT). While the Hedgehog and Black-footed Cat are likely to occur in the broad area, the Brown Hyaena is less likely to be present due to naturally low population density as well as persecution from farmers. Adequate cover and water are essential habitat requirements for the Serval and given the sparse cover at the site this species is unlikely to occur here and the area is not viewed as important habitat for this species which favours tall grassland. **Reptiles** The site represents a relatively rich habitat for reptiles as it contains various types of rocky outcrops as well as densely vegetated riparian areas and flats of varying texture. Despite the likely high reptile richness at the site, no listed species are known from the area. **Amphibians** A large proportion of the site contains well developed drainage lines and wetlands, which are likely to be the most important areas for amphibians at the site. Natural pans and man-made shallow water bodies are also present and confirmed as breeding sites for amphibians including the Giant Bullfrog, which can be confirmed present at the site. These features should be appropriately buffered to limit impact on amphibians at the site. **Avifauna** The solar facility will result in a	areas at the site which are likely to be of above average significance for mammals, the vicinity of the Brak River is important as habitat as well as for landscape connectivity, while the rocky hills are also identified as being important habitat for fauna and have higher species richness than the adjacent plains. (Todd, 2017). **Reptiles** Many reptile species would be able to use the vegetation under the panels and some species would take advantage of the buildings and structures present. Overall, as there are few range-restricted or listed reptile species at the site, impacts on reptiles from the development are likely to be local in nature and not of broader significance. **Amphibians** Development of the footprint away from permanent water bodies will limit impact on amphibians as habitat loss and erosion would be a primary risk factor for amphibians associated with the development, as this would impact water quality and amphibian habitat (Todd, 2017). **Avifauna** Sensitive microhabitats have been avoided, such as the dolerite ridges, water bodies (even when dry), and raptor nests (with a 1 kmbuffer zone).

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	number of impacts on the local avifauna, including habitat loss and disturbance during the construction and operational phases, and potentially direct mortality of priority species colliding with solar panels and associated power line structures during the operational phase. There is also a high probability that the facility will attract a number of species during the operational phase, as a result of foraging and nesting opportunities present within the facilities.	
Sensitive landscape features	**3**	**1**
	The broader property/ site falls within the following sensitive landscapes (Figure 35): 1. Critical Biodiversity Area (CBA), 2. Ecological Support Area (ESA), 3. Strategic Water Source Area, 4. National Freshwater Ecosystem Priority Area (NFEPA): Wetlands; and 5. National Freshwater Ecosystem Priority Area (NFEPA): Rivers.	The footprint falls within the following sensitive landscapes: 1. ESA; and 2. Strategic Water Source Area.
Existing Infrastructure & servitudes		
Accessibility (Roads) & Traffic Management	**2**	**1**
	Access to the property is achieved from the existing N10 national highway onto the district road 2448. Several existing farm roads occur on the property, several through sensitive environment including the Brak River floodplain.	Access to the property is achieved from the N10 national highway onto the district road 2448. Existing and new access roads will be utilised on the Solar PV footprint, very few affecting sensitive environments.
Eskom Servitudes	**2**	**1**
	Several existing Eskom transmission lines run through the property including two 400 kV, one 132 kV powerline and one 33 kV powerline (servicing the landowner premises).	Only the 33 kV powerline servicing the landowner's premises will be affected by the 132 kV distribution line running from the solar PV facility to the

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		Main Transmission Sub-station.
Stormwater	**1**	**2**
	Stormwater is largely left to follow nature flow paths with the exception of berms along existing farm roads (to avoid the roads acting as a conduit) and berms installed along sections of the Brak River to constrain the full extent of the floodplain.	Stormwater flow patterns will be left largely intact as the development will endeavour to minimise vegetation clearance however, berms and channels may be needed where necessary. Additionally, an area of high stormwater flows has been identified on the footprint, which needs to be considered in the design, especially the location of infrastructure with a risk from flooding (Figures 33 -36).
Socio-economic factors		
Employment	**2**	**1**
	The farm currently employs several staff associated with its predominantly livestock production.	A proposed dual land use model, combining continued livestock production with solar PV, will provide significantly more employment opportunities especially during the construction phase, but also during the operational phase.
Sustainable Development	**2**	**2**
	The current agricultural practices, as long as the stocking rates remain within the grazing capacity of the land, is a sustainable practice.	Dual-use can lead to sustainable utilisation of the land, as long as the solar PV footprint retains grazing capacity, and is grazed within the assessed grazing capacity of the footprint (including regular monitoring and updates). Additionally, the combined financial income streams to the landowner (both from livestock sales and passive energy generation income) may provide a better financial model to the landowner.
Land Use Compatibility		

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Land use	**1**	**2**
	Currently zoned and operated as Agriculture.	Currently zoned Agriculture but the footprint for the solar PV development will likely need to be rezoned.
Land capability	**2**	**3**
	Land Capabilities vary across the property, but are largely low and medium, with the exception of the small irrigated area classified as high.	Land Capability 6 to 8 (Low/Moderate to Moderate Sensitivity). The installation of the solar PV facility may result in reduced grazing capacity due to changes in sunlight and precipitation runoff from the panel arrays – but the longer-term effects are still largely unknown.
Existing services (Water availability & Electricity)	**2**	**2**
	There is an existing farm road network on the property, including Eskom 33 kV, 132 kV and 400 kV distribution and transmission lines.	The footprint includes existing farm roads which will need to be upgraded and additional roads created. A 132 kV distribution line will need to be erected from the solar PV switching sub-station to the main transmission sub-station. The distribution line will cross the existing 33 kV distribution line servicing the landowner.
TOTALS	**42**	**32**
<u>Impact Scoring</u> ≤32 Low Impact, 33-55 Medium 56-77 High Impact, 78+ Very-High Impact	**Medium Impact**	**Low Impact**

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(X) THE MOTIVATION FOR NO ALTERNATIVES, INCLUDING ALTERNATIVE LOCATIONS.

(vi) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such

Realistic and achievable alternatives have been assessed with the exception of alternative development footprints. The Phase 2 footprint was one of three alternatives assessed during a previous environmental authorisation application, which in that process was not selected as the preferred alternative due to technical constraints relating to transmission line capacity. This constraint has now been circumnavigated by connecting the Phase 2 to the soon to be built Hydra C Main Transmission Sub-station (MTS) authorisaed as part of Phase 1 (now known as Sun Central Cluster 1) providing for Loop-In, Loop-Out into the existing 400 kV Eskom transmission line.

(XI) THE CONCLUDING STATEMENT FOR THE PREFERRED ALTERNATIVE.

(vii) A concluding statement indicating the preferred alternatives, including preferred location of the activity.

The preferred technology alternative is a Solar PV plant which is considered to be the most feasible option for the Northern Cape, which is experiencing increasing interest in this development sector. The Solar PV technology is the most reliable of the renewable energy technologies considered for electricity generation. As a solid state technology it has the advantage of being able to directly convert sunlight into electricity. Whereas other renewable energy technology including wind, biomass and other solar options must indirectly convert the received energy to thermal or mechanical energy prior to producing electricity.

The core business of the project proponent is PV panel development and installation for the use in the generation of electricity. As such, the fundamental alternative of a development other than to conduct and operate a solar energy facility is therefore not viable in this case and will not be considered further in the EIA.

The preferred site was considered to successfully meet the required criteria to operate an efficient Solar PV plant. The farm portions selected in the Hanover District of the Northern Cape have the benefits of high quality solar irradiation, excellent sun orientation and abundant flat topography. In addition, the vital and necessary Eskom infrastructure including sub stations and powerlines to tie in the Solar PV plant are available.

The Scoping & Environmental Impact Assessment process identified the potential positive and negative environmental (biophysical and social) impacts associated with the proposed establishment of a Solar PV Plant at the preferred development footprint within the site. A number of issues for consideration were identified by the EAP and appointed Specialists

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during the scoping process. These environmental aspects were further evaluated during the EIA process for the preferred location for the establishment of the proposed Solar PV Plant.

SECTION I: DESCRIPTION OF PROCESS TO IDENTIFY, ASSESS AND RANK IMPACTS THROUGH THE LIFE OF THE ACTIVITY

See Section H(v) for full details.

SECTION J: ASSESSMENT OF IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

See Section H(v) for full details of significance ratings for development footprint and activities, structures and infrastructure exercised on the development footprint.

SECTION K: SUMMARY OF SPECIALIST REPORT FINDINGS AND RECOMMENDATIONS

where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.

Visual Impact Assessment
The construction and operation of the proposed Solar facility and its associated infrastructure will have a visual impact on the scenic resources of this region. The solar facility infrastructure will be visible within an area that is generally seen as having a high quality natural and scenic landscape and a resultant tourism value and potential. The infrastructure would thus be visible within an area that incorporates various sensitive visual receptors who would consider visual exposure to this type of infrastructure to be intrusive. The rocky outcrops and open space of the Greater Karoo is of scenic beauty, and the proposed solar facility is expected to transform the natural character of this area for the entire operational phase of the infrastructure. In addition, the tourism value of the region must not be overlooked, specifically its location within Greater Karoo. There are not many options as to the mitigation of the visual impact of the solar facilities. The infrastructure extent exceeds at least 4 km² and vegetation screening or landscaping would only partly be able to hide structures of these dimensions.

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In term of the Alternatives, all three alternatives will be visually exposed to large areas within their respective 10km offsets. This is due to the extent and dimension of the infrastructure associated with solar facilities.

Overall, considering all relevant criteria, Phase **2** is considered the **preferred alternative**, and is recommended from a visual perspective.

Mitigation Measures to be included in EMPr

The following (as detailed in section 6.7) is also recommended:

- Mitigate secondary visual impacts associated with the construction of roads by using existing roads wherever possible. Where new roads are required, these should be planned carefully, taking due cognisance of the topography. Roads should be laid out along the contour wherever possible, and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.
- Access roads which are not required post-construction or later, post decommissioning should be ripped and rehabilitated.
- Mitigate visual impacts associated with the construction phase, albeit temporary, through proper planning, management and rehabilitation of all construction sites.
- After decommissioning, all infrastructures should be removed and all disturbed areas appropriately rehabilitated.

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- Mitigate secondary visual impacts associated with the construction of roads by using existing roads wherever possible. Where new roads are required, these should be planned carefully, taking due cognisance of the topography. Roads should be laid out along the contour wherever possible and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.
- Access roads which are not required post-construction or later, post decommissioning should be ripped and rehabilitated.
- Mitigate visual impacts associated with the construction phase, albeit temporary, through proper planning, management and rehabilitation of all construction sites.
- Retain a buffer (approximately 20m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary. This measure will give some distance between the facility footprint and the visual receptors.
- Retain and maintain natural vegetation in all areas outside of the development footprint.

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Cumulative impacts:

Without mitigation, the intervisibility with the adjacent north-eastern SCC Phase 3 has the potential to generate a larger, massing effect, and with development of prominent portions of the property, be more visually prominent in the local landscape.

With mitigation, the prominent areas of the site would be excluded and intervisibility with SCC Phase 3 limited. To reduce cumulative effects, this mitigation should be implemented.

Heritage Impact Assessment

A number of known cultural heritage sites (archaeological and/or historical) exist in the larger geographical area within which the study area falls. Several archaeological and historical sites, features and finds were identified and recorded during the physical assessment undertaken.

A fairly large number of sites were identified in the study area during the 2017 & 2021 assessments, dating the Stone Age, proto-historical and later historical (Anglo-Boer War) periods. As some of the sites cannot be avoided and will therefore be directly & negatively impacted by the proposed development actions, they will form part of Phase 2 Archaeological Mitigation work that will be undertaken and completed in due course. Sites that are not directly impacted (i.e demolished or destructed), but still falls within the development footprint, will have to be managed & preserved as part of the project and forms the focus of this Cultural Heritage Management Plan. A number of sites recorded during the 2017 & 2021 assessments fall outside of the development area footprint and are not included in the CHMP. It should once again be stressed that certain portions were inaccessible as a result of recent rains and the fact that sections contains extensive wetlands. Existing dirt tracks/roads and ESKOM servitudes were used and large portions were walked on foot. Areas with the potential for containing evidence of human presence and activity such as erosion dongas; unnatural looking clumps of trees and low outcrops or rocky ridges were focused on as well. Large parts of the study area is flat and open and has been disturbed by agricultural activities that include grazing and crop growing in the recent past and currently.

All the Stone Age sites identified during the assessment are open-air surface scatters of varying densities, with many single or more tool occurrences to extensive and very dense scatters covering a fairly large area (mainly Site 23). Many of the sites fall outside the areas of direct impact, while Site 23 (the most significant of the sites) falling in what we termed PV Plant Area 2. This site needs therefore to be mitigated. This site and others recorded during the February 2017 survey is similar to those recorded by others in the larger area during earlier assessments. They are located close to and around low rocky ridges and dolerite outcrops/dykes. Stone Age quarry sites are usually found at the foot of dolerite hills

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where hornfels outcrops occur. Site 23 and some of the other smaller sites seem to be so-called quarry sites, with dense scatters of flakes, more formal tools and numbers of cores occurring at these sites. Dolerite is also associated with engraving sites. One such site has been recorded at the Commonage in Hanover Town (Palaeo Field Services 2014: 5). Although no rock engravings were identified in the area during the assessment, some rocks with signs of edges being hammered or used were identified. Many of these are located close to sites with stone-packed enclosures though to be associated with the Anglo-Boer War period in the area, although the possibility of these features being related to earlier pastoralist camps cannot be excluded.

Sampson's (1972, 1974) survey of the Seacow drainage near Hanover recorded sites and quarries, ranging from the Earlier, Middle and Later Stone Ages, to proto-historic pastoralist camps and Historic farmyards. This culture-history sequence forms a basis for identifying stone tool industries and historic occupations over the entire district. There have been several investigations in the De Aar district itself because of the ammunition disposal plant to the west and various solar panel projects (e.g. Kaplan 2010; Kruger 2012; Morris 2011). Generally, archaeologists have found scatters of stone tools dating to the Middle and Later Stone Ages. In addition, the ammunition area yielded an Earlier Stone Age scatter, and a few rock art sites are on record for the district (Morris 1988; Rudner and Rudner 1968). These reports show that the De Aar district has a rich archaeological heritage (Huffman 2013: 3).

Surface scatters of stone tools (mostly Early and Middle Stone Age) were recorded during various earlier Heritage Impact Assessments. Of most importance to the current assessment was work conducted by Morris in 2011 for the proposed Taaibosch Photovoltaic Plant between De Aar and Hanover (David Morris 2011). He recorded a variable density of stone artifacts, mostly of Pleistocene age, over most of the area examined during the Archaeological Specialist Input for this project.

Site 23 covers an extensive area with dense scatters of Stone Age material including flakes, cores and more formal tools. Mitigation measures should include detailed mapping and drawing; surface collection of representative material as well as possible excavations. The other sites in the study area are similar but contain varying degrees of scatter density, from single tools to denser scatters. Site 23 can therefore be seen as a representation of the Stone Age in the area and detailed mitigation needs to be undertaken if the site cannot be avoided.

Many of the historical sites found during the February 2017 assessment are similar to those found by Beater during her HIA for the Taaiboschfontein Solar PV Project in 2011. She indicates that these are related to the Anglo-Boer War period and assesses their significance as of local importance and therefore worthy of preservation (Beater 2011). Most of the sites

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found during 2017 fall outside of the areas of direct impact, except Site 24 located in PV Plant Area 2. Site 30 is a stone cairn that could possibly be a grave (located in Area 2 as well) and care should be taken not to impact this site without proper investigation.

Farms and other historical settlements in the area date back to the 1840's, while the area also have evidence associated with the South African (Anglo Boer) War. Signs of historical occupation are common in the general area and include abandoned sheep kraals and homestead ruins (Sites 13, 35, 36). Old railway infrastructure (housing, old railway lines and foundations) was also recorded at nearby Burgervilleweg (Becker 2012).

According to Beater, during the Anglo-Boer War of 1899-1902, the De Aar/Hanover/Graaf Reinet area was a hive of activity. Boer forces were strong in Northern Cape as towns had been scarcely garrisoned and towns as far east as Molteno were occupied by Boer commandos. The Cape Colony was initially seen as safe as it was a British Colony but Boers from the Orange River Colony crossed into the Cape Colony and occupied several towns. The railway links between Cape Town and the interior as well as smaller railway lines were crucial for the British as they provided transport from the harbour to the interior that carried soldiers, food and other goods. Disruption of the railway line by the Boer forces during the guerrilla warfare period from 1900 was ongoing and deliberate with the Boer commandos blowing up railway lines, derailing trains, and taking supplies from the trains meant for the British forces. Between December 1900 and September 1901 135 train wrecking incidents were recorded. Due to the expanding activities of the Boer commandos in the Cape more British troops had to be detailed to guard the Cape railways and from July 1901 onwards blockhouses and redoubts were built, eventually all the way down to Wellington in the Western Cape. Lord Kitchener was also forced to divert increasing numbers of troops from the occupied Boer Republics to aid the colonial detachments in dealing with the Boer commandos. In the cemetery on the outskirts of Hanover, a pyramid of stone marks the grave of three young men executed during the Anglo-Boer War of 1899-1902. A train had been derailed and plundered at Taaibosch, 20 km from town. Shortly afterwards several young men sleeping in the outside rooms of a nearby farm were taken into custody. They were charged with 'maliciously assisting Boer forces,' robbery and the deaths of passengers. Tried on somewhat dubious authority by a military court at De Aar, Sarel Nienaber, J. P. Nienaber and J. A. Nieuwoudt, were shot. They protested their innocence to the end (Beater 2011: 12-13).

The Anglo-Boer War (1899-1902) related sites (Sites 10, 14, 19-21 & 24) should be mitigated if they are to be impacted by the proposed development actions. This will include detailed mapping and drawing of the sites, as well as limited historical-archaeological excavations. If Site 30 is a grave then the site should be avoided and no impact on it allowed. The site can be fenced-off and protected. If it cannot be avoided, then the site can

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be mitigated through exhumation and relocation after all due social consultation & permitting processes have been completed.

Finally, it should be noted that although all efforts are made to locate, identify and record all possible cultural heritage sites and features (including archaeological remains) there is always a possibility that some might have been missed as a result of grass cover and other factors. The subterranean nature of these resources (including low stone-packed or unmarked graves) should also be taken into consideration. Should any previously unknown or invisible sites, features or material be uncovered during any development actions then an expert should be contacted to investigate and provide recommendations on the way forward.

From a cultural heritage point of view the development should be allowed to continue, once the recommended mitigation measures have been implemented.

Mitigation Measures to be included in EMPr

Site 23 covers an extensive area with dense scatters of Stone Age material including flakes, cores and more formal tools. Mitigation measures should include detailed mapping and drawing; surface collection of representative material as well as possible excavations. The other sites in the study area are similar but contain varying degrees of scatter density, from single tools to denser scatters. Site 23 can therefore be a representation of the Stone Age in the area and detailed mitigation needs to be undertaken if the site cannot be avoided.

The Anglo-Boer War (1899-1902) related sites (Sites 10, 14, 19-21 & 24) should be mitigated if they are to be impacted by the proposed development actions. This will include detailed mapping and drawing of the sites, as well as limited historical-archaeological excavations. If Site 30 is a grave then the site should be avoided and no impact on it allowed. The site can be fenced-off and protected. If it cannot be avoided, then the site can be mitigated through exhumation and relocation after all due social consultation & permitting processes have been completed.

Finally, it should be noted that although all efforts are made to locate, identify and record all possible cultural heritage sites and features (including archaeological remains) there is always a possibility that some might have been missed as a result of grass cover and other factors. The subterranean nature of these resources (including low stone-packed or unmarked graves) should also be taken into consideration. Should any previously unknown or invisible sites, features or material be uncovered during any development actions then an expert should be contacted to investigate and provide recommendations on the way forward.

2022 Finding: Phase 2 Footprint

A fairly large number of sites were identified in the study area during the 2017 & 2021

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assessments, dating the Stone Age, proto-historical and later historical (Anglo-Boer War) periods. As some of the sites cannot be avoided and will therefore be directly & negatively impacted by the proposed development actions, they will form part of Phase 2 Archaeological Mitigation work that will be undertaken and completed in due course. Sites that are not directly impacted (i.e. demolished or destructed), but still falls within the development footprint, will have to be managed & preserved as part of the project and forms the focus of this Cultural Heritage Management Plan. A number of sites recorded during the 2017 & 2021 assessments fall outside of the development area footprint and are not included in the CHMP.
A total of 36 sites were identified and recorded during the February 2017 assessment.

Stone Age Sites: Sites 1 – 9; 11; 12; 15-16; 18; 22-23; 25-29; 31-33

All the Stone Age sites identified during the 2017 assessment were open-air surface scatters of varying densities, with many single or more tool occurrences to extensive and very dense scatters covering a fairly large area (mainly Site 23). This site and others recorded during the February 2017 survey is similar to those recorded by others in the larger area during earlier assessments. They are located close to and around low rocky ridges and dolerite outcrops/dykes. Stone Age quarry sites are usually found at the foot of dolerite hills where hornfels outcrops occur. Site 23 and some of the other smaller sites seem to be so-called quarry sites, with dense scatters of flakes, more formal tools and numbers of cores occurring at these sites. Dolerite is also associated with engraving sites. One such site has been recorded at the Commonage in Hanover Town. Although no rock engravings were identified in the area during the 2017 assessment, some rocks with signs of edges being hammered or used were identified. Many of these are located close to sites with stone-packed enclosures though to be associated with the Anglo-Boer War period in the area, although the possibility of these features being related to earlier pastoralist camps could not be excluded.

Historical Sites: Sites 10; 13-14; 17; 19-21; 24; 30; 34-36

Many of the historical sites found during the February 2017 assessment are similar to those found by Beater during her HIA for the Taaiboschfontein Solar PV Project in 2011. She indicated that these were related to the Anglo-Boer War period and assessed their significance as of local importance and therefore worthy of preservation. Site 30 is a stone cairn that could possibly be a grave and care should be taken not to impact this site without proper investigation. Farms and other historical settlements in the area date back to the 1840's, while the area also have evidence associated with the South African (Anglo Boer) War. Signs of historical occupation are common in the general area and include abandoned sheep kraals and homestead ruins (Sites 13, 35, 36). Old railway infrastructure (housing, old

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railway lines and foundations) was also recorded at nearby Burgervilleweg.

A total of 12 sites were identified during the 2021 field assessment. They included rock engravings, a number of open-air Stone Age surface sites (with varying degrees of density) and a possible pastoralist site (stone-walled enclosure).

Rock Engravings: Site 1

Site 1 is rocky outcrop with a number of rocks containing possible engravings in the form of various striations and lines. Although the age of the engravings can't be determined without a doubt, it could be related to proto-historic pastoralists that moved through the area. Stone Age material (tools/flakes) was also identified in the general proximity of the site.

Stone Age Sites: Sites 2-10 & 12

These sites were all open-air surface scatters with differing densities of material (flakes, more formal tools such as blades and scrapers & hammer stones) on them. These artifact and sites date to between the MSA and LSA and is similar to those found in other portions of the study and development area during the 2017 assessment and in other studies by archaeologists in the larger geographical area.

Proto-Historical Site: Site 11

Site 11 contains the remains of what seemed to be a collapsed stone-walled enclosure close to a low hill in the area, situated on a natural rocky terrace, as well as a smaller section of stone walling. A grinding hollow was also recorded in close proximity. Although the age and function of these features could not be determined conclusively as yet, it is most likely related to proto-historical pastoralists and represents the remnants of a small camp.

Although the site is not completely intact, these types of sites are fairly scarce and slowly disappearing from the landscape as a result of various factors such as developments. It was therefore deemed as of fairly High Significance from a Cultural Heritage perspective.

Mitigations:

- These sites needs to be either fenced-off or a Buffer Zone of at least 30m placed around the perimeter of each site to prevent accidental damage to these sites during the development of and subsequent operation of the Solar PV Facility.
- The rock engraving site (Site 1 found in 2021) should be preserved by fencing it or by placing a Buffer Zone of at least 30m around the perimeter of the site to prevent accidental damage to the site or any of the engravings located on it. The detailed mapping, photographic recording and drawing of the site and the individual engravings (through detailed rubbings & the reproduction of each individual engraving on paper) to ensure the capturing of the information contained on the site

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as part of the Management of the site should be considered as well. This will ensure that an Object Register for the site is produced and submitted.

- Site 30 (found in 2017) is represented by a single stone cairn that was identified as a possible unknown and not formally marked grave. Although it is not possible to determine without a doubt if this feature is a grave without investigating it through excavations, the shape, size and orientation (in an east/west direction) is typical of stone-packed graves. As it is unknown with no headstone containing any inscriptions it is also deemed as older than 60 years of age and formally protected under the National Heritage Resources Act. As a result the site should be avoided at all costs if possible and fenced-off to protect it against possible damage by the development & related activities. If it cannot be avoided, then the site can be mitigated through exhumation and relocation after all due social consultation and permitting process has been completed.
- It is furthermore recommended that Information Plaques on the general archaeology and history of the area, as well as more detailed information on the specific sites located here, should to be produced and erected on-site, while an information plaque on Heritage Legislation and the Management and Preservation of Heritage Sites should also be considered. This will serve to educate and sensitize the site developers, contractors and other visitors to the Solar Facility on the significance of these sites and the motivation on why they need to be protected and managed.

Chiropteran Assessment (Bat Survey)

The conservation of the Nama-Karoo is largely dependent on the land use and conservation practices of privately owned land as the vast majority of vertebrate and invertebrate species are nomadic and move with the fluctuating availability of resources associated with the unpredictable nature of rainfall events. In order to conserve the Nama-Karoo, it is vital that landowners and developers understand that is valuable to conserve and maintain the diverse indigenous vegetation.

The potential impacts and recommended mitigation measures are discussed below.

Potential Impacts:

a. **The removal of vegetation and degradation of habitat resulting in the disturbance of important areas of bat activity,**
    - Changes in landscape and habitat conversion can affect bat populations and assemblages on a local and regional scale (Jones *et al*. 2009, Jones *et al*. 2003, Jung and Kalko 2011).
    - Large scale removal of natural vegetation for the installation and operation of solar power plants can cause a change in prey availability and thus a change in bat activity in the landscape.
    - Open water in arid and semi-arid environments (such as in the Nama-Karoo)

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may be an important resource influencing survival, resource use, distribution and activity of insectivorous bats (Korine *et al.* 2016).

- It is important that areas with low lying depressions where water pools during the autumn and summer rainfall season are not altered as they may be important areas not only for bats to drink and forage but also for socialising.

It is recommended that;

- As much of the natural established vegetation is conserved.
- Use pre-existing farm roads during construction. Discourage construction vehicles from driving through the natural vegetation and drainage lines were construction activities are not taking place.
- Seed disturbed areas after construction with seeds of the naturally occurring plant species to encourage invertebrate species richness.
- If possible, refrain from using herbicides to control the height of vegetation, rather use domestic stock (preferably sheep as goats tend to eat everything) to graze and browse the vegetation, however, this will need to be carefully monitored as grazing during and shortly after a drought can cause palatable plant species to die off, heavy grazing pressure in summer will favour the growth of karoid shrubs, and high grazing pressure during winter will favour the growth of perennial grasses (Mucina and Rutherford, 2006) both of which can affect insect abundance which in turn may affect bats.

b. It is important not to overgraze the vegetation in the solar plant farms as this will significantly alter plant canopies can lead to the reduction in leaf litter from the plants which is important for seed retention (Jones and Esler, 2004) and will expose the soil to erosion by both wind and water. With the loss of precious topsoil, the restoration of these areas will be difficult. **Disturbance to roosting sites during construction activities,**

- Bats are known to use a variety of roost types from rock cavities, exfoliating rock, tree foliage, under tree bark, tree cavities, aardvark burrows, natural and man-made caves and numerous man-made structures (Jones *et al* 2009, Monadjem *et al.* 2010, Voight *et al.* 2016) however, during the active search for roosts in the natural terrain, no roosting sites were located. There is a colony of bats roosting in the main farm house, but this colony will not be impacted by any solar power plant related construction activities.

It is recommended that if the solar power farm is to be installed near the numerous rocky outcrops in the southwest portion of the farm, it would be preferable for a 100m buffer zone to be extended around the area to limit any potential impact on roosting sites in the rocky

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outcrops.

c. Light pollution during construction and operational phase.

- Light pollution impacts both negatively and positively on bats and can alter species composition, foraging patterns, reproductive success and predation rate (Stone *et al.* 2015). Research has shown that there are open-area foraging bat populations that may benefit from feeding on insects attracted to artificial light sources (Jones *et al.* 2009, Voigt *et al.* 2016). Conversely, if artificial lighting is located close to roosting sites, the foraging emergence times of the bats can be delayed.

It is recommended that security lights/spot lights are erected only near infrastructure/where absolutely necessary and are only switched on just after the night time bat emergence (seasonally dependent).

d. Habitat changes beneath the solar panels.

- The change in the microclimate beneath the solar panels and between the solar panels may provide different ecological conditions which may encourage or provide suitable conditions for botanical diversity (Montag *et al.* 2016). Invertebrate diversity will be influenced by botanical diversity as plants provide forage, habitat and structure for reproduction (Montag *et al.* 2016), and thus in turn may positively influence and possibly increase bat foraging activity.

Mitigation Measures to be included in EMPr

It is recommended that during the rehabilitation phase, a seed mix containing a variety of the local floral species is used and that the management practices are focused on biodiversity conservation.

Annual monitoring during preconstruction and during the operational phase will provide much needed insight into the changes in bat activity, species composition and ecology over the affected property. One-year preconstruction and two years post-construction in line with the South African Good Practice Guidelines for Surveying Bats at WEF's (Sowler and Stoffberg, 2014) and SAGPG for Operational Monitoring (Aronson *et al.* 2014) should be followed as any changes in bat activity and perceived impacts will be most evident in the first two years of operation. The time frame for post-construction monitoring thereafter can be altered. By following these guidelines, data sets that are comparable with other large-scale renewable energy projects that impact bats, can be collected and collectively used to understand the extent of the impacts of these projects and define effective mitigation strategies.

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Bat activity and trends in population numbers are of particular interest to determine the cumulative long-term effects of solar power plants, it is suggested that a passive recording monitoring system be put in place for one-year pre-construction and two years post construction. These systems are to be maintained by a specialist to determine the impacts of solar power plants on bat populations in relation to landscape changes in both the physical changes with the installation of the PV panels, the resulting change in vegetation structure underneath the PV panels and the management strategy of the operational facility.

No specialist species of bats were identified during the field study, nonetheless, with additional deterioration to the landscape and the loss of habitat due to vegetation clearing may cause a shift in the species composition within the bat community to a bias towards more hardy species such as the Egyptian free-tailed bat.

The rehabilitation and management of the operational solar power plant will be a critical activity as this will have a direct impact on biodiversity and ecosystem functioning.
In my opinion, based on the data collected during the bat baseline survey and available literature, there is little reason from a chiropteran perspective for the development of the proposed Soventix Solar Farm not to be approved.

Agricultural Impact Assessment including grazing, soils and wetland assessments

The study areas are dominated by the Mispah and Swartland soil forms. Sub dominant soil forms are Glenrosa, Hutton, Valsrivier and Oakleaf. Ten soil forms have been identified from 122 soil observation sites. The majority of the soils are very shallow (around 15-30cm) with only a small minority of soils deeper than 120cm. Clay content ranges from sandy to very clayey. Calcareous soils are covering relative small areas with only focus area B that has a significant area of 105.6 ha (class 8 on the soil map) that is dominated by these soils. The median effective rooting depth of only 20cm for focus areas A and B and even less at 15cm for area C implies that even with irrigation the soils are unsuitable for most types of agriculture. Extensive grazing with relative low animal numbers is the most suitable agricultural application.

No severe donga erosion has been observed in the study areas. Minor to moderate plate erosion is present in all three main study areas. The three study areas are separated by floodplains that contain seasonal to temporary wetland systems. Severe donga and sheet erosion have been observed on these flood plains.

There are no significant wetlands present in the three main study areas. The most conspicuous wetlands are small artificial permanent wetlands around watering points. There is no major flood danger inside the study areas except for a small southern portion of focus

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area B that overlaps with the edge of the floodplain. However, the adjacent flood plains are characterised by severe flooding during some rainy seasons.

It is not envisaged that the proposed development will result in major soil erosion or any other degradation of the soils of the focus areas provided that there is proper runoff management from roads and other bare areas. The shallow soils may present a challenge for some construction items like poles that need to be planted. The clayey soils and most noticeably the Valsrivier soils may restrict vehicle movement during the wet season. It is possible that the shading effect of the proposed solar panels will increase soil moisture content and therefore improve the general grazing capacity of the study areas.

Traffic Impact Assessment

The following conclusions were made;
Traffic volumes along the N10 were obtained from SANRAL. These volumes indicate that the N10 carries very little traffic past the proposed site.
The anticipated traffic volumes that will be generated during the construction and operational phases of the project will have an insignificant impact on the road network.
The location of the access need to comply with the sight distance standards set out in the G2 manual.
It is not foreseen that any additional turning lanes to constructed at the access.

Mitigation Measures to be included in EMPr
The exact position of the access needs to be approved by SANRAL.

2022 Findings:

- The main gravel road, Burgerville Road, in the vicinity of the proposed development is in a fair to poor condition.
- The main surfaced road, the N10, in the vicinity of the proposed development is in a good condition.
- The preferred route for the haulage of imported materials is from the Port of Ngqura along the N10.
- The primary access to the proposed facility will be from the N10 along the Burgerville Road.
- The bellmouth of the western Burgerville Road approach at the N10 / Burgerville Road intersection must be widened to allow for a 22m turning circle.
- Direct access to the proposed development will be taken off the Transnet servitude road at the existing access to the subject property, approximately ±4.65km southeast of where Burgerville Road crosses the railway line. This access will be utilized by passenger and small delivery vehicles.
- The transformers will be delivered on flatbed trucks that may not fit under the

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Transnet electrical lines. Therefore, these trucks will access the subject property along Burgerville Road approximately 5.11km northeast of the N10 / Burgerville Road intersection.

- The accesses comply with sight distance requirements.
- Existing traffic information for 2022 indicates that the N10 carries an ADT of 1018 vpd (two-way) with the highest hourly volume being 186 vph (two-way).
- The N10 operates well below the capacity of 2000 vehicles per hour for a Class 1 principal arterial with two lanes.
- Traffic will be generated during the Construction, Operational and Decommissioning phases of the project.
- During the Construction and Decommissioning phases, an additional 78 daily trips (two-way) and 6 peak hour trips (two-way) will be generated by the 300MW solar PV facility.
- The following traffic impacts are related to the trips generated during the Construction and Decommissioning phases:
    - Potential congestion and delays on the surrounding road network Traffic Impact Assessment 300MW Solar PV Facility, Hanover District, Northern Cape October 2022 28
    - Potential impact on traffic safety and increase in accidents with other vehicles or animals
    - Potential change in the quality of the surface condition of the roads
    - Potential noise and dust pollution.
- Traffic generated during the Operational phase will have an insignificant traffic impact on the surrounding road network

Mitigations:

- Stagger delivery trips and schedule deliveries outside of the peak traffic periods.
- Staff trips should also occur outside of the peak hours where possible.
- Dust control of the gravel roads.
- Speed limits be implemented to ensure reduced speeds along the roads.
- Speed control during the construction of bellmouth widening of the Burgerville Road approach at the N10 / Burgerville Road intersection by means of stop-and-go system with additional flagmen.
- Regular maintenance of the gravel external access roads by the contractor during the construction period and the operator during the operational phase.
- Upgrading of the internal access road to suitable standards as specified by the civil engineer and regular maintenance of the access road during all phases of the project, especially during the construction and decommissioning phases.
- The route to the site should be further investigated to ensure that the abnormal loads

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are not obstructed at any point by geometric, height and width limitations along the route.

- The applicable permits to transport the abnormal loads should be obtained.

Social Impact Assessment

Recommendations regarding Corporate Social Responsibility Projects (CSR)

Corporate social responsibility (CSR) is a form of corporate self-regulation incorporated into a business model. CSR policy functions as a built-in, self-regulating mechanism whereby a business monitors and ensures its active compliance with the spirit of the law, ethical standards, and international norms. Through the RFP document the Department of Energy (DoE), requires that all renewable energy bidders must illustrate how the Project will benefit the local community. This must be done through:

- Enterprise development; and
- Socio-economic development.

When considering potential projects to invest in, Soventix should keep in mind that social development is a long-term process, and not something that can be achieved in a couple of years. The recommendation is therefore that Soventix identifies a sustainable project that they can be involved with and grow throughout the life of their project. Given that enterprise and socio-economic development are not the core business of Soventix; the best option is to liaise with a local NGO/NPO that has the expert knowledge on how to implement these kinds of projects. This will ensure that money and resources are not wasted, but used optimally from the start of the project. The Karoo Eisteddfod Trust (www.karooeisteddfod.com) is a multidimensional educational and development NPO based in De Aar, but operating not only in De Aar, but across the Karoo in Hanover, Phillipstown and Victoria West. The organisation has a proven auditable track record of the successful implementation of projects. Their programmes aim to address the inequities of Apartheid and help disadvantaged young people to realise their potential. Their model supports children from infancy into adulthood. As such, the NPO has extensive knowledge about the socio-economic needs of people in the region. It is recommended that when Soventix is ready to investigate CSR projects that they should contact this NPO to assist them with identifying local needs and projects and link them with other NPOs in the region.

Stakeholder Engagement Plan

Social impacts already start in the planning phase of a project and as such it is imperative to start with stakeholder engagement as early in the process as possible. A stakeholder engagement plan will assist Soventix to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the project. Such a plan cannot be considered a once off activity and should be updated on a yearly basis to ensure that it stays relevant and to capture new information. Stakeholders must provide

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input in the Stakeholder Engagement Plan.

The Soventix Stakeholder Engagement Plan should have the following objectives:

- To identify and assess the processes and/or mechanisms that will improve the communication between local communities, the wider community and Soventix.
- To improve relations between Soventix staff and the people living in the local communities.
- To provide a guideline for the dissemination of information crucial to the local communities in a timely, respectful and efficient manner.
- To provide a format for the timely recollection of information from the local communities in such a way that the communities are included in the decision-making process.

The Stakeholder Engagement Plan should be compiled in line with International Finance Corporation (IFC) Guidelines and should consist of the following components:

- Stakeholder Identification and Analysis – time should be invested in identifying and prioritising stakeholders and assessing their interests and concerns.
- Information Disclosure – information must be communicated to stakeholders early in the decision-making process in ways that are meaningful and accessible, and this communication should be continued throughout the life of the project.
- Stakeholder Consultation – each consultation process should be planned out, consultation should be inclusive, the process should be documented, and follow-up should be communicated.
- Negotiation and Partnerships – add value to mitigation or project benefits by forming strategic partnerships and for controversial and complex issues, enter into good faith negotiations that satisfy the interest of all parties.
- Grievance Management – accessible and responsive means for stakeholders to raise concerns and grievances about the project must be established throughout the life of the project.
- Stakeholder Involvement in Project Monitoring – directly affected stakeholders must be involved in monitoring project impacts, mitigation and benefits. External monitors must be involved where they can enhance transparency and credibility.
- Reporting to Stakeholders – report back to stakeholders on environmental, social and economic performance, both those consulted and those with more general interests in the project and parent company.
- Management Functions – sufficient capacity within the company must be built and maintained to manage processes of stakeholder engagement, track commitments and report on progress.
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It is of critical importance that stakeholder engagement takes place in each phase of the project cycle and it must be noted that the approach will differ according to each phase. The stakeholder analysis done in Section 6 of this report must inform the stakeholder engagement strategy.

Proposed Grievance Mechanism

In accordance with international good practice Soventix should establish a specific mechanism for dealing with grievances. A grievance is a complaint or concern raised by an individual or organisation that judges that they have been adversely affected by the project during any stage of its development. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts, or perceived impacts. The IFC standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities, and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

The grievance mechanism should be based on the following principles:

- Transparency and fairness;
- Accessibility and cultural appropriateness;
- Openness and communication regularity;
- Written records;
- Dialogue and site visits; and
- Timely resolution.

Based on the principles described above, the grievance mechanism process involves four stages:

- Receiving and recording the grievance;
- Acknowledgement and registration;
- Site inspection and investigation; and
- Response.

The Grievance Mechanism should be communicated to all stakeholders.

Mitigation Measures to be included in EMPr

Based on the findings of this study, the following key recommendations are made:

- Mitigation about safety and security must be implemented as soon as construction commences. The process must involve local security groups and landowners;
- A community liaison officer that is trusted by the community and has the necessary

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skills and education must be appointed before construction commences;

- Protocols on farm access, compensation, communication and road maintenance must be agreed upon and be in place before construction commences;
- A grievance mechanism and claims procedure must be in place and shared with all the stakeholders before the construction commences; and
- Economic benefits must be enhanced and local labour and procurement should be prioritised.

None of the social impacts identified are so severe that the project should not continue. Based on the findings of this report, it is recommended that the project continues, on the conditions that the mitigation measures are implemented.

Terrestrial Biodiversity Assessment including Animal & Plant Species

The Soventix site consists of areas of contrasting sensitivity, which is driven by the presence of the Brak River system at the site and a series of dolerite outcrops which are considered high sensitivity in comparison with the open plains of the site which are comparatively low sensitivity. This pattern is the main driver of the sensitivity of the site and the consequent development potential of the PV target areas. Although there are probably sufficient areas of low sensitivity present at the site to accommodate the full project, the indicated target areas do not always align with the lower sensitivity areas and the project will either have to reduce the development footprint to within the lower sensitivity areas or alternatively expand into low sensitivity areas that are currently outside of the demarcated target areas.

The major sensitive feature of the broader site is the Brak River system which has extensive silty floodplains that are occasionally inundated. Within each PV area there are also some dolerite ridges and outcrops which are considered sensitive and unsuitable for development.

These occupy different proportions of each PV area and will have the greatest impact on the PV1 development area. The low-lying plains in the west of PV3 are also considered sensitive due to the movement of water through this area and its function as a seasonal wetland and area of high productivity. These constraints will result in the loss of up to half of the proposed development footprint of each facility.

The primary and critical mitigation measure required to reduce impacts associated with the development to an acceptable level is the avoidance of areas demarcated as High Impact and No-Go areas. Significant infrastructure in these areas would potentially be a fatal flaw and compromise the viability of the project. However, due to the contrasting sensitivity of the site, there are also fairly extensive low sensitivity areas present where ecological impacts are likely to be low. The abundance of fauna and flora species of conservation concern in

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these areas is low and impacts would be of a local nature only. Development of PV facilities in the lower sensitivity areas would generate low impacts which are considered acceptable and which can be reduced due low significance through the recommended mitigation and avoidance measures.

Provided that the development can be restricted to the medium and lower sensitivity parts of the site, then the development of the three PV plants at the Soventix site would generate low impacts of an acceptable magnitude. As such, development of the lower sensitivity parts of the site can be supported from a terrestrial ecological perspective.

Mitigation Measures to be included in EMPr

Planning & Construction Phase

Impacts on vegetation and listed plant species

- The areas demarcated as high impact and no-go areas must be avoided in order to retain acceptable levels of impact.
- Preconstruction walk-through of the facility in order to locate species of conservation concern that can be translocated as well as comply with the provincial and DAFF permit conditions.
- Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.
- ECO to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near drainage areas.
- All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.
- Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use if they do not fall within the development footprint of the plant infrastructure.

Direct Faunal Impacts During Construction

- All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.
- Any fauna threatened by the construction activities should be removed to safety by

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the ECO or appropriately qualified environmental officer.

- All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- If trenches need to be dug for electrical cabling or other infrastructure, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open should have places where there are soil ramps allowing fauna to escape the trench.

Soil erosion and associated degradation of ecosystems during construction

- Dust suppression and erosion management should be an integrated component of the construction approach.
- Disturbance near to drainage lines should be avoided and any drainage areas near to access roads and construction activities should demarcated as no-go areas.
- Regular monitoring for erosion problems along the access roads and other cleared areas.
- Erosion problems should be rectified on a regular basis.
- Sediment traps may be necessary to prevent erosion and soil movement if there are topsoil or other waste heaps present during the wet season.
- A low cover of vegetation should be left wherever possible within the construction footprint to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover.

<u>Operational Phase</u>

Alien Plant Invasion Risk During Operation

- Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
- The recovery of the indigenous vegetation should be encouraged through leaving some areas intact through the construction phase to create a seed source for adjacent cleared areas.
- Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem on parts of the site and a long-term alien control plan will need to be implemented.
- Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as these are also likely to be prone to invasion problems.
- Regular alien clearing should be conducted using the best-practice methods for the

species concerned. The use of herbicides should be avoided as far as possible.

Soil erosion and associated degradation of ecosystems

- All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.
- All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
- All cleared areas should be revegetated with indigenous perennial grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow.

Faunal impacts during operation

- No unauthorized persons should be allowed onto the site.
- Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.
- If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
- If the facility is to be fenced, then the electrified strands should be on the inside of the fence as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour by retreating into their shells and are killed by repeated shocks.

<u>Decommissioning Phase</u>

Alien Plant Invasion Risk During Decommissioning

- The recovery of the indigenous vegetation should be encouraged after the closure of the development.
- Regular alien clearing should be conducted throughout all project phases using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.

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Soil erosion and associated degradation of ecosystems

- All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
- All cleared areas should be revegetated with indigenous perennial grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow.

Faunal impacts during decommissioning

- Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.

Cumulative Impacts

Impact on CBAs and biodiversity pattern and process within the CBAs

- Minimise the development footprint as far as possible and buffer the Brak River from impact as much as possible.
- The facility should be fenced off in a manner which allows fauna to pass through the facility as easily as possible. This implies not fencing-in large areas of intact vegetation into the facility and only the developed area should be fenced. This should be a single and not a double fence and should be electrified on the inside only.

Impact on broad-scale ecological processes

- Minimize the development footprint as far as possible and allow the retention of some natural vegetation between the rows of panels or trackers.
- The facility should be fenced off in a manner which allows fauna to pass by the facility as easily as possible. This implies not fencing-in large areas of intact vegetation into the facility and only the developed area should be fenced.

2022 Findings: Phase 2 Footprint

1) Northern Cape Conservation Plan (C-Plan)

Critical Biodiversity Areas (CBAs) are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas (ESAs) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support

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Areas may be terrestrial or aquatic.
The section of the road that will be upgraded is in an ESA2, CBA1 (Brak River) and CBA 2, although the degraded section of the roadside is more representative of "Other Natural Areas". The powerline servitude cross one small CBA1, while the remainder of the area represent ESA.

2) Broad Scale Vegetation Types

The development site lies within the Nama Karoo biome which occurs on the central plateau and western half of South Africa, at altitudes between 500 and 2000 m, with most of the biome. The dominant vegetation is a grassy, dwarf shrubland. Grasses tend to be more common in depressions and on sandy soils, and less abundant on clayey soils. The geology underlying the biome is varied, as the distribution of the biome is determined primarily by rainfall. This also determines the predominant soil type with over 80% of the area covered by lime-rich weakly developed soil over rock (Low & Rebelo, 1996).
The vegetation consists of shrubland dominated by dwarf Karoo shrubs, grasses and Senegalia mellifera subsp. detinens, and other low trees particularly on the sandy soils. The vegetation is flat to gently sloping with isolated hills of Upper Karoo Hardeveld in the south and Vaalbos Rocky Shrubland in the northeast and with many interspersed pans (Mucina & Rutherford 2006).

3) Other sensitive areas

- The project area is not located close to any formally protected area. In terms of other broad-scale planning studies, the site does not fall within a National Protected Areas Expansion Strategy Focus Area (NPAES), indicating that the area has not been identified as an area of exceptional biodiversity or of significance for the long-term maintenance of broad-scale ecological processes and climate change buffering within the region.
- The proposed development site is located within the Platberg Karoo Conservancy Important Bird Area, although the road widening or development of the PV Plant will not impede on any sensitive bird habitats.
- The project area is not located close to any listed threatened ecosystem.
- The NFEPA aquatic ecosystems layers show that several highly ranked priority wetlands occur in the area, many supporting cranes. The Brak River is also considered a high priority NFEPA river.

4) Listed and Protected Plant Species

The *Chasmatophyllum* species are associated with rocky flats and areas of exposed bedrock and *Chasmatophyllum maninum* is confirmed present at the site. *Rapanea* is associated with forest patches that usually occur around the base or in small kloofs of sandstone outcrops in

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vegetation types such as Besemkaree Koppies Shrubland and as it was not observed at the site, and it is highly unlikely to be present. Other species of significance observed at the site include Stomatium pluridens and Euphorbia crassipes, which are regional endemics and provincially protected, while other protected species include *Aloe broomii* var. *broomii*, *Aloe claviflora*, *Pachypodium succulentum*, *Ammocharis coranica*, and *Boscia albitrunca*.

5) Fauna groups

- **Mammals**

The site lies within the range of 63 terrestrial mammals, including three listed species (EWT & SANBI, Red Data Book of Mammals of South Africa, Lesotho and Swaziland, 2016). The five listed species are the Brown Hyaena Hyaena brunnea (NT), South African Hedgehog Atelerix frontalis (NT), the African White-tailed Rat Mystromys albicaudatus (VU), the Black-footed Cat Felis nigripes (VU) and the Serval Leptailrus serval (NT). While the Hedgehog and Black-footed Cat are likely to occur in the broad area, the Brown Hyaena is less likely to be present due to naturally low population density as well as persecution from farmers. Adequate cover and water are essential habitat requirements for the Serval and given the sparse cover at the site this species is unlikely to occur here, and the area is not viewed as important habitat for this species which favours tall grassland.

- **Reptiles**

According to the distribution maps available in the literature and the SARCA database, as many as 31 reptiles could occur at the site. Species observed on the site include Bibron's Gecko Chondrodactylus bibronii, Southern Rock Agama Agama atra, Karoo Girdled Lizard Karusasaurus polyzonus, Spotted Sand Lizard Pedioplanis lineoocellata lineoocellata, Western Three-striped Skink Trachylepis occidentalis, Variegated Skink Trachylepis variegata, Marsh Terrapin Pelomedusa subrufa, Verrox's Tent Tortoise Psammobates tentorius verroxii, Cape Cobra Naja nivea and Leopard Tortoise Stigmochelys pardalis.

- **Amphibians**

Eleven frog species are known from the broad area around the site, including the Giant Bullfrog Pyxicephalus adpersus which is listed as Near Threatened. Most species known from the area are toads and sand frogs which are relatively independent of water except for breeding purposes, which reflects the aridity of the area. Natural pans and man-made shallow water bodies are present and confirmed as breeding sites for amphibians including the Giant Bullfrog, which can be confirmed present at the site.

Mitigations

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- Preconstruction walk-through of the access road, powerline routes and other construction footprints to locate species of conservation concern (e.g., endemic, threatened and/or protected flora) that can be translocated.
- High visibility flags must be placed near endemic, threatened or protected plants that will not be translocated to avoid any damage or destruction of these species.
- Apply for the applicable permit(s) and or license to translocate any protected, specially protected or indigenous plants.
- Only apply for permit(s) and/or a license to "pick" a threatened or protected plant if it is not possible to relocate the footprint.
- Any subsequent restricted activity involving, or picking, or cutting, disturbing, damaging or destroying any protected, specially protected or indigenous plants must comply with the applicable permit and/or license conditions.
- Vegetation clearing to commence only after walk through has been conducted, the necessary permits and/or license have been obtained, and the visibility flags have been erected and/or applicable plants have been safely translocated.
- ECO to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near drainage areas.
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas, fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition etc.
- All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.
- Any fauna threatened by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer.
- All vehicles accessing the site should adhere to a low-speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site.
- Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- If trenches need to be dug for water supply or other infrastructure, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open should have places where there are soil ramps allowing fauna to escape the trench.
- Dust suppression and erosion management should be an integrated component of the construction approach.

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- Disturbance near to drainage lines should be avoided and any drainage areas near to the access roads and construction activities should demarcated as no-go areas (excluding areas within the designated working servitudes).
- Regular monitoring for erosion problems
- Erosion problems should be rectified on a regular basis using the appropriate erosion control structures and revegetation techniques.
- Sediment traps may be necessary to prevent erosion and soil movement if there is topsoil or other stockpiles present during the wet season.
- A low cover of vegetation should be left wherever possible within the construction footprint to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover.
- These vegetated patches should be clearly demarcated and physically protected from any disturbance.
- Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
- The recovery of the indigenous vegetation should be encouraged through leaving some areas intact through the construction phase to create a seed source for adjacent cleared areas.
- Regular monitoring for alien plants within the road footprint as well as adjacent areas which receive runoff from the road as these are also likely to be prone to invasion problems.
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- All cleared areas should be revegetated with indigenous perennial grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow.
- Any potentially dangerous fauna such as snakes or fauna threatened by the construction activities should be removed to a safe location by an experienced handler.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.
- If the road reserve is to be electrically fenced, then the live strands should be on the inside of the fence or more than 30cm from the ground.
- Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- Poisons for the control of problem animals should rather be avoided since the wrong

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use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.

- Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place.
- Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance will occur outside these areas.
- Proper stormwater management should be implemented on site, while measures to prevent any potential spills should be implemented at the mall expansion site.
- Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.
- Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. Alien invasive tree species listed by the CARA regulations should be eradicated.
- Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish.
- A plan should be developed for control of noxious weeds and invasive plants that could occur because of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the way weeds spread, and methods for treating infestations. Require the use of certified weed-free mulching. Prohibit the use of fill materials from areas with known invasive vegetation problems. The spread of invasive non-native plants should be avoided by keeping vehicles and equipment clean and reseeding disturbed areas with native plants.
- Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species' do not spread to surrounding natural ecosystems.

***Avifauna* Assessment**

The study area lies within the eastern extreme of the Nama Karoo Biome, where this meets the ecotone with the Grassland Biome. Although this region appears typical of much of the upper Nama Karoo, it supports populations of several red-listed species. Many of these are medium to large terrestrial birds (cranes, bustards, korhaans) and large raptors which occur in good numbers throughout the year. The study area and broader impact zone of the proposed development are therefore considered important for the conservation of these species.

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The proposed Soventix solar facility has the potential to have a medium to high impact on the avifauna a of the study area. The priority species in particular are at risk since most of these are susceptible to associated threats. The primary impacts that the proposed development will have include 1) a medium displacement impact caused by habitat loss and disturbance associated with construction and maintenance activities, 2) a medium impact related to avian collisions with solar panels and power line infrastructure, and 3) a medium to low impact related to cumulative habitat loss at a broader scale from renewable energy development in the wider area.

Several mitigation measures can be implemented during the construction and maintenance phase of the proposed development to reduce the impacts on the avifauna. Mitigation measures may assist in reducing the impacts associated with power line electrocutions and collisions with solar panels and power line infrastructure, and should be implemented as far as possible. Regular monitoring of these impacts should be undertaken to determine high risk areas where further mitigation can be implemented, and to contribute to a better understanding of the interactions between birds and solar facilities.

Some protected species are present, but these are relatively widespread species and the impact on these species could be reduced by the proposed mitigation measures, specifically buffering nests, water bodies and avoiding rocky outcrops and other higher sensitivity areas, as well as ensuring bird-friendly PV layouts and fixing bird flappers onto powerlines where present. The development is likely to have an impact on avifauna, especially during the construction phase, but in the long term, it is likely that most species will be able to continue to utilise the site and any impacts on avifauna would be of local significance only.

The broad area around the site has a large amount of renewable energy development, from both wind and solar development, increasing the potential significance of cumulative impacts at the site. However, the plains around the site are still largely undeveloped and the three proposed development areas are separated by some distance, which would facilitate movement of avifauna and allow for use of the intervening areas. The overall Avifaunal Specialist EIA Report 37 Soventix Solar PV Facility
Impact on landscape connectivity is likely to be low, especially given the largely intact nature of the surrounding landscape.

With mitigation and specifically the strict avoidance of the high sensitivity areas, the identified avifaunal impacts can be reduced to an acceptable level. While there are certainly some sensitive areas at the site that need to be avoided, there are also fairly of lower sensitivity plains present, where development should be focussed. As these plains are extensive, the extent of habitat loss resulting from the development of the PV facilities at

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the site is considered low and would not be likely to pose a threat to the long-term persistence of any avifauna at the site. With the implementation of these mitigation measures, the impact of the development can be reduced to an acceptable level and as such there are no fatal flaws associated with the development that should prevent it from proceeding. A final caveat is however that a power line layout has not been provided for the assessment and this could potentially have a significant impact on the current assessment should a long power line be required.

Planning & Construction Phase

Mitigation/Management Actions: Avifaunal Habitat loss impacts

- Avoid the high sensitive portions of the layout for each PV Plant site as indicated in the sensitivity map, such as the dolerite ridges, water bodies and raptor nests. The destruction of habitat during construction should also be strictly contained within the direct footprint of the development. Water bodies and nests should be buffered by 1km radius.
- The use of lay-down areas within the footprint of the development should be used where feasible during construction, to avoid habitat loss and disturbance to adjoining areas.
- All building waste produced during the construction phase should be removed from the development site and be disposed of at a designated waste management facility. Similarly, all liquid wastes should be contained in appropriately sealed vessels/ponds within the footprint of the development, and be disposed of at a designated waste management facility after use. Any liquid and chemical spills should be dealt with accordingly to avoid contamination of the environment.
- Only existing roads should be used as far as possible to avoid the unnecessary construction of new roads.
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.
- All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.
- The number of vehicle using access and maintenance roads should also be minimised, to keep disturbances to an absolute minimum.
- Sensitive microhabitats should be avoided, such as nesting sites during the breeding season of large terrestrial birds (generally during summer; Hockey et al., 2005).
- Mitigation/Management Actions Disturbance impacts on avifauna and listed bird species during Construction.

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- No construction activity should occur near to active raptor nests. If there are active nests near construction areas, they should be monitored until the birds have finished nesting and the fledglings left the nest.
- All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming species such as owls which are often persecuted out of superstition.
- All construction vehicles should adhere to a low speed limit to avoid collisions.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.

Operational Phase

Mitigation/Management Actions: Avifauna collisions with PV panels

- The layout of solar arrays should be placed so as to avoid bird flight paths between focal points such as water bodies, foraging and roosting sites.
- It has been suggested by Visser (2016) that collision mortality could be reduced at solar facilities by using 28 cm-spaced contrasting bands or 10 cm spatial gaps between solar panels. This enables birds, particularly water birds, to differentiate the expansive layout of panels as a solid structure, reducing the likelihood that they may try to land and collide with the panels. These recommendations should therefore be incorporated into new solar facilities until further research into panel design and layout suggests otherwise.
- All incidents of collision with panels should be recorded as meticulously as possible, including data related to the species involved, the exact location of collisions within the facility, and suspected cause of death. Post-construction monitoring with the aid of video surveillance should be considered, as this will contribute towards understanding bird interactions with solar panels.

Mitigation/Management Actions: Avifaunal impacts from disturbance and operational activities

- If birds are nesting on the infrastructure of the facility and cannot be tolerated due to operational risks of fire, electrical short, soiling of panels or other problems, birds should be prevented from accessing nesting sites by using mesh or other manner of excluding them. Birds should not be shot, poisoned or harmed as this is not an effective control method and has negative ecological consequences. Birds already with eggs and chicks should be allowed to fledge their chicks before nests are removed.
- If there are any persistent problems with avifauna, then an avifaunal specialist

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should be consulted for advice on further mitigation.

- All food waste and litter at the site should be placed in bins with lids and removed from the site on a regular basis.
- If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects. The use of lighting at night should be kept to a minimum, so as not to unnecessarily attract invertebrates to the solar facility and possibly their avian predators, and to minimise disturbance to birds flying over the facility at night.
- Any movements by vehicle and personnel should be limited to within the footprint of power lines and other associated infrastructure, especially during routine maintenance procedures. Utmost care should be taken to not disturb nests that may be constructed on power line structures.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species.

Decommissioning Phase

Mitigation/Management Actions: Avifauna impact from disturbance

- All personnel should undergo environmental induction with regards to avifauna and in particular not disturbing or harming birds.
- If there are active nests at the site at decommissioning, these should be left along until the birds have finished breeding.
- All construction vehicles should adhere to a low speed limit (50km/h) to avoid collisions with susceptible species.
- All litter and rubble from decommissioning should be cleaned up and removed from the site.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.

Cumulative Impacts

Mitigation/Management Actions: Habitat fragmentation and negative impacts on IBAs

- Development in the higher sensitivity areas and habitats must be avoided.
- Impacts on avifauna must be monitored and reported to authorities on an annual basis if all three PV developments are constructed, and then an offset area at the site

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should be identified and set aside for conservation-orientated use. It is recommended that this could be the western-most section of the site including the plains along the N10 and the adjacent dolerite hills.

Geotechnical Assessment

For solar panels overturning moment will be the main load on the solar panel structure support columns and excavation to 1,0 metres below natural ground level will probably be required to ensure overturning stability.

Due to hardness of, and shallow depth to dolerite bedrock, drilling/digging for placement of footing columns and digging of trenches for laying of cables will be difficult. The fact that moderately steep surface slopes occur over large parts of the areas underlain by dolerite sills, may further contribute to construction difficulties in these areas. It is thus recommended that no solar panels be erected in areas underlain by dolerite sills. (Since dolerite dykes are thin and thus do not cover pronounced surface areas, the non-construction recommendation does not include areas underlain by dolerite dykes).

Those areas of the sites not underlain by dolerite bedrock are largely underlain by soft to medium hard rock sandstone/siltstone at depths of less than 0,5 metres below ground level. Considering the time-consuming nature of pad footing construction (breaking out and removal of rock and casting of reinforced concrete), and furthermore the difficulty which rock mass at depths shallower than 1,0 m will cause to placement of screwed piles, rammed piles is considered the most effective support option for solar panels. However, since driving to at least 1 metre depth, may prove difficult over large parts of the site (where rock mass depths are < 0,5 metres), as an alternative, ground beam concrete footings (which make use of concrete strip footings at very shallow depth below ground level to act as support and counterweight for solar panels) may possibly have to be utilized. This founding option is expected to be considerably costlier than using of piles.
The southwestern portion of Site B (the vicinity of the planned Eskom sub-station and directly north and northwest thereof) is considered the only part of any of the sites with a thick enough soil horizon to possibly allow effective rammed pile installation to 1,0 m depth.

Drainage channels of episodic rivers and very low surface slopes as well as large drainage control berms occur along (or in close proximity to) the southern border of Site B and the eastern border of Site C. This indicates that submerged conditions may occur for short periods in those areas during the rainy season. Consequently, access roads in those areas will have to be supplied with properly designed and constructed gravel surfaces with a positive elevation to allow vehicular passage during periods of submersion.

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If commercially available sources of concrete aggregate prove to be too distant and expensive for utilization on site, unweathered dolerite rock which occurs in abundance on each of the sites can be considered for this purpose. The dolerite will have to be tested for quality purposes and, if found satisfactory, a rock breaking plant will have to be established on site.

Dormant (or intermittently producing) sandstone quarries on the sites can be considered as sources of road layer material. Due to the slaking behaviour of mudstone/shale, care should be taken that these sediments, which occur interlayered as minor component within the sandstones, are excluded from use.

The Eskom substations for Sites A and C are planned for areas having rock outcrop (sandstone/dolerite at Site A and dolerite at Site C), whilst the planned substation for Site B occurs in an area which may be inundated during parts of the wet season. These aspects need to be considered during the design and construction of the sub-stations.

Mitigation Measures to be included in EMPr

Preference should be given to the use of dolerite rock as construction material, however, sedimentary rock may be used with caution for the lower road layers – especially the sandstones and also mudstone/shale which have been backed by dolerite intrusions.

It is thus recommended that no solar panels be erected in areas underlain by dolerite sills. (Since dolerite dykes are thin and thus do not cover pronounced surface areas, the non-construction recommendation does not include areas underlain by dolerite dykes).

Since driving to at least 1 metre depth, may prove difficult over large parts of the site (where rock mass depths are < 0,5 metres), as an alternative, ground beam concrete footings (which make use of concrete strip footings at very shallow depth below ground level to act as support and counterweight for solar panels) may possibly have to be utilized.

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***Hydrological* Assessment**

Construction phase mitigation measures

- No pylons should be located within an area that would be expected to become

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inundated during a 1:100 flood event.

- The area of disturbance should be kept to a minimum to allow clearing of the construction right of way. The width of the construction corridor should be kept to a minimum.
- Vegetation should be removed only where essential for the continuation of the powerline. Any disturbance to the adjoining natural vegetation cover or soils should not be allowed.
- Vegetation and soil should be retained in position for as long as possible, and should only be removed immediately ahead of construction / earthworks in any specific area.
- Existing roads should be used for access as far as possible.
- The duration of construction activities at each pylon site should be minimised as far as is practical.
- Drip trays should be placed under any activity requiring active lubrication or oiling at the pylon sites.
- Spill clean-up kits should be available on site for immediate remediation of any spills and removal of contaminated soils.
- No fuel should be stored at the pylon sites and no refuelling or servicing of construction plant should take place at the construction sites.
- No construction materials should be disposed of within the delineated wetlands or within the 100m buffer zone on the watercourse.
- No concrete batching should take place within the delineated wetlands or within the 100m buffer zone.
- All surplus spoil material from the foundation excavations (i.e. not used as backfill) should be removed from the site as soon as is practically possible.

Storm water management and erosion control measures should be implemented. These should include the following:

- The excavated soil should be placed on the upstream side of construction activities in order to act as a storm water diversion berm.
- Where such diversion berms create concentrated flows, as well as in steep and/or sensitive areas (such as wetlands) the use of swales, silt fences or other effective erosion control measures is recommended to attenuate runoff.
- All storm water management measures should be regularly maintained.

Once construction at a pylon site is complete, the site should be rehabilitated immediately by removing all waste material. The rehabilitation specification should be determined by the soils and vegetation specialists.

- All waste material should be removed to a licensed waste disposal facility, if it cannot be re-used or recycled.

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- In areas where construction activities have been completed and no further disturbance is anticipated, rehabilitation and re-vegetation should commence as soon as possible.
- Replanting activities should be undertaken at the end of the dry season (middle to end September) to ensure optimal conditions for germination and rapid vegetation establishment.
- Should plants not successfully establish within two growing seasons after the first planting, new plant material should be provided.
- A weed and alien invasive species control plan should be implemented during the contract period.
- Any erosion channels developing during or after the construction period should be appropriately backfilled (and compacted where relevant) and the areas restored to a condition similar to the condition before the erosion occurred.

A construction method statement should be compiled and approved prior to the commencement of construction activities. The method statement should take cognisance of:

- The mitigation measures outlined above, as well as mitigation measures specified by each of the environmental specialists.
- The conditions of the Environmental Authorisation and Integrated Water Use License.
- The Environmental Management Program (EMPr) for the project submitted as part of the Environmental Impact Assessment Report.
- The Environmental Control Officer (ECO) must ensure that the contractor adheres to the above-mentioned documents.

Operational phase mitigation measures

- No pylons should be located within an area that would be expected to become inundated during a 1:100 flood event.
- Existing roads should be used for access as far as possible.
- The powerline route should be regularly inspected during the operational phase.
- Any erosion channels developing during or after the construction period should be appropriately backfilled (and compacted where relevant) and the areas restored to a condition similar to the condition before the erosion occurred.

2023 Findings: Phase 2 Footprint

Impacts:

- **Construction Phase:**
    - Leakages from construction and contractor vehicles accessing the site may

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cause soil pollution (i.e., un-inspected vehicles dripping oils/hydrocarbons onto soils may cause contamination of soil and surface water resources).
    - Disturbing soils (land capability) due to some vegetation clearing may promote sedimented runoff during storm events.
    - Excavation of borrow pits for road-building material may cause temporary sedimentation during storm events.
    - Disturbing sediments associated with streams to install dedicated stream crossings and road culverts may promote sediment runoff.

- **Operational:**
    - Oil spillage from parked vehicles (service vehicles)
    - Sedimentation runoff from areas where no stormwater management measures are implemented; or where vegetation is not maintained.

Mitigations:

- Only excavate / clear areas applicable to the project area.
- Keep the site clean of all general and domestic wastes.
- All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is essential.
- Retain as much indigenous vegetation as possible / re-vegetate.
- Have fuel/oil spill clean-up kits on site.
- Exposed soils are to be protected using a suitable covering or sandbags or berms to control erosion.
- Cover soil stockpiles with a temporary liner to prevent contamination (where required and visually determined).
- Ensure box culverts are used for any dedicated stream crossings. Box culverts should be sized to accommodate at least 1:100y flood events.
- Ensure all vehicles entering the site are parked in designated areas, with drip trays, and that vehicles are in good order (i.e., don't let an observed leaking vehicle enter the site or service it on-site).
- Install swales as per the CSWMP for stormwater drainage at the site.
- Re-vegetate areas where erosion is noted or where vegetation is required to reduce stormwater peak flows.
- Ensure all vehicles entering the site are parked in designated areas, with drip trays, and that vehicles are in good order (i.e., don't let an observed leaking vehicle enter the site or service it on-site).
- Regular inspections (monthly) and maintenance of sub-stations.

To be included in the EMPr and EIA

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- During the construction phase, it is recommended that sandbags and temporary berms be used, to manage stormwater runoff (if storms do occur). It is recommended that the construction phase take place during the winter months, with a decreased probability of storm events. Temporary stormwater systems should be sufficient to manage the stormwater at the site during the construction phase.
- Ensure a stormwater management plan is implemented, and that all stormwater systems are kept clean of any debris to reduce flooding risk.
- Ensure that eroded areas are re-vegetated, to ensure reduced sedimentation risk and reduced runoff volumes to the streams.
- To prevent erosion and deposition during construction use: o Minimise vegetation disturbance during construction.
    - Re-vegetate as soon as possible to establish and maintain good ground cover across the site.
    - Conduct regular inspections and maintenance of the site to ensure that vegetation cover is adequate, and no rivulets are generated.
- If PV panels and array assemblages are proposed in areas of higher flood risk, the depth of flooding should be predicted for those areas (e.g. depth of surface-water flooding predicted during the 1 in 50-year flood event).
- All electrical connectors and other items vulnerable to floodwater should be located at a minimum level of the maximum flood depth plus a 0.3m freeboard above ground level to ensure that they are protected from the design flood event.

***Aquatic* Assessment & watercourse & riparian delineation**

Construction phase mitigation measures;

Impacts on water quality: Erosion and Sedimentation that leads to increased turbidity and siltation of aquatic habitats. Chemical pollution of the water resources.

- The objective of a Storm Water Management Plan (SWMP) is to control storm water runoff from the site. It should be designed to improve the storm water quality (i.e. sediment removal) and control runoff directly being discharged from the designated site. Disturbance of the natural topography and vegetation cover should be minimised. The natural contours should be preserved as far as is practical in order to preserve the existing site drainage patterns as far as possible. Natural, dispersed, drainage should be encouraged, by maintaining the natural drainage characteristics of the land as far as possible, thereby minimising the concentration of flows and consequently the risk of erosion. Diversion of upslope surface runoff around the solar PV area should be considered. Berms and/or open drains can be provided for this purpose. The size and lining of the drain would be dependent on the peak flow rates and velocities, which should be determined through hydrological modelling. Domestic livestock should be excluded from areas under rehabilitation for at least

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the first year of recovery.

- Sites of oiling and refuelling points to be located away from rivers, surface water sewers or other watercourses. Mitigated by controlled re-fuelling points, use of bio-degradable hydraulic oils, spill kits, etc. No fuel storage, refuelling, vehicle maintenance / washing, or vehicle depots should be allowed within 50 m of the edge of any wetlands or watercourses. Refuelling and fuel storage areas, and areas used for the servicing, washing or parking of vehicles and machinery, should be located on impervious bases and should have bunds around them. Bunds should be sufficiently high to ensure that all the fuel kept in the area will be captured in the event of a major spillage. If construction areas are to be pumped of water (e.g. after rains), this water should be pumped into an appropriate settlement area, and not allowed to flow straight into any watercourses or wetland areas. An emergency protocol must be developed that deals with accidents and spills. This must include methods for absorbing chemicals / oils / fuel, and the transport and disposal of all contaminated material in a suitable hazardous waste site.
- Effluent will be generated from the on-site sanitation facilities and treated by way of a BiorockTM waste water treatment package plant. The BiorockTM Waste Water Treatment Package Plant (WWTPP) will treat the water to the requisite standard before the water is disposed of via a seep-away. However, the proponent may choose in the future to further treat the water for reuse, in which case the storage (also in a JoJo tank) will not exceed 5m3, as the daily anticipated operational usage that will generate effluent, will not exceed 2m3. The quality of the treated effluent will be of such a standard that it will not impact any groundwater resource detrimentally. The potential storage of treated effluent will be well short of the minimum threshold. The BiorockTM and potential future storage unit will be outside of any watercourses, as the full development footprint has been excluded from watercourses, including a 100-metre buffer zone.

Impacts on water quantity (surface flows and groundwater):

- The existing borehole and windmill facility is located on the north-central portion of Area B outside of the delineated watercourse. The project will require 3000m3 per year for the 18-month construction period and thereafter 850m3 per year for the operational phase. These volumes fall well within the permissible limits. The five (5) storage vessels totalling 100m3 storage capacity are all off-channel and above-ground.

Changes in riverine habitat structure and function;

- Disturbance of the natural topography and vegetation cover should be minimised. The natural contours should be preserved as far as is practical in order to preserve

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the existing site drainage patterns as far as possible. The results of the analysis indicate that the water level in the watercourse is not expected to reach the pylon of concern, at its currently indicated location. The impact on water quality of the construction and operation of the power line between the solar PV array and the existing Eskom 400 kV power line is expected to be LOW prior to mitigation, reducing to VERY LOW with the implementation of the proposed mitigation measures.

- Roads should preferably not be raised above the natural base level, allowing surface runoff to flow uninterrupted. Crossings over water-courses and wetlands should rather be built as stabilised drifts than using culverts or pipes. Roads should preferably not be raised above the natural base level, allowing surface runoff to flow uninterrupted. Crossings over water-courses and wetlands should rather be built as stabilised drifts than using culverts or pipes.

Introduction of invasive alien biota.

- Control exotics and invasive plants to be eradicated. Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Any materials brought in to construction sites should be from sources free of invasive alien species. Clearing of invasive alien plants must take place coupled with the sowing of seeds of indigenous species to stabilise disturbed habitats. Compacted bare ground should be loosened and pitted, and covered with branches or stones. This will improve the ability of the surfaces to trap seeds and to absorb rainwater, thereby hastening vegetation recovery.

Impacts on water quality: Erosion and Sedimentation that leads to increased turbidity and siltation of aquatic habitats.

- Drifts should be constructed from concrete or grouted stone pitching. Drifts should be provided at frequent spacings (recommendation is 300 m, again to minimise the concentration of flows. All storm water drainage discharge points should be provided with outlet structures, designed with adequate erosion protection, to ensure that storm water is discharged from formal structures onto the natural ground at a safe and acceptable velocity. Use existing bridges for watercourse or wetland crossings wherever possible. Minimise new crossings over wetlands and watercourses. If wetlands or watercourses cannot be avoided, ensure that road crossings are constructed using riprap, gabion mattresses, and/or other permeable material to minimise the alteration of surface and sub-surface flow. Flow of water under roads must be allowed to occur without leading to concentration of surface flow. This can be achieved through designing bridges that span the entire width of

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aquatic ecosystems where possible, or laying down pipes or culverts to ensure connectivity and avoid fragmentation of surface aquatic ecosystems. Bank stabilisation measures (gabions, eco logs, geofabric, sediment fences) are required when wetland or watercourse banks steeper than 1:5 are denuded during construction. Ensure erosion control along roads. Put in culverts at drainage lines. Build water diversion structures at 20 to 50 m intervals (depending on the steepness of the slope) along veld tracks. Soil should be dug out across veld tracks and used to create berms downslope of the ditch. Berms must be at least three times the width of the road, to prevent water running around the berm and back onto the tracks. Berm ends should be extended on the downslope side of the road with rocks to prevent diverted water eroding the soil. These will prevent veld roads acting as water channels, causing donga erosion. It will also facilitate vegetation recovery on closed roads. Storm water runoff off all roads must be spread as much as possible, to avoid concentration of flows off compacted or hardened surfaces.

Rehabilitation (DWS, 2016)

(1) Rehabilitation as contemplated in paragraph 6(1)(v) above must be conducted in terms of a rehabilitation plan and the implementation of the plan must be overseen by a suitably qualified SACNASP professional member.

(2) Upon completion of the construction activities related to the water use –
   (a) a systematic rehabilitation programme must be undertaken to restore the watercourse to its condition prior to the commencement of the water use;
   (b) all disturbed areas must be re-vegetated with indigenous vegetation suitable to the area; and
   (c) Active alien invasive plant control measures must be implemented to prevent invasion by exotic and alien vegetation within the disturbed area.

(3) Following the completion of any works, and during any annual inspection to determine the need for maintenance at any impeding or diverting structure, the water user must ensure that all disturbed areas are:
   (i) cleared of construction debris and other blockages;
   (ii) cleared of alien invasive vegetation;
   (iii) reshaped to free -draining and non -erosive contours, and
   (iv) Re-vegetated with indigenous and endemic vegetation suitable to the area.

Upon completion of any works, the water user must ensure that the hydrological functionality and integrity of the watercourse, including its bed, banks, riparian habitat and aquatic biota is equivalent to or exceeds that what existed before commencing with the works.

For most of the anticipated impacts on the environment during the construction phase of the

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dam, there are very sound mitigation measures (DWAF, 2005: Environmental Best Practice Specifications), and when implemented the process should be overseen by an Environmental Control Officer (ECO).

Buffer zones

The areas surrounding the drainage lines in the project area (Brak River and tributaries), is classified as an Ecological Support Area (ESA) and according to the Department of Environment and Nature Conservation, Northern Cape, a 100m buffer is suggested around the delineated riparian area or 100m measured from the top of bank. Buffer zones have been used in land-use planning to protect natural resources and limit the impact of one land-use on another.

Suggestion by the Department of Environment and Nature Conservation, Northern Cape:

- Conduct a buffer determination assessment around all wetlands, regardless of ecological condition or ecosystem threat status.
- Any further loss of area or ecological condition must be avoided, including if needed, a 100m generic buffer around the wetland.

Buffer zones associated with water resources have been shown to perform a wide range of functions, and on this basis, have been proposed as a standard measure to protect water resources and associated biodiversity. These functions include:

- Maintaining basic aquatic processes;
- Reducing impacts on water resources from upstream activities and adjoining land uses;
- Providing habitat for aquatic and semi-aquatic species;
- Providing habitat for terrestrial species; and
- A range of ancillary societal benefits.

Should a buffer zone be proposed, all the planned activities will be incorporated into this zone and the purpose of the buffer zone will be futile. However, the implementation of a buffer zone to emphasize the importance of the riparian zone and adjacent dry land will certainly augment the importance of the ecology in the project area. The area included in the buffer zone, as well as the core areas in the riverine zone should have explicit and very strict biodiversity conservation management measures and the operating teams should be well aware of this.

Therefore, a buffer zone for the project is suggested on both sides of the river in order to impose a level of best practices when the proposed construction gets under way.

Any potential risks must be managed and mitigated to ensure that no deterioration to the water resource takes place. Standard management measures should be implemented to

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ensure that any on-going activities do not result in a decline in water resource quality.
While determining the area and distribution of a core habitat is important, it is equally important that appropriate management measures be determined to ensure the core habitat continues to function effectively. Biodiversity conservation management measures that need to be taken into consideration when determining management measures for core habitats and corridors include:

- Habitat and species management;
- Alien and invasive species management;
- Fire management;
- Grazing management; and
- The management of soil erosion and physical disturbances.

Determining the required buffer width is largely an exercise of assessing the situation and linking it to an acceptable level of risk. Determining appropriate management measures for aquatic impact buffer zones is largely dependent on the threats associated with the proposed activity adjacent to the water resource. These threats include:

- Increases in sedimentation and turbidity;
- Increased nutrient inputs;
- Increased inputs of toxic organic and heavy metal contaminants; and
- Pathogen inputs.

Placing of Solar PV Plant

The project team took great care to position the location and construction footprint in such a way that all the identified sensitive areas were avoided (Figure 30). This realignment of the original project footprint (preferred option Area B) incorporated the 100m buffer zone and most suitable placement of the power line pylons.

***Paleontology* Assessment**

Proposed monitoring and mitigation measures for the Soventix solar PV plant, to be incorporated into the Environmental Management Programme for the development.
No palaeontological No-Go areas or fossil sites requiring specialist mitigation have been identified within the Soventix PV solar development footprint near Hanover; fossil sites are rated as of low sensitivity (Proposed Field Rating IIIC). It is recommended that the older consolidated fluvial deposits along the Brak rivier be avoided during construction since they do contain fossil wood. This area lies within the riverine buffer zone and outside the proposed solar PV plant footprint.

The ECO responsible for the construction phase of the project should be aware of the potential for important fossil finds and the necessity to conserve them for possible professional mitigation (See, for example, Macrae 1999 for a well-illustrated popular

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account of Karoo fossils). The ECO should monitor all substantial excavations into sedimentary rocks for fossil remains on an on-going basis during the construction phase.
Recommended mitigation of chance fossil finds during the construction phase of the solar PV plant and associated grid connection involves safeguarding of the fossils (preferably *in situ*) by the responsible ECO and reporting of finds to SAHRA for the Northern Cape (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). Where appropriate, judicious sampling and recording of fossil material and associated geological data by a qualified paleontologist, appointed by the developer, may be required by the relevant heritage regulatory authorities. Any fossil material collected should be curated within an approved repository (museum / university fossil collection) by a qualified palaeontologist. These recommendations should be included within the Environmental Management Programme for the proposed alternative energy project.

Geohydrology Assessment

Based on the findings of the investigation, the following conclusion is drawn:
1. The study area is predominantly underlain by sedimentary rocks of the Beaufort Group, which forms part of the Karoo Supergroup. Occurrences of dolerite sills and dykes are well known to occur in the project area, and the contacts between the intrusive rock and the host rock are generally targeted for groundwater development.
2. Based on the groundwater data collected, it is confirmed that three (3) aquifers exist in the area:
a. Unconfined aquifers associated with paleo drainage as well as flood plains of non-perennial river systems (about 5 to 10m thick) – not associated with the study area but closer to the Brak River;
b. A shallower semi-unconfined aquifer system associated with weathered Beaufort sediments; and
c. A deeper confined intergranular and fractured aquifer network is associated with the older Beaufort and Ecca sediments, of the Karoo Group.
3. The aquifer underlying the development areas can be regarded as a moderate-yielding aquifer, with reported yields ranging from 0.5 to 2 l/sec. From available literature data, the weathered zone for the area is estimated to be in the order of 10m thick, followed by a subsequent thicker fractured aquifer zone. Based on available groundwater levels for the study area, the groundwater table is placed in the order of 5 mbgl, when considering a regional-scale water table. Groundwater is found within the bedding planes in shale or interbedded sandstone and jointed and fractured contact zoned between sedimentary rocks and dolerite dyke. As such, where these structures daylight in low laying topographical areas, springs will be produced fed by the groundwater within the contacts. The groundwater table mimics the topography and groundwater flows from high-lying areas (water divides) to low-lying areas.
4. Surface water streams in the area are non-perennial. Hence, groundwater is the main source of water for inhabitants who reside in the project area. As part of this assessment, a hydrocensus was undertaken, and 28 boreholes were identified in the study area, of which 13 are used for livestock watering and 6 for domestic use.

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5. The end client desires to use groundwater to supplement the construction and operational water required for the project. The boreholes were yield tested, based on 8hr recommended abstraction. Smaller-size pumps can be installed if 24hr pumping is required. This is however not advised, as the boreholes may be over pumped, decreasing the borehole life and increasing the probability of pump failure.
6. Several groundwater borehole positions were sited, via the application of magnetic geophysical methods, within the Phase 1, Phase 2 and Phase 3 areas.
7. Groundwater quality for the region, and based on field-gathered data, can be considered hard water. The high dissolved salt content will likely cause scaling in piping exposed to heat, or in utensils used to boil water. High EC indicates a high salt load, which could result in scaling on solar panels if applied and left to evaporate. For cleaning purposes, the water would need to be wiped from the panels before it is allowed to evaporate. Otherwise, water softeners or deionisation plants will be required.
8. The projected rainfall decrease for the area as a result of climate change is estimated to decrease by as much as 150mm, reducing the total rainfall to about 170 mm/yr by 2050. It should be noted that the projected changes in the annual average number of extreme rainfall days throughout the district over the period 2021-2050 under the RCP 8.5 scenario suggest either a decrease or increase in a rainfall event. It is anticipated that under the scenarios put forth, the groundwater resources in the project area may become completely replenished in the event of 1:50 and 1:100 year storm events that occur in the project area. As a climate change scenario, the 170mm annual rainfall for the area is used.
9. The risk assessment for both construction and post-construction phases of the project is considered marginal, with mostly reversible and manageable impacts. The largest risk pertaining to geohydrology is the proposed groundwater abstraction activities. As groundwater is a very important resource for locals in the area, care should be taken not to overproduce from boreholes chosen for this project; and there is a limited impact on existing livestock/domestic watering already implemented. The risk of poor-quality seepage via the vadose zone and impacts on groundwater water quality is predicted to be marginal, and will only be a problem if the developing contractor allows leaking vehicles onto the site, or cause deliberate environmental harm.

Mitigation measures for inclusion in the EMPr and EIA

The following mitigation measures can be implemented as part of the EMPr to further reduce the risk of flooding on site and contribution to stormwater generation potential:

 During the construction phase, it is recommended that sandbags and temporary berms be used, to manage stormwater runoff (if storms do occur). It is recommended that the construction phase take place during the winter months, with a decreased probability of storm events. Temporary stormwater systems should be sufficient to manage the stormwater at the site during the construction phase.

 Ensure that all vehicles entering the site (construction and servicing) are not leaking fuel or oils, which can lead to soil and water contamination. Have spill kits on site.

 Do not overproduce from existing or proposed boreholes and ensure that water level monitoring of boreholes within a 1.5km radius of the pumping borehole is undertaken. If a decline in water levels is noted in all boreholes, as a result of pumping, the abstraction rate should be lowered to prevent aquifer depletion.

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Civil Aviation Statement
By considering the requirements set forth by the South African Civil Aviation Authority (SACAA), the project has effectively addressed and mitigated any potential risks that could pose a threat to aviation safety and operations. The checklist based on the civil aviation theme has provided a clear framework to assess and ensure compliance with the regulations and standards. This has enabled the identification and implementation of appropriate measures to minimize potential hazards, such as marking, lighting, or painting the solar panels to ensure their visibility to pilots. The sensitivity assessment conducted in the screening report aligns with the findings of this study, concluding that the proposed solar PV installation poses a negligible impact on aviation safety and operations. The classification of the safety risk severity as 1E: Extremely Improbable, Negligible further supports this conclusion. Moreover, the study highlights the positive impact that the solar PV facility can have on the environment by contributing to greenhouse gas emission reduction and promoting sustainable energy solutions. The careful consideration of environmental factors, including the assessment of local ecosystem impacts, demonstrates the project's commitment to responsible and sustainable development.

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SECTION L: ENVIRONMENTAL IMPACT STATEMENT

an environmental impact statement which contains-

(i) a summary of the key findings of the environmental impact assessment:
(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and
(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.

A summary of the key findings:

The project area is zoned as Agriculture Zone 1. The project area is in Wards 3, 6 & 8 of the Emthanjeni Local Municipality that is located in the Pixley Ka Seme District Municipality in the Northern Cape province.

The proposed development area does not fall within any of the eleven (11) identified Renewable Energy Development Zones (GN No. 114, GG No. 41445 of 16 February 2018, as well as GN No. 786 of 17 July 2020), but it is located within a Strategic Transmission Corridor (GN No. 113 in GG No. 41445 of 16 February 2018, as well GN No. 383, GG No. 44504 of 29 April 2021), specifically within the "Central Corridor." Despite being in the Central Corridor, the applicant cannot follow the basic assessment procedure contemplated in Regulation 19 and 20 of the Environmental Impact Assessment Regulations, 2014 in order to obtain environmental authorisation because the scope of this application excludes LA 9 of LN2.

The project area falls within an Astronomy Advantage Area (AAA) under the Astronomy Geographic Advantage (AGA) Act, 2007 (Act No. 21 of 2007), but the proposed solar PV facility represents a low risk of interference to the SKA radio telescope.

The project area is not within (a) a protected area or within 5 km of a protected area, (b) the core area or within 5 km of the core area of a Biosphere Reserve, (c) a National Protected Area Expansion Strategy Focus Area according to the National Protected Area Expansion Strategy (2016), and (d) a sensitive area in terms of an EMF.

The project area is not within an Air Quality Priority Area.

The project area is not within a site identified in terms of an international convention, such as a RAMSAR site but contains artificial wetlands associated with the two boreholes servicing

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the site. These boreholes are currently used for watering of livestock, and their constant overflow over long durations has created wetland conditions.

The project area is largely flat with ridgelines to the north of the development footprint, which have been excluded from the development to reduce associated visual, heritage and ecological impacts. Additionally, these ridgelines act as a watershed and are a source of stormwater runoff, with a central corridor of high runoff identified by the aquatic specialist which corroborates with soil forms and conditions. This high runoff area is not a hinderance to development, but must be considered in light of the establishment of infrastructure which is susceptible to flooding e.g. sub-stations, transfomers etc. which must be located outside this higher risk area.

There are no formal drainage systems within the footprint, but stormwater runoff would drain toward the Brak River. A tributary of the Brak River is affected by the distribution line connecting the proposed solar PV footprint to the Main Transmission Substation on the already authorised Phase 1/ Cluster 1 project. The upstream reaches of the ephemeral tributaries of the Brak River and considered to be in a largely natural ecological state with the exception of a man-made impoundment, which impedes and stores runoff from the unnamed tributary of the Brak River and associated floodplain, across which the distribution line crosses. These systems have a far less predictable flow regime compared to perennial or seasonal rivers and are frequently dry for long periods in arid regions.

1:100-year ponded flood occurrence zones were identified for the large project area, none of which occur within the solar PV footprint, but are associated with the unnamed triburaty of the Brak River, over which the distribution line will cross. These ponded flood occurrence zones are associated with micro sub-catchment sheet flow towards lower-lying depressions.

De Aar is strongly dependent on groundwater for agriculture and drinking water. Furthermore, water scarcity in the arid Pixley Ka Seme District Municipality is expected to be exacerbated by climate change, specifically drought. Under a low climate change mitigation scenario, model simulations indicated an average temperature increase by 2.3 °C, and a decrease in rainfall annually. Based on the findings of the Geohydrological Study, groundwater availability on all sub-catchments for the current setting is estimated to be enough to sustain a proposed 8-hour abstraction from the designated boreholes and the sub-catchments they fall in, as long as abstraction is undertaken in accordance with the determined sustainable yield.

The project area is not within a critically endangered or endangered ecosystem in terms of SANBI's latest NBA (2018). Northern Upper Karoo is one of the most extensive vegetation types in the country and occupies over 40 000km^2 of the interior Karoo. Northern Upper

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Karoo has not been significantly affected by transformation and is still approximately 96% intact and is classified as Least Threatened.

The project area is located within an Ecological Support Area (ESA) according to the Northern Cape Biodiversity Conservation Plan.

In terms of animal species, the DFFE Screening, site sensitivity verification and specialist studies confirmed the low sensitivity.

The project area is within an Important Bird Area (IBA) called Platberg-Karoo Conservancy (unprotected). 84 bird species were observed within and around the Combined Project Area out of an expected total of 104 species, based on previous surveys. Many of the birds observed are generally considered to be common, widespread and adaptable species which were observed within their expected habitats. Several Species of Conservation Concern have been confirmed in the area, including Blue Cranes, Ludwig's Bustard and Verreaux's Eagle. Blue Cranes were observed especially in association with drainage lines and artificial water points. Ludwig's Bustards were infrequent in their observations and were mostly observed close to koppies, drainage lines, adjacent to roadsides and in adjacent livestock fields. Larger raptors persisted throughout the survey area but were often congregated near perching habitat (pylons).

Due to the high diversity and density of Red-Listed species, (including regionally and globally listed Endangered and Vulnerable birds), the region as a whole is considered to be an area of very high avifaunal importance.

It is the finding of the Visual Statement, that the 2016 VIA impacts and conclusions are valid. However, due to the risks of intervisibility and skyline intrusion, the small hill section of the study area has been excluded from development so that the Sun Central Cluster Phase 2 (this assessment) would not be visible to the Sun Central Cluster Phase 3 (VIA also undertaken by Visual Resource Management Africa), and the adjacent Skilpadkuil Farmstead would also be less visually exposure. With this mitigation, the author concurs with the following Henwood VIA finding:
"The anticipated visual impacts listed above (i.e., post mitigation impacts) are not considered to be fatal flaws from a visual perspective, especially considering the low occurrence of visual receptors within the 10km offset. It is therefore recommended that the development of the solar facility as proposed (i.e. Phase 2) be supported, subject to the implementation of the recommended mitigation measures and management actions."

The project area does not fall within a World Heritage Site or within 10 km of a World Heritage Site according to the PAR. A total of 31 sites were identified during the 2022

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assessment in the study with several within the footprint of low significance, and those of high significance largely constrained to the ridgelines which have been excluded from the development footprint.

The project area is underlain at depth by potentially fossiliferous continental bedrocks of the Lower Beaufort Group (Karoo Supergroup) of Middle Permian age that have yielded sparse but scientifically important vertebrate remains in the Hanover area as well as commoner petrified wood. Also present are non-fossiliferous dolerite intrusions and Late Caenozoic superficial sediments (e.g., alluvium, surface gravels) which might contain important fossil mammal and other remains as well as reworked fossil wood blocks. "The most likely outcome, based on comparable project areas in the Hanover - De Aar region of the Great Karoo, is that comparatively few scientifically useful fossil sites will be recorded, while No-Go palaeontological areas are very unlikely to be designated. Most Karoo fossil sites are of limited extent and can be effectively mitigated in the pre-construction phase, so palaeontological constraints on the project footprint are not anticipated, although they cannot be completely excluded in advance."

Preferred Alternative Site
Based on the findings of the specialist studies and assessment of residual impacts post-mitigation, the proposed project is considered to have an overall Low to Medium negative environmental impact with several positive impacts achievable largely due to socio-economic factors.

The construction of the proposed solar PV facility and its associated infrastructure will avoid the sensitive environmental features identified during the S&EIR process.

Based on the motivation for the need and desirability of the proposed project, it is concluded that the nature, scale, time and location of the proposed activities are needed and desirable for the proposed site and local communities as well as at provincial and national scale, and that the proposed solar PV facility complements national energy planning, provincial/regional economic development planning and provincial/regional spatial development planning.

Southern Africa is witnessing an increased frequency and intensity in climate change-associated extreme weather events, causing water, food, and energy insecurity. Reduced agricultural production, lack of access to clean water, sanitation, and clean, sustainable energy are the major areas of concern (Mpandeli S., et. al. 2018).
What is clear is that climate change impacts are cross-sectoral and multidimensional, and therefore require cross-sectoral mitigation and adaptation approaches. In this regard, a well-coordinated and integrated WEF nexus approach offers opportunities to build resilient

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systems, harmonise interventions, and mitigate trade-offs and hence improve sustainability (Mpandeli S., et. al. 2018).

The proposed development involving an 'Agrivoltaic' system can, if supported by sound ecological and water use management strategies (incorporated into the EMP), provide the kind of cross-sectoral climate change adaptation opportunity needed to respond to the challenge of climate change on the water-energy-food (WEF) nexus in southern Africa.

The proposed adoption of a symbiotic 'Agrivoltaic' system that combines agriculture, specifically good ecological management (grazing) practices, with green energy generation, simultaneously supports the agricultural and energy industries. Furthermore, diversification by changing the current land-use from Agriculture to an 'Agrivoltaic' system is potentially a powerful climate resilient tool, involving both climate change mitigation and adaption measures, compared with the increased pressures of extensive grazing on a terrestrial ecosystem under more frequent and intense drought periods.

The success of the proposed 'Agrivoltaic' system in building climate change resilience is further facilitated by proposed mitigations to halt and reverse existing degradation from extensive livestock production or other drivers and maintain ecosystem integrity by undertaking detailed soil mapping and veld condition assessments (during the environmental impact assessment) to determine the grazing capacity of the project area so that the landowner doesn't exceed recommended stocking densities thereby ensuring adequate vegetation cover necessary for the maintenance of ecosystem services.

The proposed development of a 300 MW Solar PV Facility, particularly when considered together with Phases 1 and 3 (1 GW in total), will make a significant contribution to our country's power deficit when supply falls behind demand, meeting basic needs and equity that the no-go option cannot achieve. At a local level, the landowner or farmer's livelihood is also protected as the additional income stream from leasing the land to Soventix SA (Pty) Ltd will help offset productivity and sales losses from reduced stocking densities when drought periods dictate lower carrying capacities, whilst ensuring good ecological management and maintenance of ecosystem integrity.

Based on the above considerations, it was concluded that the development of a 300 MW Solar Photovoltaic (PV) facility and associated infrastructure (Phase 2) does not represent a significant risk to the environment nor to the surrounding residents and local community, provided that the relevant best practices and applicable legislation is complied with and that the recommended mitigation measures and monitoring activities are implemented.

No-Go-option

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The no-go option would remain agriculture, specifically extensive livestock grazing. Agriculture, which already forms the backbone of the economy of the Emthanjeni Local Municipality and accounts for the largest labour/employment contributor to date.

Extensive Livestock grazing on its own, unless diligently managed, cannot offer the same protection to the land and landowner as that afforded by diversification, in this case the cross-sectoral land-use option of an 'Agrivoltaic' system.

Other opportunity costs for maintaining the status quo include depriving citizens of such socio-economic outcomes as employment opportunities during development (and operation), and much needed green electricity.

Cumulative Environmental Impact Statement

Several other renewable energy developments occur within a 30km radius of the proposed site, which together with the current proposed development, would potentially generate significant cumulative impacts on habitat loss and fragmentation and negative impact on broad-scale ecological processes such as dispersal and climate change resilience.

Positive impact associated with project expenditure and the funding of local socio-economic development initiatives would increase to a cumulative positive impact of high significance.

The current developments within the region raise the possibility of significant cumulative impacts, especially concerning collision risk, habitat loss and fragmentation and loss of suitable habitat for threatened species.

The construction of the solar PV facility development and other renewable energy facilities in the area would result in visual impacts resulting from the presence of the solar PV facility in the landscape and the change in land use. The visual recommendations were all incorporated into the layout design (assuming uptake from Eskom regarding the lightning recommendations at the sub-station).

Overall, and based on the above cumulative environmental impact considerations, it is recommended that the proposed development proceed subject to implementation of mitigation measures of the various specialist, particularly with regards to terrestrial biodiversity and avifauna.

A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives is included in the Impact Assessment section (Section H(v)) as well as Table 27.

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SECTION M: IMPACT MANAGEMENT OBJECTIVES AND IMPACT MANAGEMENT OUTCOMES

based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;

Impact Management Objective and Outcomes have been included in the Impact Assessment & EMPr.

SECTION N: FINAL PROPOSED ALTERNATIVES AND MITIGATION MEASURES

the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment

Only one development footprint was assessed, but assessed impacts on the environmental attributes have been assessed for both the development footprint and associated activities, structures and infrastructure in the Impact Assessment section (Section H(v)).

SECTION O: CONDITIONAL FINDINGS OF EAP AND SPECIALISTS

any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.

1. The holder of the authorisation must appoint an experienced independent Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations referred to in this environmental authorisation are implemented and to ensure compliance with the provisions of the EA and approved EMPr.

2. The authorisation is valid for 10 years.

3. The adoption of a symbiotic 'Agrivoltaic' system that combines agriculture, specifically good ecological management (grazing) practices and green energy.

4. The maintenance and monitoring of vegetation cover through ecologically sustainable grazing management practices and veld condition assessments.

5. Reduce visual impacts by the adoption of visually unobtrusive lighting systems which will reduce impacts on surrounding landowners and occupiers as well as affected fauna.

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SECTION P: ASSUMPTIONS AND UNCERTAINTIES

a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed

Underlying assumptions, uncertainties and gaps in knowledge are addressed in the impact assessment under each phase and activity group. The table below provides a simplified summary of the specialist assumptions and uncertainties.

Aquatic
• this report is based on information that could reasonably have been sourced within the time period allocated to the report and is dependent on the information provided by management and/or its representatives. • it is trusted that the construction team management with the help of the ECO will ensure that these mitigatory measures be implemented where applicable. • Project proponents will always strive to avoid and mitigate potentially negative project related impacts on the environment, with impact avoidance being considered the most successful approach, followed by mitigation. It further assumes that the project proponents will seek to enhance potential positive impacts on the environment.
Aviation
• None stated.
Chiropteran
• as the area is located outside of the initial assessment, however it is assumed that since it falls outside of the low-lying areas that the bats appear to favour, bat activity will not necessarily be negatively impacted. • footprint has increased in distance away from a potential roosting site and extended into an area that had low bat activity recorded, thus gaining favour for development.
Grazing
• None stated.
Visual
• This assessment was undertaken during the planning stage of the project and is based on information available at that time.
Heritage
• Certain areas where inaccessible • it should be noted that although all efforts are made to locate, identify and record all possible cultural heritage sites and features (including archaeological remains) there is always a possibility that some might have been missed as a result of grass cover and other factors.
Traffic
• None stated.
Social
• Not every individual in the community could be interviewed therefore only key people in the community were approached for discussion. Additional information

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was obtained using existing data • The social environment constantly changes and adapts to change, and external factors outside the scope of the project can offset social changes • Social impacts can be felt on an actual or perceptual level, and therefore it is not always straightforward to measure the impacts in a quantitative manner • Social impacts commence when the project enters the public domain. Some of these impacts will occur irrespective of whether the project continues or not, and other impacts have already started • There are different groups with different interests in the community, and what one group may experience as a positive social impact, another group may experience as a negative impact • Social impacts are not site-specific, but take place in the communities surrounding the proposed development
Avifauna
• There is a scarcity of published, scientifically vetted information regarding the avifaunal impacts at existing SEFs • Assessment of the impacts associated with bird-SEF interactions is problematic due to: (i) limitations on the quality of information available describing the composition, abundance and movements of the local avifauna, and (ii) the complete absence of any local, empirical data describing the known impacts of existing SEFs on birds (Jenkins, 2011) • Limited time in the field and no seasonal spread means that important components of the local avifauna could have been missed
Fauna and Flora
• The timing of the site visit was near-optimal and followed extensive rainfall in the region with the result that the vegetation was in an excellent condition for sampling with the majority of species present in flower or seed. • faunal activity was high and most of the common species of the area were observed at the site. • final layout has not been provided by the developer for the assessment and it is therefore not possible to provide a definitive assessment.
Geotechnical
• None stated.
Hydrological
• Steady-state flood modelling ignores the effect of storage within the system and therefore produces higher flood levels than would be expected to occur. • The manning coefficients for the vegetation observed, and the medium-low resolution topographic data, the flood risk to the surface infrastructure has been adequately assessed for the project area. • The ALOS DTM is used to delicate the sub-catchments are of sufficient resolution to accurately describe the runoff from the site(s).
Palaeontology
• None stated.

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SECTION Q: REASONED OPINION

a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

In consideration of the investigated cumulative impacts, the nature and extent of the proposed development, compliance with the relevant legal, policy and planning documentation (i.e. "need and desirability") and the findings of the specialist studies, it is the opinion of Ecoleges that the proposed Soventix Solar PV Plant development is supported from an environmental perspective and should be considered for Environmental Authorisation, subject to the implementation of identified mitigations and recommendations.

The reasoned opinions of the appointed specialists are summarised below:

Flora and Fauna Specialist

Provided that the development can be restricted to the medium and lower sensitivity parts of the site, then the development of the three PV plants at the Soventix site would generate low impacts of an acceptable magnitude. As such, development of the lower sensitivity parts of the site can be supported from a terrestrial ecological perspective.

Avifauna Specialist

While there are certainly some sensitive areas at the site that need to be avoided, there are also fairly of lower sensitivity plains present, where development should be focussed. As these plains are extensive, the extent of habitat loss resulting from the development of the PV facilities at the site is considered low and would not be likely to pose a threat to the long-term persistence of any avifauna at the site. With the implementation of these mitigation measures, the impact of the development can be reduced to an acceptable level and as such there are no fatal flaws associated with the development that should prevent it from proceeding.

Chiropteran Specialist

In my opinion, based on the data collected during the bat baseline survey and available literature, there is little reason from a chiropteran perspective for the development of the proposed Soventix Solar Farm not to be approved.

Heritage Specialist

From a cultural heritage point of view the development should be allowed to continue, once the recommended mitigation measures have been implemented.

Visual Specialist

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Overall, considering all relevant criteria, **Alternative 2** is considered the **preferred alternative**, and is recommended from a visual perspective. However, both Alternatives 1 and 3 would be acceptable should Alternative 2 not be viable due to other constraints.

Social Specialist

None of the social impacts identified are so severe that the project should not continue. Based on the findings of this report, it is recommended that the project continues, on the conditions that the mitigation measures are implemented.

Hydrological Specialist

The results of the analysis indicate that the water level in the watercourse is not expected to reach the pylon of concern, at its currently indicated location. The impact on water quality of the construction and operation of the powerline between the solar PV array and the existing Eskom 400 kV powerline is expected to be LOW prior to mitigation, reducing to VERY LOW with the implementation of the proposed mitigation measures. The impact on catchment yield (water quantity) is assessed as NO IMPACT.

Aquatic Specialist

The project team took great care to position the location and construction footprint in such a way that all the identified sensitive areas were avoided. This realignment of the original project footprint (preferred option Alternative 2) incorporated the 100m buffer zone and most suitable placement of the power line pylons.

Paleontology Specialist

There are no fatal flaws in the proposed alternative energy project from a palaeontological heritage viewpoint. Cumulative impacts of fossil heritage in the context of several proposed or authorised alternative energy developments in the region (especially around De Aar) are assessed as low, given their comparatively small footprint compared with the outcrop area of the rock units concerned. There are no objections to authorisation of the proposed solar development, provided that the recommended mitigation measures are incorporated into the EMPr for this project and fully implemented.

Traffic Specialist

Based on the conclusions, it is recommended that the proposed development of a 225MW solar PV facility be approved. Access to the plant from the N10 should comply with the relevant standards.

Recommended conditions within the Environmental Authorisation

1. The holder of the authorisation must appoint an experienced independent Environmental Control Officer (ECO) for the construction phase of the development

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that will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations referred to in this environmental authorisation are implemented and to ensure compliance with the provisions of the approved EMPr.

2. The authorisation is valid for 10 years and there should be no restriction on commencement of construction as the project is reliant on the REFIT program.
3. If the project is launched 5 years after the authorisation is granted there should be a review of the EA and EMPr against all legislation, technology and renewable energy best practice.
4. Vegetation clearing must be kept to an absolute minimum. Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.
5. An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste, which will not be recycled, must be disposed of at a landfill licensed in terms of section 20 (b) of the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008).
6. A permit must be obtained from the relevant nature conservation agency for the removal or destruction of indigenous, protected or endangered plant or animal species and a copy of such permit/s must be submitted to the Department for record keeping.

SECTION R: OPERATIONAL ASPECTS AND POST CONSTRUCTION MONITORING

where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;

The scope of the environmental authorisation is for development only activities, but in the interest of full life cycle assessment, operational and decommissioning activities have been included, which are thus not compliance requirements in terms of implementation, but industry best practice guidelines.

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SECTION S: APPOINTED INDEPENDENT EAP

Appendix 2 Section 2 (j) of the Environmental Impact Assessment (EIA) Regulations, 2014 (promulgated in terms of the National Environmental Management Act 107 of 1998, as amended - NEMA), requires:

j) an undertaking under oath or affirmation by the EAP in relation to-

- *(i) the correctness of the information provided in the report;*
- *(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and*
- *(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;*

EAP AFFIRMATION.

I, **Shaun Donovan MacGregor**, on behalf of Ecoleges, hereby affirm the correctness of the information provided in the report; including comments and inputs from stakeholders and interested and affected parties; and any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties. That all comments and inputs received from stakeholders and interested and affected parties have been accurately recorded herein and, insofar as comments are relevant and practicable, and have been included in the final Environmental Impact Assessment Report submitted to the Competent Authority.

Signature of the EAP

05 June 2023
DATE:

MEMBERS: J.A. Bowers (M Tech, Pr.Sci.Nat.) & S.D. MacGregor (M.Sc., Pr.Sci.Nat., Reg. EAP)
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SECTION U: ANY DEVIATION FROM THE SCOPING REPORT

an indication of any deviation from the approved scoping report, including the plan of study, including-

(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and
(ii) a motivation for the deviation;

Changes in methodology were implemented in the impact assessment section relating to risks and impacts on the environmental attributes associated development footprint. An adjusted methodology was employed which is believed to align strongly with the EIA Regulations (2014) requirements.

SECTION V: COMPETENT AUTHORITY SPECIFIC INFORMATION

any specific information required by the competent authority

Specific information required by the Competent Authority has been captured in the Comments and Response Sheet, including details on how the matters have been addressed.

SECTION W: OTHER INFORMATION REQUIRED BY REGULATIONS

(w) any other matter required in terms of section 24(4)(a) and (b) of the Act.

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

Government No. 42323 in Government Gazette, 22 March 2019, has provided Generic Environmental Management Programmes (EMPr) for the development and expansion of substation infrastructure for the transmission and distribution of electricity and the development and expansion for overhead electricity transmission and distribution infrastructure. These EMPr's will be used within the context of this project for the relevant infrastructure components. Hence, the project-specific EMPr will pertain to the Solar PV footprint and associated infrastructure, but not the grid integration infrastructure.

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