CEN INTEGRATED ENVIRONMENTAL MANAGEMENT UNIT

Environmental and Rural Development Specialist

FINAL BASIC ASSESSMENT REPORT:

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

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

January 2015

Project Title:

Final 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

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REVISIONS TO THE BASIC ASSESSMENT REPORT

This document is based on the Draft Basic Assessment Report. Additions and changes to the report are indicated by yellow (grey in black and white version) highlighting.

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 18 June 2010 (GN R. 543) and in terms of the EIA Regulations of 4 December 2014 (GN R 982) (in terms of the National Environmental Management Act, Act 107 of 1998 as amended).

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 site is accessed from a gravel road, the Hillwacht Road (DR01940) which links to the R75 (Uitenhage Road).

The proposed solar production entails a solar panel tracker mounting system (automatic), 1000V DC PV system and 11kV distribution system and transmission / distribution line to connect to the existing 11kV transmission / distribution line (Eskom). The existing Eskom 11kV transmission / distribution line is located adjacent to the proposed solar array area.

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**. The distance between the PV frame arrays (rows) is approximately five (5) meters to ensure that each row to the north does not cast a shadow on the row to the south during periods of the day when the sun is at a lower angle in the sky. This also provides sufficient space for maintenance purposes, e.g. replacing panels or mowing grass with a tractor.

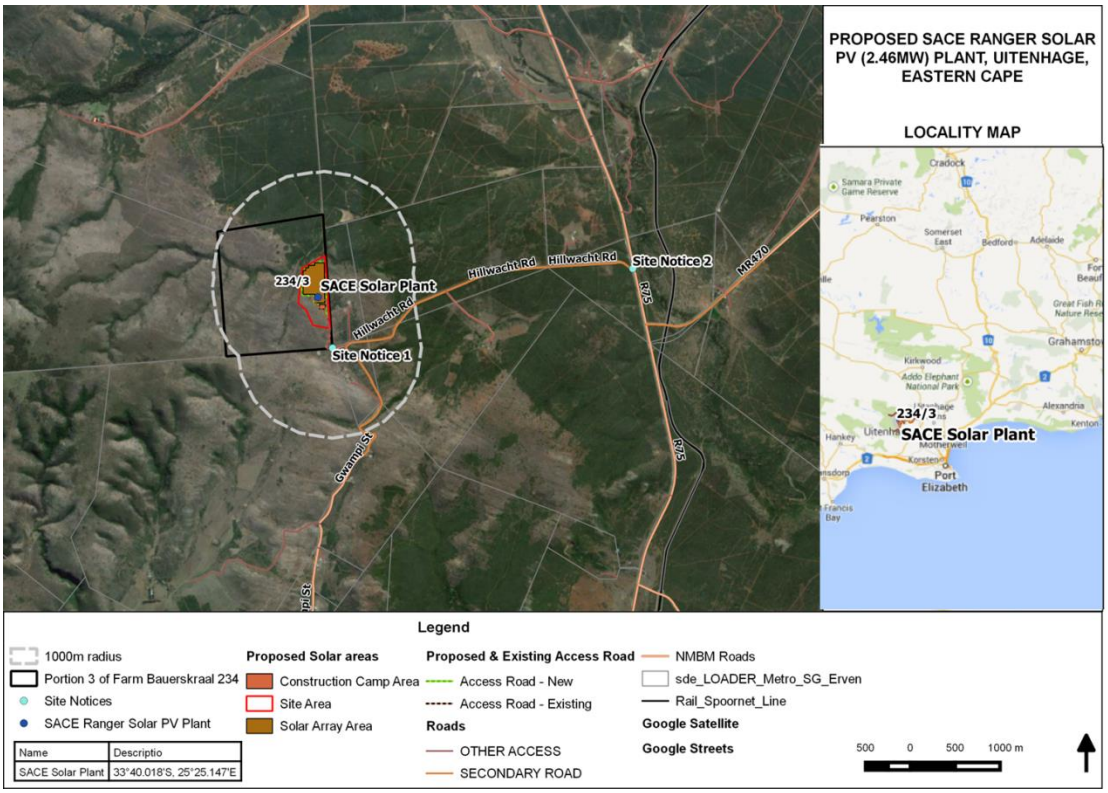

Figure 1: Locality Map

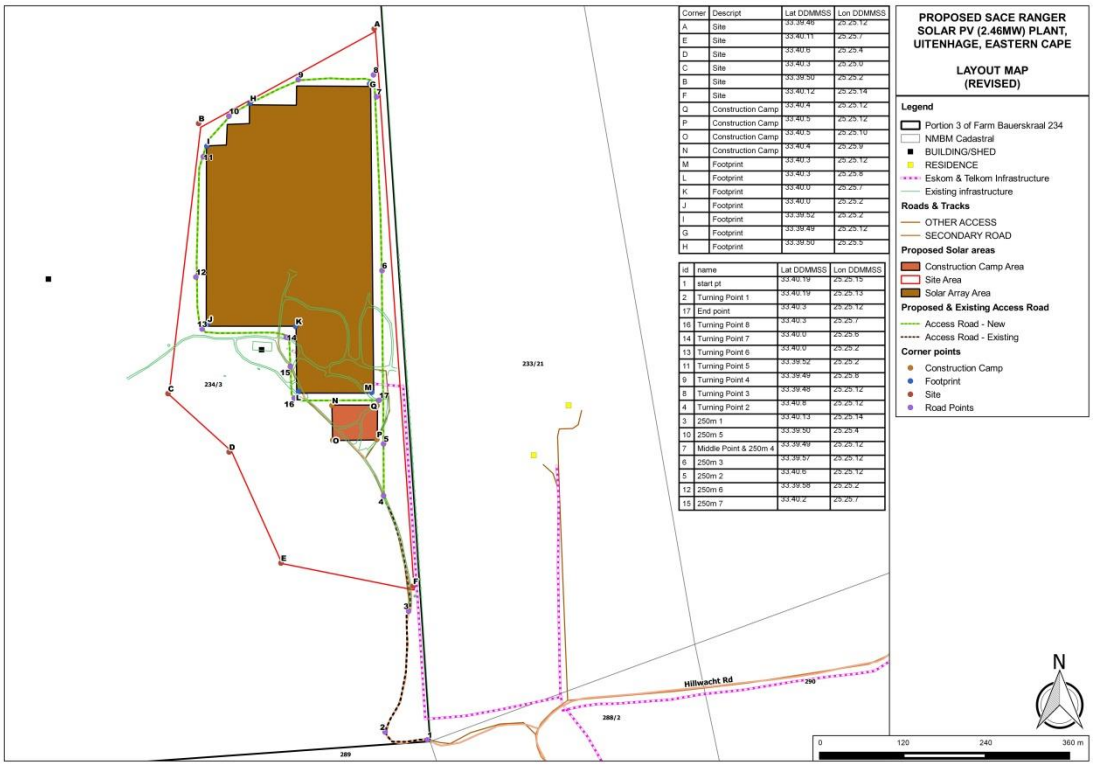

Figure 2: Layout Map

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 (panel) is approximately ~~1200mm by 600mm~~ 1956×992×40mm 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. Solar panels are connected to inverters with special DC solar cables (as per the manufacturer's guideline). The inverters are located within the solar plant / array area. Decentralized inverters are typically mounted to the back or beneath of the panel racking structures, while larger centralized inverters are installed on the ground, both within a fenced off area. The proposed PV plant would generate 400V and would be inverted to 11kV.

The “substation” for low or medium voltage is typically referred to as the transformer, which adapts the voltage to the required voltage. The turnkey provider will plan, design, procure and construct the PV plant including appropriate transformers. The PV pant can be flexibly designed to meet either under or above ground requirements without negatively influencing the effectiveness of the PV plant. It is anticipated that the connecting cables (from the inverters to the transformer) will be underground. The transformer will adapt the voltage to the voltage required. It is anticipated that the connecting transmission / distribution line will be underground.

Construction Phase

The construction phase will be undertaken in three (3) phases, and is anticipated to be undertaken in four (4) months. During the assembly of the solar panels 30 trucks are expected to transport components to the site, this entails two (2) trucks per day over a period of two (2) to three (3) weeks.

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, areas that may require clearing include solar array area, trenches for cabling, construction and laydown areas in order to undertake the required construction.

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 (mowing or cutting) of vegetation to avoid shading (i.e. shadows) or affecting operations (e.g. creating barriers). Pathways (approximately 5m in width) between arrays are left unobstructed, ensuring maintenance staff have access to all portions of each array.

Once the solar farm is operational, it is assumed that a maximum of two vehicle trips will arrive on site during the AM peak hour and depart during the PM peak hour.

No chemical cleaning agents are utilised during the operational phase. The solar panels are cleaned with water and sponges.

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 25 August – 6 October 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:	Visibility of the solar infrastructure will be

Summary of main issues raised by I&APs	Summary of response from EAP
a) Adjacent landowners b) Hikers on trails in the Groendal Wilderness Area, Vermaaksop, Lady Slipper c) Sun glinting off the solar panels	dependent on the height from which the development will be viewed. The solar panel frames are low in height, below 1m. 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 impact can be offset by vegetation providing a natural screening. The solar infrastructure may be visible from the Groendal Wilderness Area (located approximately 6.7km to the west), 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 (DR01940). 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

Summary of main issues raised by I&APs	Summary of response from EAP
	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. The impact can be mitigated to a low negative impact significance, from a medium negative impact.
Impacts to fauna and 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. Fauna will need to remain out of the solar panel (solar array) area, as a result the solar array (approximately 10ha) will be fenced. The fence line is to be checked on a weekly basis for any fauna species caught in the strands. The solar site will be positioned in a degraded vegetation area and presents little grazing value to animals. A search and rescue will be undertaken prior to construction and animals will be removed from the solar site. Tortoises will move back to the area but will move again when disturbed.
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

Summary of main issues raised by I&APs	Summary of response from EAP
	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 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. There is no problem with toxins from the solar farm. Toxins are a problem in the actual manufacturing process of the solar panels. There would be no pollution for to the borehole water. No chemical cleaning agents are utilised during the operational phase. The solar panels are cleaned with

Summary of main issues raised by I&APs	Summary of response from EAP
	water and sponges. The recommendation has been made for the developer to take a borehole water sample prior to construction and then annually for an agreed period, to test the water quality for any pollution coming from the solar farm. If any pollution is found and is associated with the solar farm then the developer will need to correct the pollution.
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. Old waste equipment will be removed from site and recycled. Waste that cannot be recycled will be disposed of at a registered landfill site.
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 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.

Summary of main issues raised by I&APs	Summary of response from EAP
	The security risks would be higher during the construction phase. The contractor would have security on-site full time during the construction phase. During the operational phase the operational contractor would check the site periodically. It is not known if security personnel will be on site full time, however it is anticipated that some security checks will be made.
Impact of heavy vehicles.	Traffic impacts relate to potential increases in traffic within the area, with resultant potential congestion, road damage, road safety, noise, etc. issues. During the assembly of the solar panels 30 trucks are expected to transport components to the site, this entails two (2) trucks per day over a period of two (2) to three (3) weeks. Once the solar farm is operational, it is assumed that a maximum of two vehicle trips will arrive on site during the AM peak hour and depart during the PM peak hour. A Traffic Impact Study (Appendix D) has been undertaken with the following main results. The DR01940 presently carries low traffic volumes related to the farms situated along the road. The results from the traffic survey undertaken on 20 November 2014 at the DR01940 and R75 intersection indicate four vehicles exiting the DR01940. In terms of the Rural Road Category (as defined by traffic volumes) the DR01940 is categorised in the 'low' category, i.e. 0-50 vehicles per day. During the construction phase, the additional daily traffic will increase current daily volumes between the R75 and the solar site by 4 heavy vehicle trips per day. During the operational phase, the additional daily traffic is anticipated to be 4 vehicle trips per day. Additional vehicle (predominantly heavy vehicles / trucks) trips generated by the proposed development will have a low impact in terms of peak hour intersection capacity given the low peak hour volumes at the affected intersection (R75 and DR01940). In addition to safety aspects related to lack of advanced warning road signage and possible deterioration of the road due to a lack of maintenance, the following safety issues may arise as a result of additional vehicle movements along DR01940: • Heavy vehicles travelling through sections with limited sight distance albeit that truck drivers will have better visibility due to their higher seat position. • Lack of maintenance leads to a loss of

Summary of main issues raised by I&APs	Summary of response from EAP
	fine material which creates dusty and slippery conditions in dry and wet weather conditions respectively. The surface of the DR01940 appears to be in a poor condition based on the visual condition assessments conducted, and is conducive to relatively low operating speeds. Substantial loose material is evident along the whole length of the DR01940. Given the status of DR01940, it is assumed that DR01940 has been constructed to primarily cater for access to agricultural properties along its length. Based on the surveyed peak hour traffic volumes, the road accommodates between 0 and 50 vehicles per day – a low category gravel road – with a gravel pavement layer of 75mm. Construction vehicles transporting materials to the site for use during construction may also damage the road. The related traffic impacts can be mitigated to a low negative impact significance.
Protected trees	The Basic Assessment Report (Section D: Impact Assessment) and Environmental Management Programme (Chapter 4) includes the requirement for obtaining a licence from DAFF for protected trees that need to be removed or disturbed.
Eskom Infrastructure	The Eskom requirements for works at or near Eskom infrastructure have been included in the Environmental Management Programme (Appendix G). The proposed solar production entails a solar panel tracker mounting system, 1000V DC PV system and 11kV distribution system and transmission / distribution line to connect to the existing 11kV transmission / distribution line (Eskom). The existing Eskom 11kV transmission / distribution line is located adjacent to the proposed solar array area. There are no Eskom substations within 5km of the proposed solar plant. The impact relates to disruption of or damage to existing services and infrastructure, e.g. Eskom 11kV distribution line and can be mitigated to a low negative impact.
Additional detail on the proposed Solar PV Infrastructure	Each PV module (panel) is approximately 1956×992×40mm in size. The solar panels will be positioned approximately 0.5m above ground level. The distance between the PV frame arrays (rows) is approximately five (5) meters to ensure that each row to the north does not cast a shadow on the row to the south during periods of the day when the sun is at a lower angle in the sky. This also provides sufficient space for maintenance

Summary of main issues raised by I&APs	Summary of response from EAP
	purposes, e.g. replacing panels or mowing grass with a tractor. The solar tracking system is automatic. Solar panels are connected to inverters with special DC solar cables (as per the manufacturer's guideline). The inverters are located within the solar plant / array area. Decentralized inverters are typically mounted to the back or beneath of the panel racking structures, while larger centralized inverters are installed on the ground, both within a fenced off area. The proposed PV plant would generate 400V and would be inverted to 11kV. The "substation" for low or medium voltage is typically referred to as the transformer, which adapts the voltage to the required voltage. The turnkey provider will plan, design, procure and construct the PV plant including appropriate transformers. The PV pant can be flexibly designed to meet either under or above ground requirements without negatively influencing the effectiveness of the PV plant. It is anticipated that the connecting cables (from the inverters to the transformer) will be underground. The transformer will adapt the voltage to the voltage required. It is anticipated that the connecting transmission / distribution line will be underground.
Vegetation	Approximately 10ha will be cleared of vegetation for the solar array area, extension of the access road and construction camp. Vegetation in areas that have not been disturbed is largely intact, approximately 4ha of this vegetation will be cleared. The remaining footprint area (approximately 6ha) consists of degraded and transformed areas. Bushes and trees will need to be removed, whilst grass will be cut. Vegetation under and between the frames will be physically mowed or cut in order to prevent casting of shadows on the panels or from vegetation creating barriers. Ground maintenance includes trimming (mowing or cutting) of vegetation to avoid shading or affecting operations, i.e. vegetation under and between the frames will be mowed or cut during the year to keep it short in order not to cast shadows on the panels. No threatened ecosystems are identified within the site. The ecosystem within the site is identified as Least Threatened. Measures to remove and control of alien species include physical or chemical means. The preferred option is physical removal.

Summary of main issues raised by I&APs	Summary of response from EAP
Water use authorisation requirements	A non-perennial drainage line is located adjacent to the site on the western and northern boundary. The drainage line forms part of the Coega River catchment area. There are no identified watercourses in terms of the National Freshwater Ecosystem Priority Areas (NFEPA), within or adjacent to the site. An artificial wetland is located in the adjacent property to the south, and has a NFEPA condition of Z3 and NFEPA rank of 6 (NFEPA, 2011). The artificial wetland is a man-made structure that provides a watering point for game and/or livestock. A man-made dam is located in the south eastern corner of the property, that provides a watering point for game within the property. There are no functional wetlands within 500m of the proposed site. The 1:100 year floodline is undetermined for this unnamed tributary. The Subtropical Thicket Ecosystem Project (STEP, 2007) identifies the drainage areas adjacent to the site as Process Areas, and this is reflected similarly in the NM MOSS / NMBM Bioregional Plan, 2010 as a riverine corridor. Thicket clumps become denser along the western and northern drainage lines. The proposed development falls outside of these areas and the associated 32m buffer. The proposed development does not trigger any of the exclusions provided in the General Authorisation for Section 21 c and i activities (i.e. impeding or diverting flow and altering the bed, banks, course or characteristics), GN 1199 of 18 December 2009; and as a result would not require a Water Use Licence. Should any activity fall within the riverine corridor, the General Authorisation would be applicable and the associated conditions therein
Implementation of conditions and recommendations.	An environmental officer is appointed during the construction phase to undertake regular audits, in order to ensure the authorisation conditions and recommendations are being complied with. The environmental officer reports non-compliance to the authorities.

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				
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~~ Medium (-)	Neutral

SUMMARY OF IMPACTS & SIGNIFICANCE				
Phase	Alternative 1 (Preferred)			No Go
	Planning & Design	Construction & Decommiss.	Operational	
Significance after mitigation	Neutral	Low (-)	Low (-)	Neutral
Traffic : Traffic safety impact due to additional traffic				
Significance before mitigation	Neutral	Medium (-)	Medium (-)	Neutral
Significance after mitigation	Neutral	Low (-)	Low (-)	Neutral
Traffic : Deterioration of public road network				
Significance before mitigation	Neutral	Medium (-)	Medium (-)	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
Significance after mitigation	Neutral	Neutral	Low (-)	Neutral
Social : Existing Services and Infrastructure				
Significance before mitigation	Medium (-)	Medium (-)	Medium (-)	Neutral
Significance after mitigation	Low (-)	Low (-)	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 Heritage Specialist has recommended that the proposed construction of the SACE Ranger photovoltaic (solar) plant near Uitenhage, Nelson Mandela Bay Municipality, Eastern Cape Province, is exempted from a full Phase 1 Archaeological Heritage Impact Assessment. 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 DR01940 presently carries low traffic volumes related to the farms situated along the road. The results from the traffic survey undertaken on 20 November 2014 at the DR01940 and R75 intersection indicate four vehicles exiting the DR01940. In terms of the Rural Road Category (as defined by traffic volumes) the DR01940 is categorised in the 'low' category, i.e. 0-50 vehicles per day. During the construction phase, the additional daily traffic will increase current daily volumes between the R75 and the solar site by 4 heavy vehicle trips per day. During the operational phase, the additional daily traffic is anticipated to be 4 vehicle trips per day. Additional vehicle (predominantly heavy vehicles / trucks) trips generated by the proposed development will have a low impact in terms of peak hour intersection capacity given the low peak hour volumes at the affected intersection (R75 and DR01940). In addition to safety aspects related to lack of advanced warning road signage and possible deterioration of the road due to a lack of maintenance, the following safety issues may arise as a result of additional vehicle movements along DR01940:

- Heavy vehicles travelling through sections with limited sight distance albeit that truck drivers will have better visibility due to their higher seat position.
- Lack of maintenance leads to a loss of fine material which creates dusty and slippery conditions in dry and wet weather conditions respectively.

The surface of the DR01940 appears to be in a poor condition based on the visual condition assessments conducted, and is conducive to relatively low operating speeds. Substantial loose material is evident along the whole length of the DR01940. Given the status of DR01940, it is assumed that DR01940 has been constructed to primarily cater for access to agricultural properties along its length. Based on the surveyed peak hour traffic volumes, the road accommodates between 0 and 50 vehicles per day – a low category gravel road – with a gravel pavement layer of 75mm. Construction vehicles transporting materials to the site for use during construction may also damage the road. The traffic related impacts 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.

The proposed solar production entails a solar panel tracker mounting system, 1000V DC PV system and 11kV distribution system and transmission / distribution line to connect to the existing 11kV transmission / distribution line (Eskom). The existing Eskom 11kV transmission / distribution line is located adjacent to the proposed solar array area. There are no Eskom substations within 5km of the proposed solar plant. The impact relates to disruption of or damage to existing services and infrastructure, e.g. Eskom 11kV distribution line and can be mitigated to a low negative impact.

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~~ DEA, 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.
6. The developer install additional road warning traffic signs as indicated in the Traffic Impact Assessment and that such signage be installed as soon as development commences.
7. Temporary signs warning motorists of construction vehicles be erected on the approaches to the access road.
8. Vegetation is cleared on the DR01940 road verge at the entrance to the solar site.
9. The developer ensures that the DR01940 is left in an acceptable state once construction has been completed.
10. Proposed road upgrade and/or maintenance meets the approval of the Department of Roads and Public Works.
11. Old waste equipment to be recycled. Waste that cannot be recycled will be disposed of at a registered landfill site.
12. Eskom approval per requirements for work in or near Eskom servitudes or infrastructure.
13. Decommissioned, faulty or broken solar panels, equipment or cabling is to be taken off site and recycled. If items are unable to be recycled, to be disposed of at an appropriate landfill site.

14. All overhead power lines to include bird deflectors. Electrical cabling and connecting distribution lines to be underground.
15. A Fire Management Plan be compiled and implemented.
16. Solar PV infrastructure and access road surrounding the solar array area to be located outside of steep terrain.
17. Permits must be obtained from the DAFF and/or DEDEAT prior to the removal of protected trees and Species of Special Concern (SSCs).
18. Borehole water samples are to be taken prior to construction to determine a baseline for the water quality.
19. Borehole water sample testing to be done annually for an agreed period, to test the water quality and determine if any pollution is coming from the solar farm. If any pollution is found and is associated with the solar farm, then the developer is responsible to correct the pollution.

Table of Contents

J-2: List of plant species (indigenous and exotic) identified on site
J-3: Assumptions, uncertainties and gaps in knowledge
J-4: Reference list

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