CEN INTEGRATED ENVIRONMENTAL MANAGEMENT UNIT

Environmental and Rural Development Specialist

DRAFT BASIC ASSESSMENT REPORT:

PROPOSED SACE RANGER SOLAR PV (2.46MW) PLANT, UITENHAGE, EASTERN CAPE

DEA REFERENCE NO: 14/12/16/3/3/1/1172

August 2014

Project Title:

Draft Basic Assessment Report:

Proposed SACE Ranger Solar PV (2.46MW) Plant, Uitenhage, Eastern Cape

Project Applicant:

South African Clean Energy Solutions (SACE)

Reference Number:

DEA REFERENCE NO: 14/12/16/3/3/1/1172

Environmental Assessment Practitioner:

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Executive Summary

CEN Integrated Environmental Management Unit (CEN IEM Unit) was appointed by South African Clean Energy Solutions (SACE) to undertake the environmental assessment for the Proposed SACE Ranger Solar PV (2.46MW) Plant, Uitenhage, Eastern Cape.

CEN IEM Unit meets the requirements for an independent Environmental Assessment Practitioner (EAP) in terms of the Environmental Impact Assessment (EIA) Regulations of 2010.

Overview of Proposed Project

South African Clean Energy Solutions (SACE) are proposing the development of a small scale, pilot solar (photovoltaic, PV) plant, in order to generate 2.46MW net capacity of electricity.

The proposed solar plant, the SACE Ranger Solar PV Plant, will be located on Portion 3 of the Farm Bauwerskraal, No 234, Uitenhage situated within the Nelson Mandela Bay Municipality, Eastern Cape (**Figure 1**). The total project site is approximately 19.2ha in extent, and within this area approximately 9.5ha will be used for the solar array area (footprint area) and 0.3ha for the construction camp area (**Figure 2**).

The proposed solar production entails a solar panel tracker mounting system, 1000V DC PV system and 11kV distribution system and transmission line to connect to the existing transmission line.

The proposed solar plant will convert sunlight into electricity, through photovoltaics (PV). Photovoltaics convert light into electric current. Solar cells produce direct current (DC) power which fluctuates with the sunlight's intensity. For practical use this usually requires conversion to certain desired voltages or alternating current (AC), through the use of inverters. Multiple solar cells are connected inside modules. Modules are wired together to form arrays (rows), then tied to an inverter, which produces power at the desired voltage, and for AC, the desired frequency/phase.

The solar tracking system would consist of a single axis PV system. The system is a simplified mechanical structure with pre-assembled components. The system mounting components are able to withstand changes in topography and settling. Examples of a solar PV tracking system are presented in **Figure 3**.

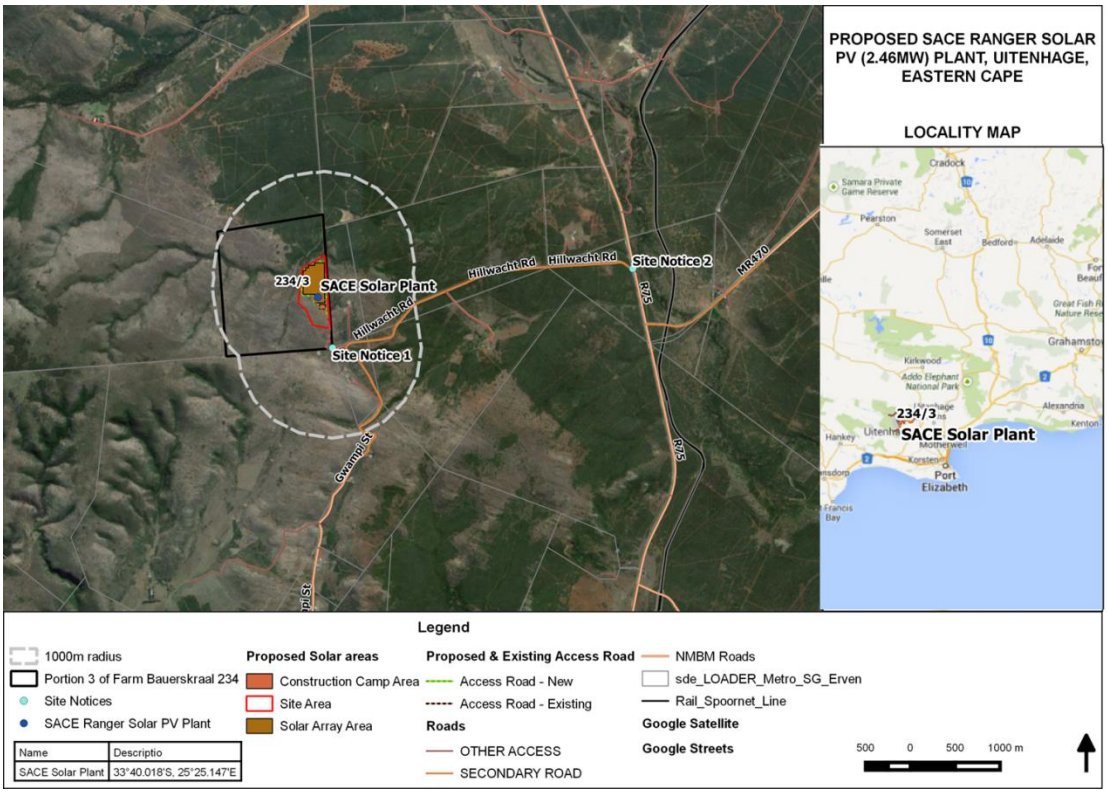
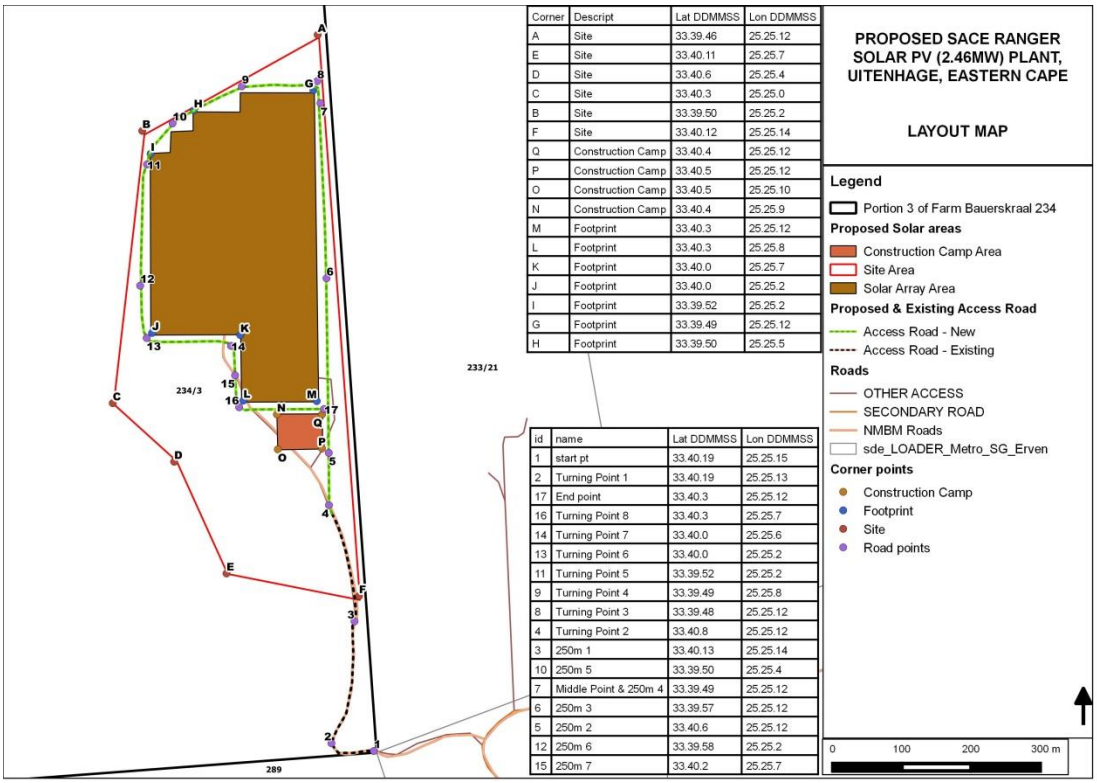


Figure 1: Locality Map



Corner	Descript	Lat DDMMSS	Lon DDMMSS
A	Site	33.39.46	25.25.12
E	Site	33.40.11	25.25.7
D	Site	33.40.6	25.25.4
C	Site	33.40.3	25.25.0
B	Site	33.39.50	25.25.2
F	Site	33.40.12	25.25.14
Q	Construction Camp	33.40.4	25.25.12
P	Construction Camp	33.40.5	25.25.12
O	Construction Camp	33.40.5	25.25.10
N	Construction Camp	33.40.4	25.25.9
M	Footprint	33.40.3	25.25.12
L	Footprint	33.40.3	25.25.8
K	Footprint	33.40.0	25.25.7
J	Footprint	33.40.0	25.25.2
I	Footprint	33.39.52	25.25.2
G	Footprint	33.39.49	25.25.12
H	Footprint	33.39.50	25.25.5

id	name	Lat DDMMSS	Lon DDMMSS
1	start pt	33.40.19	25.25.15
2	Turning Point 1	33.40.19	25.25.13
17	End point	33.40.3	25.25.12
16	Turning Point 8	33.40.3	25.25.7
14	Turning Point 7	33.40.0	25.25.6
13	Turning Point 6	33.40.0	25.25.2
11	Turning Point 5	33.39.52	25.25.2
9	Turning Point 4	33.39.49	25.25.8
8	Turning Point 3	33.39.48	25.25.12
4	Turning Point 2	33.40.8	25.25.12
3	250m 1	33.40.13	25.25.14
10	250m 5	33.39.50	25.25.4
7	Middle Point & 250m 4	33.39.49	25.25.12
6	250m 3	33.39.57	25.25.12
5	250m 2	33.40.6	25.25.12
12	250m 6	33.39.58	25.25.2
15	250m 7	33.40.2	25.25.7

Figure 2: Layout Map

Figure 3: Examples of Solar PV Tracking System (Source: First Solar)

The solar panels or PV modules consists of thin film solar module technology, certified for use in 1000V DC systems. The PV modules are manufactured off-site, and certified for reliability and safety by international institutes. Each PV module is approximately 1200mm by 600mm in size and will be positioned in rows to form the solar array area. The operational lifespan is approximately 25 years. The solar panels will be positioned approximately 0.5m above ground level.

Construction Phase

The construction phase will be undertaken in three (3) phases, and is anticipated to be undertaken in four (4) months.

Phase 1: Preparation of the site for construction, surveying and mapping the foundation points with GPS co-ordinates, on-site secured storage facilities, mansheds and toilets. Clearing of site of vegetation

Phase 2: Construction of all civil activities. This phase includes lengthening and widening of the access road, trenching for cables, setting racking foundations, mounting PV panels to each new row of standing racks, installing the inverters to the racks, stringing the panels, pulling the cables, and ends with completing all the PV plant electrical works.

Phase 3: Testing and commissioning of equipment. The PV plant's performance is measured, review of as-built plans. Detected failures will be repaired prior to issuing the provision acceptance certificate (PAC).

Operation and Maintenance Phase

Monitoring, inspections and regular maintenance of solar equipment. A data collection system is used to monitor the functioning of the tracking system.

Reactive repairs – measures are taken to restore the operation and safety of solar park immediately after becoming aware they have been affected by a malfunction.

Ground maintenance includes trimming of vegetation to avoid shading or affecting operations. Pathways between arrays are left unobstructed, ensuring maintenance staff have access to all portions of each array.

Legislative Framework

This basic assessment report is a standard template report required by the National Department of Environmental Affairs (DEA) in terms of the EIA Regulations, 2010.

Table 1 presents a cross reference to the information requirements per Regulation 21 and 22 of Government Notice R.543 (of 18 June 2010, NEMA EIA Regulations).

Table 1: Information Requirements per Regulation 21 and 22 of GN R.543

Description	NEMA EIA Regulations (GN R543)	Section in BAR
Details of Application	*21(1)*	Section A
Details of the Environmental Assessment Practitioner (including expertise)	*22(2)(a)*	Appendix H
Description of the proposed activity.	*22(2)(b) & (r)*	Section A
Description and a map of the property and the location of the activity on the property.	*22(2)(c) & (r)*	Section A & B Appendix A
Description receiving affected environment and manner in which the environment may be affected.	*22(2)(d), (r) & (s)*	Section B & D Appendix F
Legislation and guidelines considered.	*22(2)(e) & 22(3)(a) & (b)*	Section A
Details of the public participation process.	*21(2)(a), (b), (c) & (e)* *22(2)(f), (o), (p),(q) & (s)*	Section C Appendix E
Description of the need and desirability.	*22(2)(g)*	Section A
Description of identified alternatives	*22(2)(h) & 22(4)*	Section A
Description and assessment of significance of environmental impacts.	*22(2)(i) & (s), & 22(4)*	Section D Appendix F
Environmental management and mitigation measures proposed.	*22(2)(j) & (s)*	Section D Appendix F
Inputs and recommendations made by specialists.	*22(2)(k) & (r)*	Section B Appendix D
Draft Environmental Management Programme	*22(2)(l) & (s)*	Appendix G
Description of any assumptions, uncertainties and gaps in knowledge.	*22(2)(m) & (s)*	Appendix J
Recommendations (reasoned opinion and conditions)	*22(2)(n)*	Section E

The proposed SACE Ranger Solar PV (2.46MW) Plant include activities that may have a detrimental effect on the environment as listed in GN R.544 and GN R.546 (Government Gazette 33306 of 18 June 2010, as amended). The process to be followed in the application for an Environmental Authorisation regarding the relevant activities is a Basic Assessment process, as described in the EIA Regulations, 2010, published in terms of Section 24(5) of the NEMA. The proposed SACE Ranger Solar PV (2.46MW) Plant may not commence without an Environmental Authorisation from the DEA.

No waste management activities as listed in GN R.921 of 29 November 2013 in terms of Section 19 (1) of the National Environmental Management: Waste Act No. 59 of 2008 (NEM:WA) have been identified. It is anticipated that storage of waste, including hazardous waste, will not exceed 80m^3 at any one time.

Methodology

In preparing this assessment, readily available information relating to the affected environment was collected and reviewed for use in the report. Every effort was made to use the most current information. Refer to **Appendix J-3** for assumptions and limitations.

Members of CEN IEM Unit visited the site in August and October 2013 to undertake the relevant site assessments of the proposed development site. The site visit was used to determine the nature of the affected environment and to identify potential environmental issues of concern.

Public Participation

Various mechanisms were used to create awareness of the proposed project among the people that may be directly or indirectly affected by the proposed project. The announcement of the project included the following:

1. Newspaper advertisements appeared in The Herald (English), and in Die Burger (Afrikaans), 12 September 2013.
2. Two A2-sized site notices.
3. Notifications, including the Background Information Document (BID), were sent to I&APs to notify them of the proposed project.

The Draft Basic Assessment Report was made available for a 40 day review period to state departments and registered I&APs from 15 August – 25 September 2014.

The Final Basic Assessment Report will be available for a 21 day review period.

Table 2 presents a summary of the main issues raised and response.

Table 2: Summary of Issues and Response

Summary of main issues raised by I&APs	Summary of response from EAP
Requires rezoning application to be submitted to the NMBM for consideration.	A rezoning application will be submitted.
Impacts to property values.	There is no evidence that solar farms affect property prices either positively or negatively. The impact can be mitigated to a low negative impact significance.
Visual impacts relating to: a) Adjacent landowners b) Hikers on trails in the Groendal Wilderness Area, Vermaaksop, Lady	Visibility of the solar infrastructure will be dependent on the height from which the development will be viewed. The solar panel frames are low in height, below 1m. Solar PV

Summary of main issues raised by I&APs	Summary of response from EAP
Slipper c) Sun glinting off the solar panels	panels are dark rather than reflective, and are designed to absorb rather than reflect sunlight. However there may still be a limited amount of light being reflected from the glass outer casing, and likely to be visible at higher elevations. The visual impact can be offset by vegetation providing a natural screening. The solar infrastructure may be visible from the Groendal Wilderness Area, specifically Vermaakskop being at a higher elevation than the solar plant. However the visibility may be reduced due to the undulating topography of the area. The solar infrastructure would not be visible from the Springs Local Nature Reserve. The impact can be mitigated to a low negative impact significance, from a medium negative impact.
Noise impacts on adjacent landowners.	The nearest residential building is 206m to the east of the proposed site. Noise creation from construction workers and vehicles may impact on surrounding landowners during the construction phase. This includes noise emanating from construction machinery, power tools and compressors, construction vehicles and general construction activity. Noise activities during the operational phase would be limited to periods when maintenance activities are being undertaken. No significant noise levels are expected from the operating solar tracking system. The impact can be mitigated to a low negative impact significance.
Clarification on the position and extent of the site.	The proposed solar 2.46MW plant will be located on Portion 3 of the Farm Bauwerskraal, No 234, Uitenhage situated within the Nelson Mandela Bay Municipality, Eastern Cape. The proposed site is easily accessed from the Hillwacht Road. The site is approximately 7km north of the urban area of Uitenhage. The total project site is approximately 19.2 ha in extent, and within this area approximately 9.5 ha will be used for the solar array area (footprint area).
Fire risks and/or fire hazards.	Fire is a potential risk with any electrical system. Veld fires are a potential risk considering the vegetation types occurring within and adjacent to the site. During construction the risk may be attributed to inappropriate construction activities (e.g. hot work, welding) on dry, windy days. During the operational phase, fire risks may be associated with incorrect or loose wiring of the solar panels or transmission lines, or when wiring is inadequate and cannot

Summary of main issues raised by I&APs	Summary of response from EAP
	withstand electricity generation. The impact can be mitigated to a low negative impact significance, from a medium negative impact.
Impacts to avifauna.	Potential impacts to avifauna include sun glinting from the solar panels and connecting transmission line interrupting flight during the operational phase. Solar PV panels are dark rather than reflective, and are designed to absorb rather than reflect sunlight. However there may still be a limited amount of light being reflected from the glass outer casing. Overhead transmissions lines may present a potential collision risk or electrocution to avifauna. The impact can be mitigated to a low negative impact significance.
Dust management measures during construction.	Mitigation measures for dust impacts include: a) Prompt rehabilitation and wetting down of recently cleared areas to minimize dust creation. b) Until vegetation used in rehabilitation efforts has established, temporary stabilization methods must be used (e.g. protecting exposed soils with coarse granular materials, mulches, or straw). c) Construction should be undertaken in a phased manner, so as to limit the size of the area to be exposed at any one time. d) Dust levels are not to exceed 600mg/m2/day averaged over an annual period for rural areas. e) Dust suppression techniques (e.g. wetting of areas) to be used on all dust generating surfaces. Potable and contaminated water not to be used as a dust-suppressing agent. f) All work must stop during high wind conditions (i.e. when wind speeds exceed 35km/h). g) Construction vehicles must adhere to speed limits.
Health related impacts.	Potential health and safety risks (e.g. exposure to toxic chemicals and gases) related to the solar panels are prevalent with the manufacturing process of the solar panels. The risks associated with the manufacturing process are not applicable as manufactured solar panels will be installed. Although tiny amounts of semiconductor materials are imbedded in the solar panel / module, toxic compounds cannot cause any adverse health effects unless they enter the human body in harmful doses through ingesting flakes or dust particles; or inhaling dust and fumes. The solar panels or modules are enclosed by thick layers of

Summary of main issues raised by I&APs	Summary of response from EAP
	glass or plastic and unless these components are ground into particles or exposed to fire, the risk of ingestion or inhalation is minimal. Solar PV panels have a zero vapour pressure at ambient conditions and the risk of inhalation of any vapours or dust during normal use of solar PV panels are minimal (Markvart and Castaner, 2003). No chemical cleaning agents are utilised during the operational phase. The solar panels are cleaned with water. The impact can be mitigated to a low negative impact significance, from a medium negative impact.
Contamination of soils, ground and surface water.	Soil and water pollution impacts relate to spillages from construction materials, such as diesel, oils and cement, if dispersed via surface run-off, or are allowed to permeate into the soils and groundwater. The potential negative changes to water quality during the operational phase would be limited to sedimentation. The potential risk of trace metals leaching from installed solar PV panels into soils, surface or groundwater is low due to the sealed nature of the solar PV panels, however this risk may increase with broken or aged solar panels. The impact can be mitigated to a low negative impact significance, from a medium negative impact.
Waste management practices and vermin control.	Impacts relating to ineffective waste management procedures may lead to the dumping of building rubble, littering and pollution of the surrounding areas as well as unsanitary (toilet) conditions and an increase in vermin. No vermin will be attracted during the operational phase. Decommissioned, faulty or broken solar panels, equipment or cabling will be taken off site and recycled. If items are unable to be recycled, to be disposed of at an appropriate landfill site. No illegal dumping, burying or burning of waste is allowed. No hazardous waste material will be disposed of as general waste. The impact can be mitigated to a low negative impact significance, from a medium negative impact.
Soil erosion.	Soil exposed by the clearing of vegetation during construction and maintaining vegetation cleared areas during the operational phase will have substantially elevated erosion levels. The risk of soil erosion increases in areas where vegetation and rocks are removed on steeper slopes in order to cater for solar PV infrastructure and access road. The impact can be mitigated to

Summary of main issues raised by I&APs	Summary of response from EAP
	a low negative impact significance, from a medium negative impact.
Safety and security impacts during construction.	Security aspects relate to potential theft of construction materials and theft of neighbouring farmers livestock or equipment. The presence of workers on the site for construction related activities, irrespective of whether or not they are local, may create an increased safety and security risk to local households in the area. In addition, any changes in the local crime rates are likely to be attributed to the influx of construction workers, whether such changes can be attributed to their presence or not. The impact can be mitigated to a low negative impact significance, from a medium negative impact.
Impact of heavy vehicles.	Traffic impacts relate to potential increases in traffic within the area, with resultant potential congestion, road damage, noise, etc. issues. The impact can be mitigated to a low negative impact significance.

Summary of Environmental Impact Assessment

Based on the site visit and the information gathered, potential significant impacts and potential cumulative impacts that are associated with the proposed SACE Ranger Solar PV (2.46MW) Plant were identified and summarised in **Table 3**.

Table 3: Summary of Impacts

SUMMARY OF IMPACTS & SIGNIFICANCE				
Phase	Alternative 1 (Preferred)			No Go
	Planning & Design	Construction & Decommiss.	Operational	
Ecological : Loss of vegetation				
Significance before mitigation	Neutral	Medium (-)	Medium (-)	Medium (+)
Significance after mitigation	Neutral	Low (-)	Low (-)	Medium (+)
Ecological : Loss of habitat containing Species of Special Concern				
Significance before mitigation	High (-)	High (-)	High (-)	Medium (-)
Significance after mitigation	Medium (-)	Medium (-)	Medium (-)	Medium (-)
Ecological : Potential spread of alien vegetation				
Significance before mitigation	Neutral	Medium (-)	Medium (-)	Medium (-)
Significance after mitigation	Neutral	Low (-)	Low (-)	Low (-)
Ecological : Changes to the hydrological systems				
Significance before mitigation	Medium (-)	Medium (-)	Medium (-)	Neutral
Significance after mitigation	Very low (-)	Very low (-)	Very low (-)	Neutral
Ecological : Pollution of soils, surface and groundwater				

SUMMARY OF IMPACTS & SIGNIFICANCE				
Phase	Alternative 1 (Preferred)			No Go
	Planning & Design	Construction & Decommiss.	Operational	
Significance before mitigation	Neutral	Medium (-)	Medium (-)	Neutral
Significance after mitigation	Neutral	Low (-)	Low (-)	Neutral
Ecological : Disturbance to Fauna and Avifauna				
Significance before mitigation	Neutral	Low (-)	Low (-)	Neutral
Significance after mitigation	Neutral	Low (-)	Low (-)	Neutral
Air Quality : Dust and Air Pollution				
Significance before mitigation	Neutral	Medium (-)	Medium (-)	Medium (-)
Significance after mitigation	Neutral	Low (-)	Low (-)	Very Low (-)
Heritage Resources : Loss of heritage resources				
Significance before mitigation	Neutral	Low (-)	Neutral	Low (-)
Significance after mitigation	Neutral	Very Low (-)	Neutral	Low (-)
Land Use : Loss of agricultural land				
Significance before mitigation	Neutral	Neutral	Medium (-)	Medium (-)
Significance after mitigation	Neutral	Neutral	Medium (-)	Low (+)
Land Use : Soil erosion				
Significance before mitigation	Medium (-)	Medium (-)	Medium (-)	Neutral
Significance after mitigation	Low (-)	Low (-)	Low (-)	Neutral
Waste Management : Liquid and solid waste, vermin control				
Significance before mitigation	Medium (-)	Medium (-)	Medium (-)	Medium (-)
Significance after mitigation	Low (+)	Low (-)	Low (-)	Low (+)
Traffic : Increased traffic in greater area				
Significance before mitigation	Neutral	Medium (-)	Low (-)	Neutral
Significance after mitigation	Neutral	Low (-)	Low (-)	Neutral
Social : Noise pollution				
Significance before mitigation	Neutral	Medium (-)	Low (-)	Neutral
Significance after mitigation	Neutral	Low (-)	Low (-)	Neutral
Social : Visual Intrusion				
Significance before mitigation	Neutral	Medium (-)	High (-)	Neutral
Significance after mitigation	Neutral	Low (-)	Low (-)	Neutral
Social : Health, safety and security				
Significance before mitigation	Neutral	Medium (-)	Medium (-)	Neutral
Significance after mitigation	Neutral	Low (-)	Low (-)	Neutral
Social : Employment Opportunities				
Significance before mitigation	Neutral	Medium (+)	Medium (+)	Medium (-)
Significance after mitigation	Neutral	Medium (+)	Medium (+)	Medium (-)
Social : Reduction in property values				
Significance before mitigation	Neutral	Neutral	Low (-)	Neutral

SUMMARY OF IMPACTS & SIGNIFICANCE				
Phase	Alternative 1 (Preferred)			No Go
	Planning & Design	Construction & Decommiss.	Operational	
Significance after mitigation	Neutral	Neutral	Low (-)	Neutral
Renewable Energy Infrastructure : Production of cleaner energy				
Significance before mitigation	Neutral	Neutral	Medium (+)	Medium (-)
Significance after mitigation	Neutral	Neutral	High (+)	Medium (-)

Environmental Impact Statement

The construction phase would have the greatest impact on the clearance of vegetation. The operational phase of the project would have a limited impact on vegetation regrowth within the solar array area and immediate adjacent area, as vegetation will need to be kept clear of tall bushes and trees as these would contribute to shaded areas over the solar panels. Vegetation underneath the solar panels would also need to be controlled in order not to interfere with the tracking system. With the mitigation measures in place, the impact on the loss of vegetation would remain localised resulting in a low impact.

One hundred and thirty plant species were identified on site. Of these four (4) are Species of Special Concern (SSC), twenty seven (27) species are protected plants, and one (1) protected tree species, was identified on site. The majority of these species are located on the boundaries of the proposed site, and a few are scattered within the proposed solar array area. With the mitigation measures in place, the impact on the loss of habitat and SSCs would remain localised resulting in a medium impact.

A low level of alien plant invasion is scattered across the site. Five alien invasive species were identified on site. The potential of alien plants spreading is likely if not managed during the site establishment, construction and operational phases. With the mitigation measures in place, the impact on the spreading of alien plants into the indigenous vegetation would remain localised, with natural re-vegetation happening within a short time period, resulting in a low risk and low impact significance.

Sediment entering the dry drainage line located to the west and north of the site may impact on water quality and aquatic ecosystem functioning. The proposed activities fall outside of the 32m buffer of the nearest drainage line (located to the west and north of the site), and no removal of riverine vegetation will be undertaken. Although the proposed site is located within 500m of an artificial wetland (manmade dams), located to the south, the proposed development will not impact on this area. The impact on changes to the hydrological system: potential loss of aquatic habitat can

be mitigated to a very low negative impact significance, from a medium negative impact.

Soil and water pollution impacts relate to spillages from construction materials, such as diesel, oils and cement, if dispersed via surface run-off, or are allowed to permeate into the soils and groundwater. The potential negative changes to water quality during the operational phase would be limited to sedimentation. The potential risk of trace metals leaching from installed solar PV panels into soils, surface or groundwater is low due to the sealed nature of the solar PV panels, however this risk may increase with broken or aged solar panels. The impact can be mitigated to a low negative impact significance, from a medium negative impact.

Faunal impacts relate to the disturbance and restriction of fauna movement due to the area being fenced. Construction activities may disturb any fauna and avifauna located within the immediate location, however this will be limited to the construction phase. Potential impacts to avifauna include sun glinting from the solar panels and connecting transmission line interrupting flight during the operational phase. Solar PV panels are dark rather than reflective, and are designed to absorb rather than reflect sunlight. However there may still be a limited amount of light being reflected from the glass outer casing. Overhead transmissions lines may present a potential collision risk or electrocution to avifauna. Impacts to fauna and avifauna can be mitigated to a low negative impact significance.

Dust and air pollution impacts relate to the generation of dust during construction related activities, poorly maintained construction vehicles and burning materials for warmth during winter by contraction staff. In relation to operational phase activities, the impact relates mainly to dust from cleared areas, e.g. the gravel access road and solar array area. The operation of solar PV systems does not produce any emissions. Dust and air pollution impacts can be mitigated to a low negative impact significance, from a medium negative impact.

The loss of heritage resources relates to the possible loss of cultural heritage resources, including archaeological artefacts. A few isolated weathered quartzite stone tools (most probably of Middle Stone Age origin) were observed in tracks or where the yellowish top soils were disturbed. These stone tools were in secondary context and not associated with any other archaeological material. The stone tools are of low cultural significance and no further action is required. The area is of low cultural sensitivity and it is highly unlikely that any archaeological remains of any significance will be found in situ or exposed during the development. There are no known graves or historical buildings older than 60 years on the site. The impact to heritage resources can be mitigated to a very low negative impact significance, from a low negative impact.

Agricultural potential of the site is low as it is classified as non-arable agricultural land, classification VIII (8), according to the land capability classification. As such, the site is not suitable for cultivation purposes. The site is currently utilised partially as a grazing area for game / wildlife, and historically has been utilised as a grazing area for livestock. A large portion of the site is currently being used to stockpile old equipment and waste materials. The proposed solar PV site is currently zoned as Agriculture and will require subdivision and rezoning. The loss of agricultural land impact remains as a medium negative impact.

Soil exposed by the clearing of vegetation during construction and maintaining vegetation cleared areas during the operational phase will have substantially elevated erosion levels. The risk of soil erosion increases in areas where vegetation and rocks are removed on steeper slopes in order to cater for solar PV infrastructure and access road. The impact of soil erosion can be mitigated to a low negative impact significance, from a medium negative impact.

Impacts relating to ineffective waste management procedures may lead to the dumping of building rubble, littering and pollution of the surrounding areas as well as unsanitary (toilet) conditions and an increase in vermin. Domestic and construction waste as well as decommissioned solar panels and batteries will increase the amount of waste disposed to landfill, including old equipment and cleared vegetation. No vermin will be attracted during the operational phase. Waste management impacts can be mitigated to a low negative impact significance, from a medium negative impact.

Traffic impacts relate simply to potential increases in traffic within the area, with resultant potential congestion, road damage, noise, etc. issues. The impact can be mitigated to a low negative impact significance.

Noise impacts relates to potential changes in the nuisance impacts from noise generation from the site. Noise creation from construction workers and vehicles may impact on surrounding landowners during the construction phase. This includes noise emanating from construction machinery, power tools and compressors, construction vehicles and general construction activity. Noise activities during the operational phase would be limited to periods when maintenance activities are being undertaken. No significant noise levels are expected from the operating solar tracking system. Noise impacts can be mitigated to a low negative impact significance.

During construction visual impacts are associated with cleared areas of vegetation, the construction camp; and during the operational phase visual impacts are associated with the solar array area consisting of the solar panels impacting on aesthetics and potential glinting of the sun off the solar panels. The current landscape can be defined as a very attractive landscape and with the proposed solar

array area would be changed to that of a good quality landscape. Visibility of the solar infrastructure will be dependent on the height from which the development will be viewed. The solar panel frames are low in height, below 1m. The visibility of the solar array area may be reduced due to vegetation screening on the boundaries of the site and the undulating topography of the area. Solar PV panels are dark rather than reflective, and are designed to absorb rather than reflect sunlight. However there may still be a limited amount of light being reflected from the glass outer casing, and likely to be visible at higher elevations. The visual impacts can be mitigated to a low negative impact significance, from a medium negative impact.

Public health, safety and security impacts include linkages to fire management, crime and promiscuous sexual behaviour during construction. Fire management is further considered during the operation phase. General safety of persons is a concern due to construction activities, e.g. open excavations and machinery, resulting in potential injury to construction staff; health and safety aspects relate to the potential spread of HIV and STDs. Potential health and safety risks (e.g. exposure to toxic chemicals and gases) related to the solar panels are prevalent with the manufacturing process of the solar panels. The risks associated with the manufacturing process are not applicable as manufactured solar panels will be installed. The solar panels or modules are enclosed by thick layers of glass or plastic and unless these components are ground into particles or exposed to fire, the risk of ingestion or inhalation is minimal. No chemical cleaning agents are utilised during the operational phase. The solar panels are cleaned with water. During the operational phase, cleaning activities create a risk of damage to the solar panels and array components, as well as the potential for electric shock. Cracked or broken modules represent a shock hazard due to leakage currents, and the risk of shock is increased when modules are wet. The manufacturer's user guide details the correct procedures to be undertaken for installation, maintenance and cleaning procedures. Security aspects relate to potential theft of construction materials and theft of neighbouring farmers livestock or equipment. The presence of workers on the site for construction related activities, irrespective of whether or not they are local, may create an increased safety and security risk to local households in the area. In addition, any changes in the local crime rates are likely to be attributed to the influx of construction workers, whether such changes can be attributed to their presence or not. Fire is a potential risk with any electrical system. Veld fires are a potential risk considering the vegetation types occurring within and adjacent to the site. During construction the risk may be attributed to inappropriate construction activities (e.g. hot work, welding) on dry, windy days. During the operational phase, fire risks may be associated with incorrect or loose wiring of the solar panels or transmission lines, or when wiring is inadequate and cannot withstand electricity generation. Public health, safety and

security impacts can be mitigated to a low negative impact significance, from a medium negative impact.

Approximately 50 and 6 employment opportunities will be created during the construction and operational phases respectively. An adverse effect on this impact may occur in that high expectations are formed regarding construction employment opportunities and that these expectations cannot be sustained. The impact related to employment opportunities can be mitigated to a medium positive impact.

There is no evidence that solar farms affect property prices either positively or negatively. The impact of the reduction of surrounding property values due to the solar infrastructure can be mitigated to a low negative impact significance.

Renewable energy infrastructure relates to the production of cleaner energy from renewable sources, and moving to a less carbon-intensive electricity production (i.e. reducing carbon emissions associated with coal power stations). Although only 2.46MW will be fed into the electrical grid, the proposed project forms a source of zero carbon electricity generation and contribution to the renewable energy targets. The impact relating to the production of cleaner energy from renewable energy sources can be mitigated to a high positive impact significance.

The negative impacts identified can be mitigated to a lower negative significance or positive significance if all mitigation measures identified and as included in the Environmental Management Programme (EMPr) attached in Appendix G are implemented.

Recommendations

CEN IEM Unit recommends that the application be authorised by the DEDEAT, with the following conditions:

1. All mitigation measures in the Environmental Management Programme (EMPr, **Appendix G**) are followed.
2. An experienced Environmental Officer is appointed by the Contractor and an experienced independent ECO is appointed by the developer to monitor compliance with the EMPr during construction.
3. Alien plant regrowth is to be monitored and managed during the construction phase by the Contractor and operational phases by the developer.
4. Only indigenous plant species must be used in the re-vegetation process.
5. No activities within 32m of the drainage lines.

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