Final Impact report -Part 2 EA Amendment 14/12/16/3/3/2/1054

PROPOSED RENEWABLE ENERGY GENERATION PROJECT ON THE REMAINDER OF THE FARM BOLOBEDU 1024 LT, GREATER LETABA LOCAL MUNICIPALITY, MOPANI DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.: BOLOBEDU SOLAR PARK

July 2021

Commissioned by: Bolobedu Solar Farm PV (Pty) Ltd
Document version 2.0 Final
Report compiled by Hiadee von Well.

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BOLOBEDU SOLAR PARK - 14/12/16/3/3/2/1054

PART 2 EA AMENDMENT APPLICATION FOR THE PROPOSED RENEWABLE ENERGY GENERATION PROJECT ON THE REMAINDER OF THE FARM BOLOBEDU 1024 LT, GREATER LETABA LOCAL MUNICIPALITY, MOPANI DISTRICT MUNICIPALITY, LIMPOPO PROVINCE.

July 2021

PROJECT APPLICANT

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DOCUMENT HISTORY

Report No	Date	Version	Status
14/12/16/3/3/2/1054	June 2021	1.0	Draft
14/12/16/3/3/2/1054	July 2021	2.0	Final

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ABBREVIATIONS AND ACRONYMS

AGES	Africa Geo-Environmental and Engineering Services (Pty) Ltd
BID	Background Information Document
BESS	Battery Energy Storage System
CO	Carbon Monoxide
CO2	Carbon Dioxide
CSP	Concentrating Solar Power
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DEAT	Department of Environmental Affairs and Tourism
DFFE	Department of Forestry, Fisheries and the Environment
DoE	Department of Energy
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environment Impact Assessment Report
EMP	Environmental Management Plan
ESS	Environmental Scoping Study
FIT	Feed in Tariffs
GHG	Green House Gases
GIS	Geographic Information Systems
GN	Government Notice
GWh	Giga Watt hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPP	Independent Power Producer
kV	kilovolt
MW	Mega Watt
MWp	Mega Watt peak
NEMA	National Environmental Management Act - Act no. 107 of 1998
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act - Act no. 25 of 1999
NWA	National Water Act - Act no. 36 of 1998
PoS	Plan of Study
PV	Photovoltaic
REFIT	Renewable Energy Feed-in Tariffs
RFP	Request for Qualification and Proposals for New Generation Capacity under the IPP Procurement Programme
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
UPS	Uninterruptible Power Supply
Wp	Watt Peak

1. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Name of EAP: AGES – Engela Grobler

Contact details of EAP:
Physical Address: 120 Marshall Street,
Polokwane, 0699
Telephone number: 015 291 1577
Fax number: 015 291 1577

Expertise of EAP: A Master's Degree in Environmental Management and 10 years of experience with the management and conducting of EIA's. Several renewable energy projects which participated in the IPP Programme, issued 3rd August 2011 by the Department of Energy have been awarded Preferred Bidder Status.

2. INTRODUCTION AND BACKGROUND

Bolobedu Solar Park will be located on the Farm Bolobedu 1024 LT, Greater Letaba local Municipality, Mopani District Municipality, Limpopo Province

Bolobedu 1024 LT - T0LT00000000010240000

The planned development site is located 49km southwest of Giyani and 75km north-east of Tzaneen. Modjadjiskloof is 58km southwest of the project site.

Please note that the farm Bolobedu 1024 LT is the result of an application for the consolidation of the Remainder of the Farm Kromrivierfontein 360 LT and the Remainder of the farm Worcerster 200 LT. This was done through a process in conjunction with the surveyor general and this area is now registered at the Deeds Office as the farm **Bolobedu 1024 LT**.

Some of the specialist reports might still refer to the study area as the Remainder of the Farm Kromrivierfontein 360 LT and the Remainder of the farm Worcerster 200 LT. However, the farm is now officially and legally consolidated and is now called Bolobedu 1024 LT.

The proposed development site is located on communal land and is surrounded by rural villages.

Environmental Authorisation (EA) was obtained for Bolobedu Solar Park, with Reference Number: 14/12/16/3/3/2/1054 on 25 January 2019.

Due to new project and industry developments, application is now made for:

1. **the inclusion of a Battery Energy Storage System (BESS) and**
2. **increase in the height of the panels from 3.1m to 4.5m**
3. **increase in Generating Capacity up to 130MW without changing the development footprint**

The Bolobedu Solar Park has already been approved, and as such, a Part 2 Amendment/Substantial Amendment process is required. This application for an amendment on the EA entails the inclusion of a battery storage facility at the PV Solar Plant, an increase in panel height to increase the efficiency of the PV Plant and an increase in the generating capacity to up to 130MW without changing the development footprint size.

There was uncertainty regarding the requirements for the inclusion of a battery storage facility in the current, approved site lay-out and project description.

An official enquiry was submitted to the DFFE, and a response was received in which it is indicated that a Part 2 EA Amendment process must be followed. A battery storage facility is considered a change in scope of the proposed development.

Installation of battery storage facilities are not considered to be the storage or handling of dangerous goods and therefore would not trigger listed activities within certain thresholds as specified in Listing Notices included in the EIA Regulations, 2014, as amended.

The ecologist who did the ecological assessments during the EIA process was requested to assess the change in specifications and to make a statement regarding the impact of the changes, on the **ecology** of the development site. The specialists' statement is included in Annexure B.

During the previous EIA process, a **Visual Impact Assessment** was conducted to determine the visual impact of the proposed solar park.

In the original report the visual impact was rated as ***medium* to *medium – high***. it can be concluded that the **change in impact would not result in an increase in the significance rating** as per the EIA significance rating system based on DEAT's Guideline Document: EIA Regulations (1998).

A **fire management plan** was included in this application to address the fire risk of the battery storage facility and is included in Annexure D.

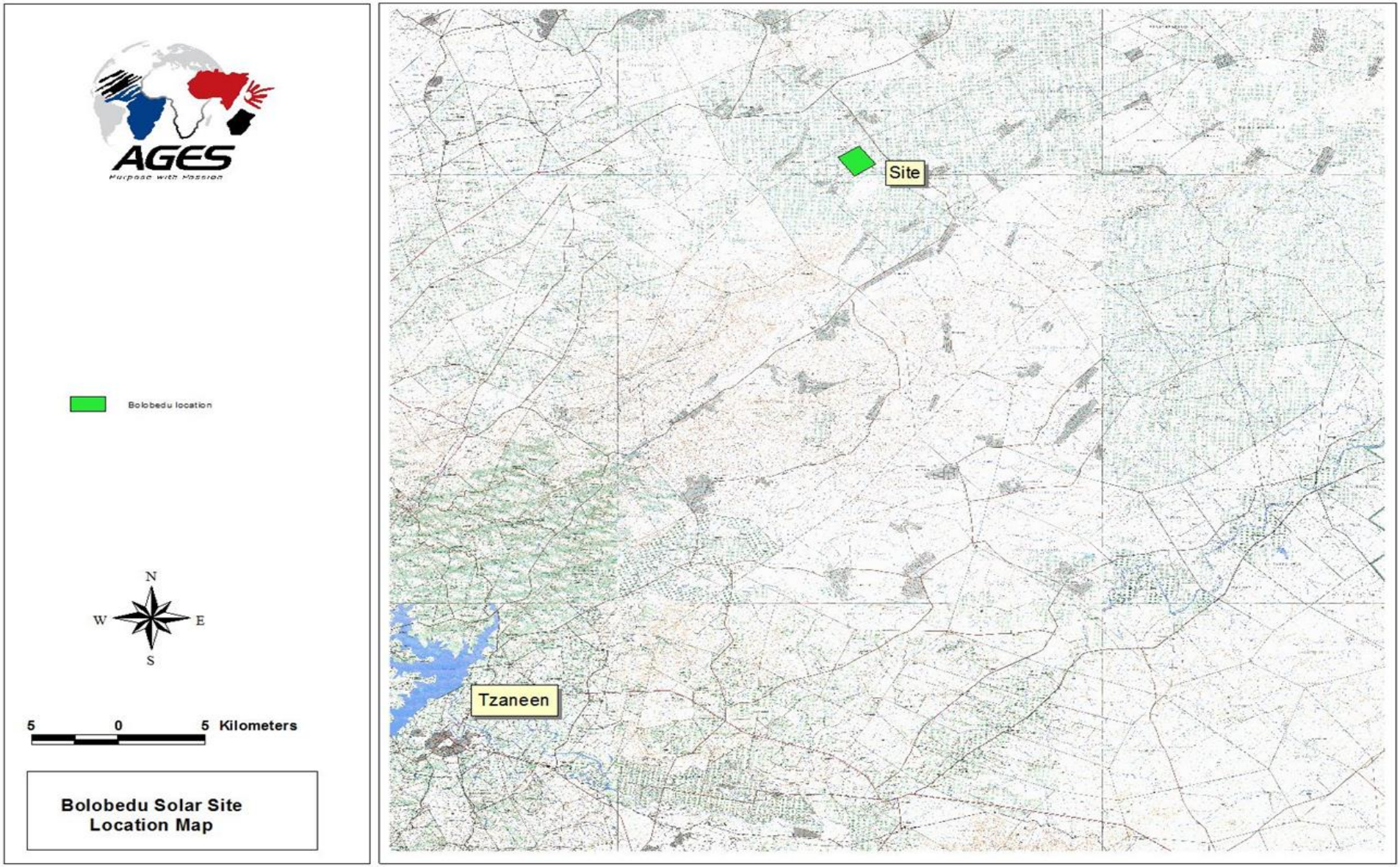
The original EA was issued in the name of Ms Mikateko Gail Khosa

4. This should be changed to reflect:
   Ms Jo Dean
   Unit 227 441@ Kirkness, Sunnyside Pretoria
   P O.Box 42343 Heuwilsig 9332
   Cell: 082 922 3224
   joanne@enerj.co.za

The company name remains the same: **Bolobedu Solar Farm PV (Pty) Ltd**

AGES Limpopo is in a position of independency from Bolobedu Solar Farm PV (Pty) Ltd; therefore, they are not subsidiaries or affiliated to the latter. AGES Limpopo has no secondary interest connected with the development of this project or of other projects which may originate from the authorisation of the project.

Location of Bolobedu Solar Park



Location of Bolobedu Solar Park

3. LEGAL REQUIREMENTS

The original application for Environmental Authorisation was done in terms of the EIA Regulations of 2014, as amended.

The EA amendments applied for here, will *not* trigger any listed activities as included in Listing Notices 1, 2 & 3 of the EIA Regulations, 2014, as amended.

Listed Activities in terms of the EIA Regulations 2014, as amended, which were approved in the **ORIGINAL Environmental Authorisation** in terms of NEMA.

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended
GN R.983, Item 12	**The development of - (ii) infrastructure or structures with a physical footprint of 100 square metres or more. where such development occurs - (a) within a watercourse. (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse**
GN R.983, Item 19 (i)	**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 - (i) a watercourse**
GN R.983 Item 24 (ii)	**The development of a road – (ii) with a reserve wider than 13,5m, or where no reserve exists where the road is wider than 8m.**
Activity No(s):	Provide the relevant **Scoping and EIA Activity(ies**) as set out in **Listing Notice 2** of the EIA Regulations, 2014 as amended
GN R.984 Item 1	**The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 MW or more**
GN R.984 Item 15	**The clearance of an area of 20 ha or more of indigenous vegetation**

The **Amendment Process Requirements** are in terms of Regulation 31 and 32 of the 2014 National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations,

Bolobedu Solar Farm PV (Pty) Ltd wishes to apply for a substantive amendment to the EA issued. Regulation 31 (Part 2) of the 2014 NEMA EIA Regulations states that:

"An environmental authorisation may be amended by following the process prescribed in this Part if the amendment will result in a change to the scope of a valid environmental authorisation where such change will result in an increased level or nature of impact where such level or nature of impact was not:

a) assessed and included in the initial application for environmental authorisation; or
b) taken into consideration in the initial environmental authorisation; and the change does not, on its own, constitute a listed or specified activity."

As per sub-regulation (a) the proposed application for the addition of a BESS and increased panel height was not considered as part of the in the initial EIA process or the amendment process undertaken, therefore these (potential) impacts need to be assessed according to the change in level or nature of impact.

4. NEED AND DESIRABILITY OF THE PROPOSED PROJECT

As discussed in the original EIA application motivation for the Solar Park:
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, is about ensuring the availability of energy resources, and access to energy services in an affordable and sustainable manner, whilst minimising adverse environmental impacts.

To ensure continued security of energy supply, it is essential that a co-ordinated and integrated approach to energy planning is undertaken. The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008) the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in Government Gazette.

Solar technologies feature prominently in the energy mix, which include inter alia, nuclear, coal, natural gas, and biogas. This should be supported by the implementation of mini-grid, off-grid, and distributed generation. Solar PV technologies in urban and rural areas should continue to play a role and regulations pertaining to small-scale distributed power, to be fed back to the grid, need to be developed.

Following the promulgation of the IRP2010 the DoE initiated the IPP Procurement Programme to procure renewable energy generation from the private sector in a series of rounds (known as Bid Windows). In December 2012, Ministerial Determinations were announced for the procurement of 3 200 MW of Renewable Energy (RE) generation from IPPs. To date the DoE has procured over 4 000 MW of renewable energy across Bid Windows 1 to 3.5 under the REIPP Programme.

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 daily solar radiation in South Africa varies between 4.5 and 6.5 kilowatt hours per square meter (kWh/m²), compared to 3.6 kWh/m² in parts of the United States and 2.5 kWh/m² in Europe and the United Kingdom. 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.

For electricity generation, the technology mix should take into consideration the roles that different technologies play in providing baseload and peaking power. Solar Energy should play a 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. Solar PV includes large scale installations for power generation which supply to the grid and individual, off-grid solar home systems and rooftop panels. Job creation and localisation potential Solar PV technologies present the greatest opportunity for localisation. To this effect several developments should be supported.

The reasons for the location of the project area include the following:

- low requirement for municipal services;
- compliance with national and provincial energy policies and strategies;
- no impact on people health and wellbeing;
- no waste and noise;
- no impact on air quality;
- compatibility with the ecosystem and the surrounding landscape;
- Likelihood of social and economic development of and in rural communities.

4.1. NEED FOR BATTERY ENERGE STORAGE SYSTEM (BESS)

The Battery Energy Storage System is needed in combination with the solar power plant to provide multiple services to the plant and to the power transmission network adding flexibility to the system.

Batteries store and produce energy as needed. In PV systems, they capture surplus energy generated by the PV system to allow storage of energy for use later.

A battery converts chemical energy to electrical energy. Rechargeable batteries also convert electrical energy into chemical energy. Batteries help to use more of the energy collected by the PV system.

Batteries can provide power when electrical loads require more power than the PV panels are generating. This can be due to the generation of less electricity due to adverse weather conditions, greater than normal power usage, or other anomalies with the PV power collection.

Batteries also help establish the DC operating voltage for the required auxiliary components in the PV system.

Possible applications include amongst others: renewable generation time shifting, unbalancing reduction, curtailment avoidance, frequency regulation, voltage support, spinning reserve.

5. PUBLIC PARTICIPATION PROCESS

Public Participation Process Regulation 32 of the EIA Regulations state that:
"The holder must-

a) within 90 days of receipt by the competent authority of the application made in terms of regulation 31, submit to the competent authority a report, reflecting-

i. an assessment of all impacts related to the proposed change.

ii. advantages and disadvantages associated with the proposed change.

iii. measures to ensure avoidance, management and mitigation of impacts associated with such proposed change; and

iv. any changes to the EMPR; which report-

(i) had been subjected to a public participation process, which had been agreed to by the competent authority, and which was appropriate to bring the proposed change to the attention of potential and registered interested and affected parties, including organs of state, which have jurisdiction in respect of any aspect of the relevant activity, and the competent authority, and

(ii) reflects the incorporation of comments received, including any comments of the competent authority".

An application was submitted to DFFE along with the Draft Impact report.

A Public Participation plan and meeting request was submitted to DEFF on 27 November 2020. The Plan was accepted on 03 December 2020.

All potential I&APs were notified of the proposed amendment process via

- The placement of an **advertisement** on the in the **Mopane Herald** (same newspaper used for the original EIA process), in the 25 June 2021 edition.
- placement of **site notices** at the proposed site on 23 June 2021,
- **Notification letters** to all the I&APs that were identified in the previous processes.

The registration and commenting period will be for 30 days.

- The draft report was distributed to I&APs for a 30-day commenting period (as per Section 32 of the EIA Regulations).
- The commenting period was from 25 June 2021 until 26 July 2021.
- Results of the public participation process are included in this final impact report to be submitted to the DEFF, in the form of a Comments and Responses Report which will include all steps and proof of the public participation process.
- All comments and responses received are included in the FINAL Amendment Report.

5.1. RESULTS OF PUBLIC PARTICIPATION PROCESS

In all the other past public participation processes run for the Bolobedu PV Solar Park there were very little response and registrations from I&APs. The main reason for this is that the proposed development site is located on state land, but which is governed by the local community. Community liaison happens on another level and there is continuous liaising taking place with the Traditional Authority, which in case, is the Modjadji Traditional Authority.

There were no comments from any state department of any IA&P during the public participation process for the Part 2 EA Amendment for the proposed Bolobedu Solar Park.

A Comments and Responses Report is included in Annexure F attached to this report. The Comments and Responses Report all steps taken during the public participation process and proof of all actions taken and proof of correspondence.

The only comments received were from DFFE and is responded to in a cover letter added to this report. The comments from DFFE and the corresponding responses from the EAP is included in the Comments and Responses Report in Annexure F.

6. AMENDMENTS BEING APPLIED FOR

6.1. Change of Applicant Representative Contact Details

The original EA was issued in the name of Ms Mikateko Gail Khosa
This should be changed to reflect:

MS JO DEAN
Unit 227 441@ Kirkness , Sunnyside Pretoria, P O.Box 42343 Heuwilsig 9332
Cell: 082 922 3224
joanne@enerj.co.za

The company name remains the same: Bolobedu Solar Farm PV (Pty) Ltd

6.2. Addition of Battery Storage for Generated Electricity

The application for the amendment of the afore-mentioned EA is for the addition of a **Battery Energy Storage System (BESS)** for the storage of part of the electric energy generated by the PV solar plant.

A **Battery Energy Storage System (BESS)** with a storage capacity up to **60 MWh** will be installed within the approved footprint and fenced area of the Bolobedu Solar Park.

The lithium-ion batteries will store energy at times of low energy demand and release the energy to the grid at times of pick demand.

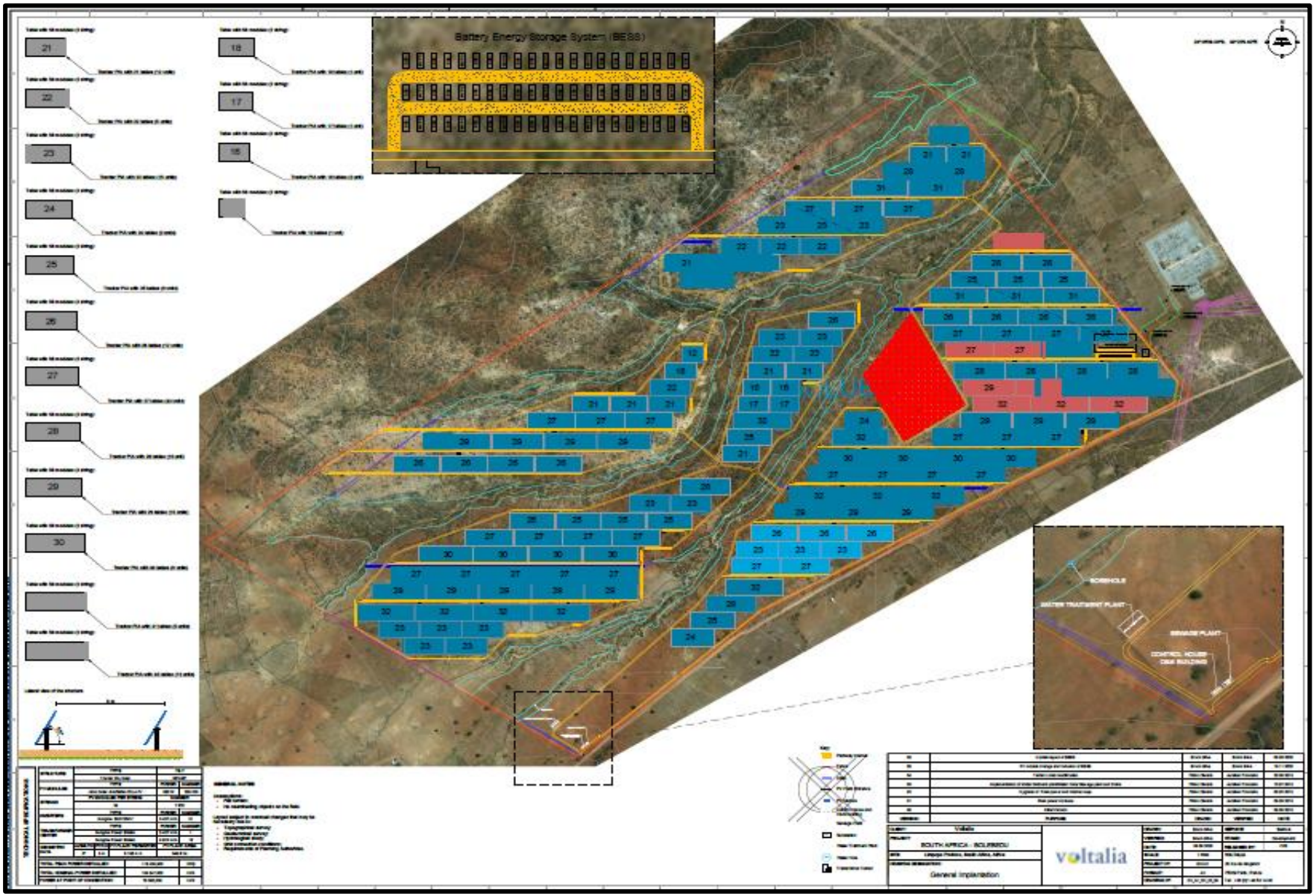
The Battery Storage Facility will have a footprint of **about 2.5 hectares** and will comprise of the following equipment:

- Up to 100 containers (each up to 40 m^2), each with a storage capacity of up to 5 MWh and on a concrete platform. These will house the batteries, management system and auxiliaries.
- Up to 50 transformer stations (up to 35 m^2 each).
- Up to an additional 10 m^2 per container for cooling units.
- Internal access roads up to 8.0 m wide between rows of containers. However, where required, internal access roads will be constructed.
- BESS will be connected:
- to the PV plant by means of DC/DC inverters, and
- to the 33kV bus-bay of the on-site step-up substation by means of kiosk transformers, medium-voltage overhead lines and/or underground cables.
- Temporary infrastructure including a site camp and a laydown area.

Please note that the site layout plan included in this section is the amended layout plan as included in the draft motivation report. However, a Revised Site Layout Plan was obtained as a result of comments received from DFFE. Because of its size it was not possible to include the Revised Site Layout Plan in the report itself, but is included in Annexure A.

The technical description and details are attached in Annexure E.

LAYOUT PLAN



The batteries to be installed in the containers will be of the Lithium-ion type and the battery cells will be pre-assembled at the supplier factory prior to delivery to the site. NO electrolytes will be transported to and handled on site.

There will be no need for any additional clearance of vegetation for a new area for the battery storage facility as it will be located inside the already authorised PV plant footprint area.

The Battery System shall be able to store electrical energy and charge and discharge electrical energy when connected to a Power Conversion Unit (PCU), which performs the current conversion from LV DC to MV AC (and vice versa). The battery is commonly connected at AC MV level to the Renewable Power Plant for HV conversion and grid interconnection.

6.3. INCREASE IN HEIGHT OF SOLAR PANELS

The increase in the height is due to advances in tracker structures from 3.1m to 4.5m.

As compared to previous tracker structures, with recent innovations, tracker structures can tilt to much steeper angles than in previous years i.e., the maximum tilt angles for tracker structures are expected to increase to up to 60°.

Furthermore, the way that the solar panels are mounted on tracker structures have also changed in certain scenarios, the panels can be mounted in portrait rather than landscape configuration, which would increase the maximum height of the panels.

Effectively, with these two new changes in tracker design, the maximum height has increased. Height of installed panels from ground level: Approximately 4.5m.

The number of panels and solar trackers is dependent on the type of module used.

6.4. INCREASE IN GENERATING CAPCITY

As the need for renewable energy increased and the demand became high, there were significant advances made relating to the technology used at PV Solar Parks. This led to the possibility of installing the same number of solar panels and covering the same development footprint size and thus having a higher generating capacity PV Power Plant feeding electricity into the Eskom grid.

In the case of Bolobedu Solar Park, the development footprint is 200ha and the generating capacity is 75MW. The applicant would like to increase the generating capacity to up to 130MW but without changing the development footprint that is currently authorized.

7. PROJECT LAYOUT

The approved layout in the original EA of the proposed development was the result of a comparative study of various layout alternatives and had been defined whilst considering the results of the specialist studies conducted during the previous EIA process.

The preferred site layout (Approved) was designed by a qualified and experienced design engineer, who specializes in the design of solar parks. He was given all the available information with reference to specialist studies to design and draw the preferred site lay out plan.

Changes in the layout will constitute, in essence, only the addition of the battery storage facility as part of the infrastructure at the PV plant.

All other components as included in the approved layout plan will stay the same.

The development footprint size of approximately 200 ha will not change. An amended site lay out plan is included in Annexure A.

Changes in the layout will constitute, in essence, the configuration of the solar panels to increase the generating capacity of the solar park. Once the panels are in a portrait configuration the height will increase as the tracker system will allow the panels to tilt at a 60˚ angle. With the tilting of the solar panels and the portrait configuration, the height of the solar panels, at its highest will be 4.5m. All other components as included in the approved layout plan will stay the same. The development footprint size of 200ha will not change. The number of panels and solar trackers is dependent on the type of module used.

The increase in generating capacity from 75MW to 130MW will not require an increase in the development footprint area of 200ha.

7.1. Structures and Infrastructure

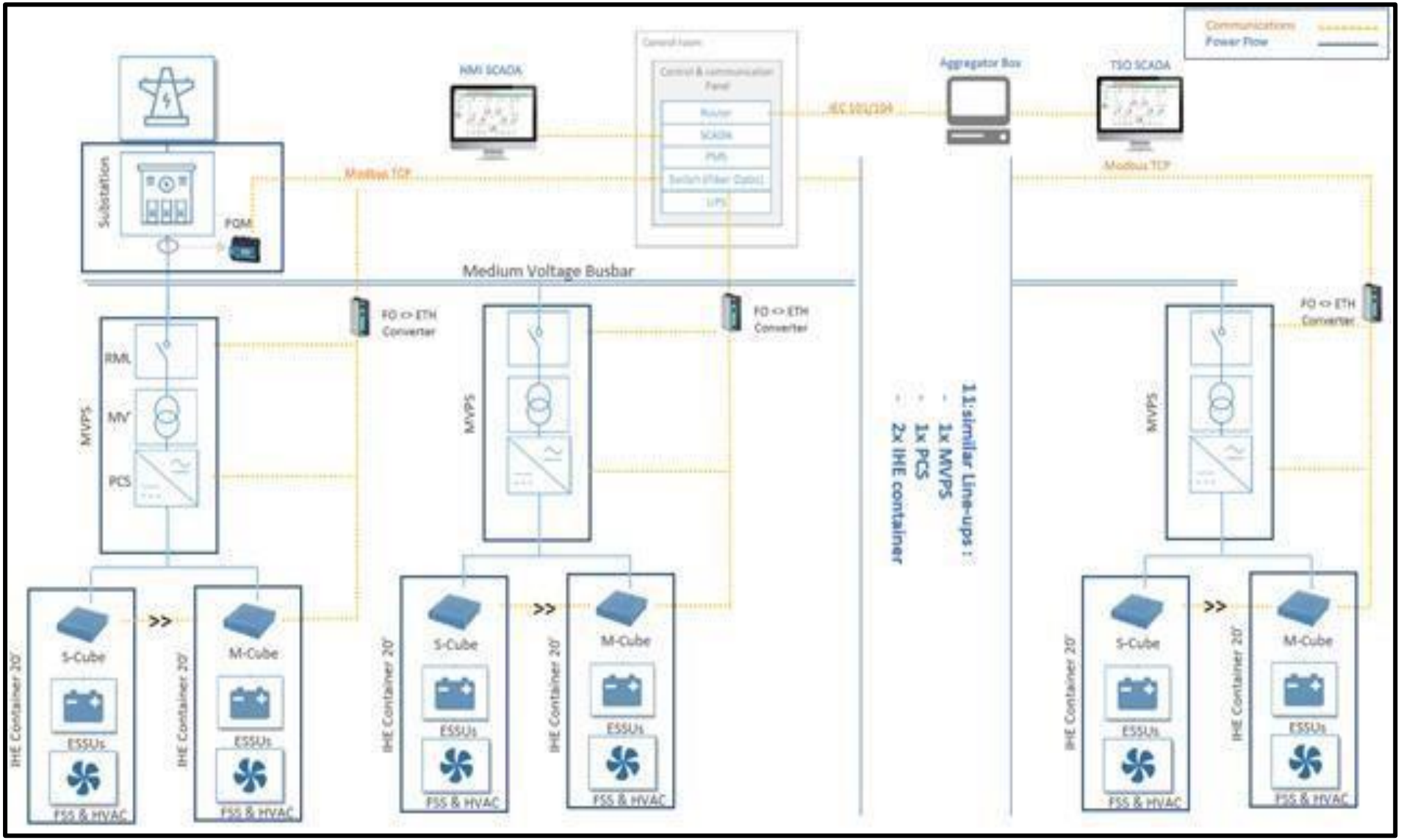
A PV power plant requires little infrastructure apart from the actual solar panels / PV arrays. There is no production of any product and there is no effluent or emissions as a result of the PV power plant.

No accommodation is provided on site and security personnel and maintenance personnel will be employed in shifts and therefore, housing will not be required.

The proposed development infrastructure will consist mainly of the following components and structures:

- Internal roads
- PV arrays (solar panels)
- Medium Voltage receiving stations.
- Control buildings
- Warehouses (including small water treatment system)
- Access Road
- **Battery Energy Storage System (BESS)** (Battery racks, containerized housing for the battery racks and its cooling system, Power Conversion Unit)

PRELIMINARY LAYOUT



7.1.1. Access road and internal roads

Access to Bolobedu Solar Park will be from a secondary road from R81. During the construction phase, the road reserve will be wider than 13.5 m to allow transportation of abnormal loads. Internal roads will be maximum 8.0 m wide with a road reserve maximum 12.0 m wide.

Internal roads will be designed to be in the most environmentally responsible locations. However, the crossing of drainage lines will not be excluded as there will have to be access to all developed areas on site and some the drainage lines cannot be avoided.

The vertical alignment of the roads will not present significant challenges due to the flatness of the terrain. The entire development will be contained inside a fenced area and the roads are not intended for public use and will **not change because of the inclusion of the battery storage facility or increase in panel height**.

7.1.2. Lighting system

Security lighting would only be activated upon illegal entry to the site.

A video-surveillance system using infrared or microwave video cameras, which do not need a switched-on lighting system, is recommended.

There will **not be a change because of the inclusion of the battery storage facility or increase in panel height.**

7.1.3. Water requirements during operations

WATER REQUIREMENT DURING THE OPERATIONAL PHASE		
DESCRIPTION	**UNIT**	**TOTAL**
Average daily water consumption for sanitary use	*l/day*	3,000
Average daily water consumption during cleaning activity (*)	*l/day*	74,000
Average monthly water consumption for sanitary use (over 30 days)	*l/month*	90,000
Annual water consumption for sanitary use	***m^3/year***	**1,095**
Annual water consumption for PV modules cleaning activities (twice/year)	***m^3/year***	**1,700**
ANNUAL WATER CONSUMPTION DURING OPERATION	***m^3/year***	**2,795**
DAILY WATER CONSUMPTION DURING OPERATION (average over 365 days)	***m^3/day***	**7.66**

There will **not be an increase in water requirements because of the inclusion of the battery storage facility or increase in panel height**.

8. STATUS QUO OF THE RECEIVING ENVIRONMENT

The receiving environment has been described using a combination of specialist inputs, on-site observations, a review of existing literature and utilizing Geographic Information Systems (GIS) planning tools. This has not changed since the issuance of the Environmental Authorisation.

9. ENVIRONMENTAL FEATURES

9.1. Climate

The climate for the region can be described as warm-temperate.

The Giyani area which is near to the project site normally receives about 421mm of rain per year, with most rainfall occurring mainly during mid-summer. The area receives the lowest rainfall (0mm) in June and the highest (93mm) in January. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Giyani range from 23.9°C in June to 31°C in January. The region is the coldest during July when the mercury drops to 8°C on average during the night.

9.2. Topography and drainage

The project area is characterised by slightly undulating to flat plains with two major drainage channels bisecting the area. The topography across the site is slightly undulating with the average elevation of 580 mamsl.
The site is located within the B81G quaternary catchment and is situated in the Letaba / Levuhu Water Management Area. Drainage occurs as sheet-wash towards the major rivers.

9.3. Soils and geology

The assessment of the agricultural soil potential and land capability of the project site is detailed in a Soil, Land Use and Agricultural Potential Report from Exigo3.

The land type units which are used to determine the potential agricultural value of soils in an area and represented within the study area include the Ae326 land type.

Land types, geology, and soil types of the development area.

Landtype	Soils	Geology
Ae326	Red-yellow apedal, freely drained soils; red, high base status, > 300 mm deep (no dunes)	Grey biotite gneiss and migmatite of the Goudplaats Gneiss in the north; leucocratic biotite granite of Vaalian age in the south and east; many diabase dykes.

The high variability in rainfall distribution within the area could however render dryland farming a risky venture, even under irrigated conditions. Higher day temperatures in summer months may hamper soil moisture storage for crop use. At present no irrigation or functional centre pivots occur in the project area. The climatic conditions are the main factor determining the soils to be marginally suitable for arable agriculture.

The site has a low to medium agricultural potential according to the characteristics of the soils and vegetation as well as rain fall in the area.

The site has a medium to low potential for grazing due to the dense stands of sickle bush. When severe and prolonged overgrazing in the semi-arid savanna ecosystem occurs, the grass component is severely restricted in growth, or in moisture usage. Therefore, more moisture remains available in the soil to be used by the woody plants, and the result is bush encroachment, a structural change towards more strongly woody vegetation.

The grazing has a low palatability, and the soil is in a degraded state at present due to previous overgrazing.

The Specialist indicated that the addition of the battery storage facility and increased panel height would <u>NOT</u> have a significant negative impact on the proposed development relating to the Soils, Land Use, agricultural Potential, and land capability. This statement letter is included in Annexure B

9.4. Geo-hydrology

The project site is in the B81G quaternary catchment. Two primary drainage features occur in the PV located Plant site, one in the north and the other in the south, both draining in an eastern direction. These drainage lines also run though the powerline study area.

The study area is in the summer rainfall region of South Africa, with precipitation generally occurring as short, intense, thundery showers. The mean annual precipitation for the area as measured in the surrounding weather stations is 675 mm/annum. Average annual precipitation for the B81G quaternary catchment calculated by DWS during the GRA II study is given as 629 mm/annum.

For this study only the riparian zones that bisect the proposed development site were assessed namely the northern water courses. In determining the integrity of these hydrogeomorphic units the condition of the site and the indirect and direct disturbances were considered. The roads, erosion, overgrazing, alien invasive vegetation species, *etc*. were considered in determining the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of these wetland units.

The non-perennial water courses and riparian woodland in the northern section of the project area have a 'Largely Natural' PES, with the only impacts being from livestock overgrazing and some isolated eroded areas. These well-defined channels have a 'Moderate' EIS and support ecosystem functioning, especially in terms of the connectivity towards the larger area.

Impacting activities which have altered the expected floristic composition include overgrazing, encroachment of woody layer, impoundment, and road crossings.

The Specialist indicated that the addition of the battery storage facility and increased panel height would <u>NOT</u> have a significant negative impact on the proposed development relating to the wetland and Riparian Delineation Report. This statement letter is included in Annexure B.

9.5. Ecology (fauna & flora)

An Ecological Impact Assessment was conducted by during the previous EIA process, to verify the ecological sensitivity and ecological components of the site at ground level.

The development site lies within the Savanna biome which is the largest biome in Southern Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs).

The most recent classification of the area by Mucina & Rutherford is the Granite Lowveld Bushveld vegetation type, although most of the proposed development sites have been completely modified and represent degraded bushveld or old fields.
The conservation status of the vegetation type is vulnerable with some 17% conserved in Kruger National Park, and the same percentage conserved in smaller private reserves. More than 20% of this vegetation type has been transformed, mainly by cultivation and by settlement development.

The vegetation units on the site vary according to soil characteristics, topography, and land-use. Most of the site has become encroached by dense stands of sickle bush due to the overgrazing, while 2 major drainage channels bisect the site in the south and north respectively.

The ecologist was requested to write a statement to indicate whether the proposed inclusion of the BESS and the increase in panel height to the development will have any significant impacts on the ecology of the area.

He indicated that the addition of the battery storage facility and increased panel height would NOT have a significant negative impact on the proposed development. The letter is included in Annexure B.

The recommendations and mitigating measures included in the Ecological Impact Assessment included in the Final EIA Report of the previous application process, should still be implemented.

As compared to previous tracker structures, with recent innovations, tracker structures can tilt to much steeper angles than in previous years i.e., the maximum tilt angles for tracker structures are expected to increase to up to 60°. Furthermore, the way solar panels are mounted on tracker structures have also changed in certain scenarios, the panels can be mounted in portrait rather than landscape configuration, which would increase the maximum height of the panels. Effectively, with these two new changes in tracker design, the maximum height has increased.
Considering that the development footprint remains the same as discussed in the reports the conclusion is that the impacts on the biodiversity, wetlands, and soil potential will remain the same as discussed in the abovementioned reports.

9.6. Visual

During the previous EIA process, a Visual Impact Assessment was conducted to determine the visual impact of the proposed solar park.

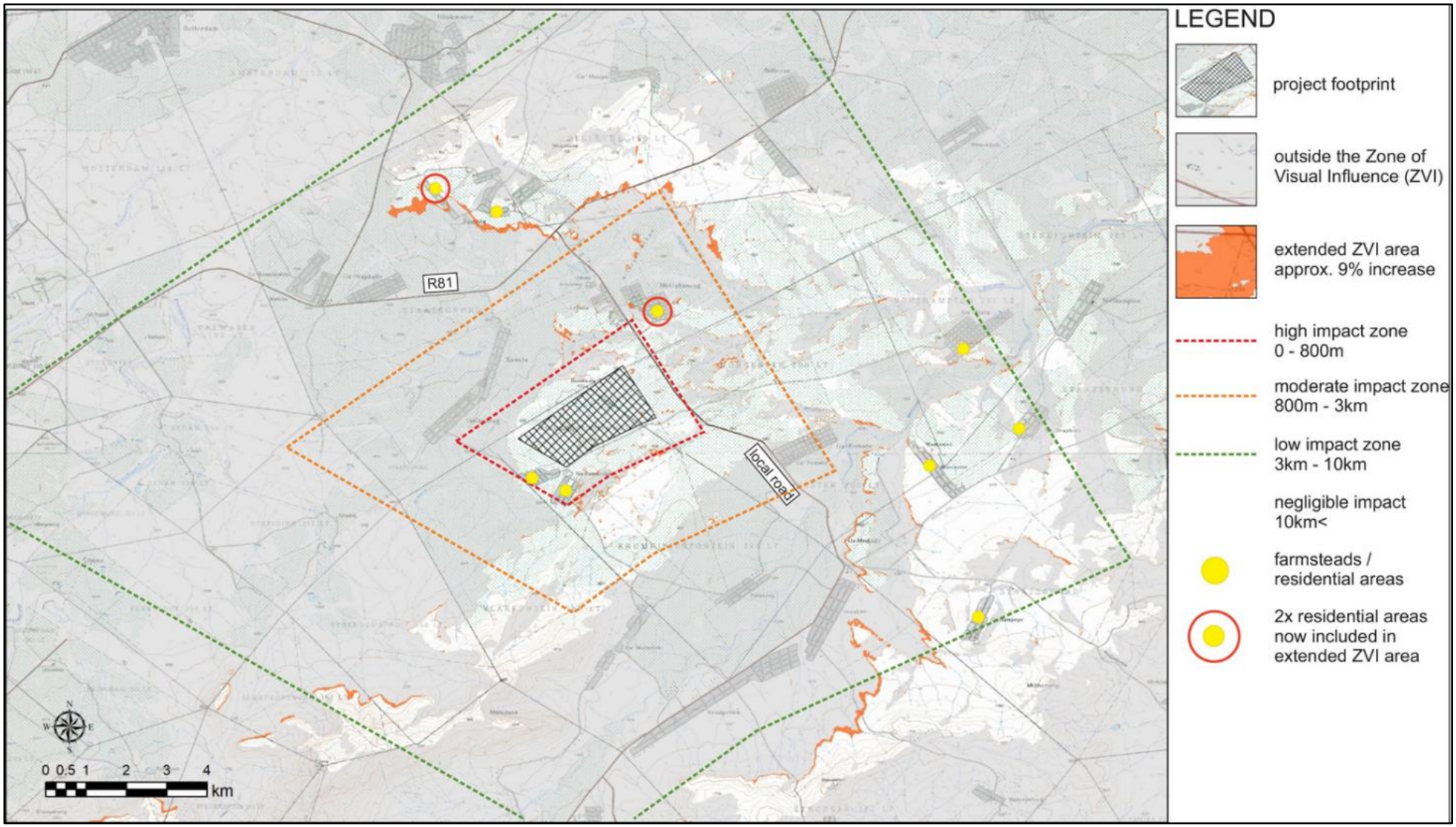
The final ***EIA significance*** from the **Original Visual Impact assessment concluded that** the impact from the project was rated as *negative* ***medium* to *medium – high***. Without following mitigation measures, the impact would be substantial due to the size of the development. (See Annexure C)
Comment on the Change in the Visual Impact (refer to ***Image 1: Visual Impact Comments***)
In terms of the area that would be visual affected / **Zone of Visual Influence** (ZVI - white areas on the map):

- the increase in the affected area is approximately 3%
- the most significant impact would occur in north, southeast and southwestern sections of the study area.
- the extended areas are located over all the impact zones, within the *high impact zone*, it occurs mostly in the eastern half of the zone.
- **taking the statements above into consideration, the impact as a result of the increased ZVI could be regarded as a small impact.**

With regards to the effect on **visually sensitive receptors** (VSRs):

- with the increase in height, **two additional residential areas** (one to the north and on to the northwest of the project) would now possibly have views of the project components. The nearest occurs within the settlement of Mohlabaneng within the *moderate impact zone* and the northern most one occurs in the *low impact zone.* In both cases, the view may be screened by existing buildings along the periphery of the settlement.
- an increase in height would result in a larger portion of the panels possibly being visible to VSRs, however:
  - only one of the VSRs is located within the *low impact zone*, this VSR is not opposing the development.
  - for most of the VSRs the panels would be at least partially screened by the existing buildings and vegetation in the immediate surrounding of the VSR.
- **taking the statements above into consideration, the increased impact on VSRs could be regarded as a slight, bordering on a moderate, increase.**

In the original report the visual impact was rated as ***medium* to *medium – high***. it can be concluded that the **change in impact would not result in an increase in the significance rating** as per the EIA significance rating system based on DEAT's Guideline Document: EIA Regulations (1998).


LEGEND
project footprint
outside the Zone of Visual Influence (ZVI)
extended ZVI area approx. 9% increase
high impact zone 0 - 800m
moderate impact zone 800m - 3km
low impact zone 3km - 10km
negligible impact 10km<
farmsteads / residential areas
2x residential areas now included in extended ZVI area
R81
local road
0 0.5 1 2 3 4
km

10. SPECIALIST STUDIES

Due to the nature of the changes in the specifications of the proposed development, a visual impact assessment specialist was requested to assess the visual impact of the increase in the height of the solar panels.

The ecologist was requested to assess the changes and give a statement.

A Fire Management Plan was added to assist with the added BESS.

The public participation process to be followed will provide valuable information in the identification of other issues which need to be addressed.

The specialist studies which have been conducted and attached to this Impact Report are the following:

- Ecological Statement (Annexure B)
- Amended Visual Impact Assessment (Annexure C)

11. IMPACT ASSESSMENT: METHODOLOGY

Methodology used for the identification and assessment of the impacts.

The potential environmental impacts identified in the study have been quantified and the significance of the impacts has been assessed according to the criteria set out below.

Each impact has been assessed and rated.

The assessment of the data, where possible, has been based on broadly accepted scientific principles and techniques. In defect, judgements and assessments are necessarily based on the consultant's professional expertise and experience.

11.1. Project phasing

To assess these impacts, the project has been divided into phases from which impacting activities can be identified:

- **Planning**
- **Site clearing & construction phase.**
- **Operational phase**

The project is still in the planning phase and although an EA was obtained, site clearing, and construction has not commenced.

This EA amendment application is for the addition of a battery storage facility and increase in panel height. The impacts expected, will be applicable to the operational phase.

11.2. Assessment Criteria

The terms of reference for the study include criteria for the description and assessment of environmental impacts. These criteria are drawn from the *Integrated Environmental Management Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts*, published by the DEA in terms of the Environmental Impact Assessment. These criteria include:

Impact Assessment Criteria

Nature of impact This is an appraisal of the type of effect the proposed activity would have on the affected environmental component. The description should include what is being affected and how.		
Extent The physical and spatial size of the impact.	**Site**	The impact could affect the whole, or a measurable portion of the above-mentioned properties.
	Local	The impacted area extends only as far as the activity, e.g. a footprint.
	Regional	The impact could affect the area including the neighbouring farms, the transport routes, and the adjoining towns.
Duration The lifetime of the impact; this is measured in the context of the lifetime of the base.	**Short term**	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than any of the phases.
	Medium term	The impact will last up to the end of the phases, where after it will be entirely negated.
	Long term	The impact will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter.
	Permanent	The only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
Intensity	**Low**	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
	Medium	The affected environment is altered, but function and process continue, albeit in a modified way.
	High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
Probability The likelihood of impacts occurring. Impact may occur for any length of time during the life cycle of activity and not at any given time.	**Improbable**	The possibility of the impact occurring is very low, due either to the circumstances, design, or experience.
	Probable	There is a possibility that the impact will occur to the extent that provisions must be made therefore.
	Highly probable	It is most likely that the impacts will occur at some or other stage of the development. Plans must be drawn up before the undertaking of the activity.
	Definite	The impact will take place regardless of prevention plans, and there can only be relied on mitigation actions or contingency plans to contain the effect.

Determination of significance. Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.	**No significance**	The impact is not substantial and does not require any mitigation action.
	Low	The impact is of little importance but may require limited mitigation.
	Medium	The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
	High	The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

The general approach to this study has been guided by the principles of Integrated Environmental Management (IEM). In accordance with the IEM Guidelines issued by the DEA, an open, approach, which encourages accountable decision-making, was adopted. The principles of the IEM require:

- informed decision-making;
- accountability for information on which decisions are made;
- a broad interpretation of the term “environment”;
- an open participatory approach in the planning of proposals;
- consultation with I&APs;
- due consideration of alternatives;
- an attempt to mitigate negative impacts and enhance positive impacts of proposals;
- an attempt to ensure that social costs of developments are outweighed by the social benefits;
- democratic regard for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of proposals; and
- the opportunity for public and specialist input in the decision-making process.

12. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

12.1. Potential Impacts

Potential impacts associated with the construction and operational phases of Bolobedu Solar Park together with its connection infrastructure were outlined and evaluated during the previous EIA process for which Environmental Authorisation was issued.

The identification of impacts is based on:

- legal and administrative requirements.
- the nature of the proposed change in activity and specifications.
- the nature of the receiving environment.
- specialist studies and inputs.

Potential impacts, only associated with the proposed amendment of the addition of a battery warehouse and the increase in the height of the panels may include:

- Impacts on ecology.
- Visual impacts.
- Impacts on water and soils should any battery leak.
- Impacts on safety of workers in battery storage facility.
- Impacts on the economic feasibility of the PV plant.
- Fire and explosion risk

12.2. Cumulative Impacts

There are no other similar facilities within a 30km radius of the proposed development site. T**he cumulative impact is not applicable.**

Several mitigation measures are proposed which will lead to the impacts that may result from the establishment of the Bolobedu Solar Park to be low. The cumulative impacts of each of the possible impacts are assessed hereunder.

12.3. Impacts Assessment & Mitigation Measures

12.3.1. Construction & operational phases impacts and mitigation measures.

All possible impacts that could have been predicted in both the construction and operational phases of the PV plant were addressed in the previous EIA process. Specific mitigation measures were proposed, and the significance of these impacts were described with and without the mitigation measures. In this report, only impacts and mitigation measures applicable to impacts as a result of the change in specification will be addressed. These changes include the addition of the battery storage facility at the PV plant and the increase in the height of the panels from 3.1m to 4.5 m.

12.3.2. Impact of the development on the ecology (fauna & flora) of the area

The removal of natural vegetation and destruction of habitat will have a negative effect on the biodiversity. However, considering that the development footprint remains the same the conclusion is that the impacts on the biodiversity and soil potential will remain the same as discussed in the following reports, which formed part of the previous EIA process.

- An Environmental Report on the Ecology (Flora and Fauna) for the Proposed Renewable Energy Generation Project on Farm Bolobedu 367, Limpopo Province.
- An Environmental Report on the Soils, Land Use, Agricultural Potential and Land Capability for the Proposed Renewable Energy Generation on the Farm Bolobedu 367 Limpopo Province.
- A wetland delineation report for the Proposed Renewable Energy Generation Project on the Farm Bolobedu 367 Limpopo Province.

The removal of natural vegetation and destruction of habitat will have a negative effect on the biodiversity. The specific mitigation measures included in the Ecological and Avifauna Impact Assessment included in the previous EIA process should be adhered to. Impacts on ecologically sensitive areas will be avoided and not impacted on by the proposed development.

Lithium-ion with immobilised electrolyte do not require spill control and there is no risk of spillage or pollution and subsequent negative impacts on the ecology.

12.3.3. Visual impacts

Construction phase
The natural visual character of the site will be changed by the PV Plant but there will be no extra changes with the addition of the battery storage facility.

Operational phase
Buildings and the solar modules have a visual impact on the surrounding area. The increase in height from 3.1m to 4.5m (solar panels) had to be considered.

IMPACT: VISUAL DISTURBANCE WITH PROPOSED AMENDMENTS									
Project Phase	**Activity/Aspect**	**Specific impact**	**Severity**	**Duration**	**Extent**	**Frequency**	**Probability**	**Significance**	
								With Mitigation	**Without Mitigation**
Construction	Buildings and panels	Visual	Low	High	Low-Medium	High	High	Low-Medium	Medium-High
	Lights	Visual	Low	Medium	Low-medium	Medium-high	High	Low-Medium	Medium-High
Operation	Buildings & panels – 3.1m (current authorisation)	Visual	Medium	High	Medium	High	High	Medium	Medium-high
	Buildings & panels – 4.5m (Amendment applied for)	**Visual**	**High**	**High**	**Medium**	**High**	**High**	**Medium**	**Medium-high**
	Lights	Nuisance	Low	High	Low-medium	Medium-High	High	Low-Medium	Medium
	Electrical lines	Visual	Low	High	Low	High	High	Low-Medium	Low-Medium
Cumulative Impacts	**Increased in visibility of increased infrastructure in the area**	**Increased visual intrusion and nuisance**	**Medium-High**	**Medium**	**Medium**	**Low-Medium**	**High**	**Low-Medium**	**Low-Medium**

Measures: Avoidance, Management and Mitigation included in previous EIA Report

- Only the footprint and a small "construction buffer zone" around the proposed components are exposed and the natural occurring vegetation, should be retained.
- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the project site.
- Minimise number of light fixtures and connecting lights to motion sensors to limit light pollution.
- A video-surveillance system using infrared or microwave video cameras, which do not need a switched-on lighting system, is recommended.
- Cumulative impacts will be low as it was possible to mitigate the visual impact at Bolobedu Solar Park successfully as a result of the natural characteristics of the area.

Measures: Avoidance, Management and Mitigation <u>revised and additional measures</u>

- Natural occurring vegetation, (indigenous vegetation) should be retained as far as possible, especially vegetation along the boundary of the project site:
- Incorporate cleared vegetation into a rehabilitation plan. This should be done in conjunction with the ecologist, visual Impact, and any other relevant specialists.
- Cleared vegetation could be planted in areas that have line of sight from visual receptors.
- Ensure dust suppressing techniques are always in place and may include regular soil wetting or application of dust suppressing agents. Wetting of soil should be used as a last resort due to low availability of water in the area.
- Minimise the clearance of existing vegetation. Cleared areas should re-vegetated.

The Battery storage facility will not have any additional negative visual impacts on the environment.

The visual impact of the PV plant cannot be avoided, but it can be managed and mitigated.

12.3.4. Fire hazards

The primary focus is on fire hazards associated with Li-ion batteries and the potential for a condition known as 'thermal runaway'. Thermal runaway results from internal shorts inside a battery cell which occur due to a variety of reasons and can ultimately lead to the battery catching fire. This will be the case especially during the operational period.

IMPACT: FIRE (EXPLOSIONS)									
Project Phase	**Activity / Aspect**	**Specific impact**	**Severity**	**Duration**	**Extent**	**Frequency**	**Probability**	**Significance**	
								With Mitigation	**Without Mitigation**
Construction	Buildings& panels (<u>Authorised</u>)	Lower Groundwater quality	Low	High	Low	High	Low	Low-Medium	Medium-High
	Increase in temperature of batteries	**Possibility of fire or explosion- Thermal Runaway**	**High**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low-Medium**
Operation	**Increase in temperature of BESS**	**Possibility of fire or explosion- Thermal Runaway**	**High**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low-Medium**
Cumulative Impacts	Pollutants into groundwater	Cumulative negative impact to groundwater quality	High	Low-medium	Low	Low-Medium	Medium	Low-Medium	Medium

Measures: Avoidance, Management and Mitigation included in previous EIA Reports

- The Contractor shall conform to the Occupational Health and Safety act (Act 85 of 1993) and regulations applicable. The Act requires the designation of a Health and Safety representative when more than 20 employees are employed.
- Open trenches or excavations must be marked with danger tape or safety netting.
- The number of construction workers to stay on site should be limited to the minimum.
- Proper access control (I.D. cards) should be enforced to ensure that no authorised persons enter the site.
- No solid waste or vegetation may be burnt on the premises or surrounding areas.
- Firebreaks should comply with the National Veldt and Forest Fire Act, 1998 (Chapter 4: Duty to prepare and maintain firebreaks).
- Fire extinguishers and fire-fighting equipment must be available.
- A fence should be constructed along the boundary of the development.
- The cumulative impacts of this impact can be successfully mitigated if managed properly.

Measures: Avoidance, Management and Mitigation <u>revised and/or additional measures</u>

- The Battery Management System should include an approved device to preclude, detect, and control thermal runaway.
- The BESS should incorporate appropriately certified inverters/inverter systems and must comply with other recognised safety standards which address risk assessment and controls.
- The BESS must be well away from critical buildings or equipment and located in a non-combustible enclosure. Sufficient clearance must be maintained around the installation to provide fire service access.
- Advisory and warning signage must be visibly displayed.
- An approved, monitored, automatic smoke detection system must be installed at the BESS. A fire suppression system must be designed and installed at the BESS.
- Regular inspections must be undertaken to ensure the battery systems are not overheating.
- Portable fire extinguishers must be provided at the BESS.
- Installations should have emergency power disconnects to ensure manual, remote, and local disconnect is possible adjacent to the BESS.
- The BESS must have an online condition monitoring system. The system should be fitted with temperature monitoring which incorporates a high temperature alarm for the battery room and container. Temperatures should be monitored at a constantly attended location.

12.3.5. Safety of Workers

Project Phase	IMPACT: SAFETY OF WORKERS (ADDITION OF BATTERY STORAGE FACILITY)								
	Activity / Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Increase in temperature of batteries	Negative impact to safety of workers – Thermal Runaway	High	Low	Low	Low	Low	Low	Low-Medium
Operation	Increase in temperature of BESS	Negative impact to safety of workers – Thermal Runaway	High	Low	Low	Low	Low	Low	Low-Medium
Cumulative Impacts	Safety of workers	Cumulative negative impact to safety of workers	High	Low-medium	Low-Medium	Low-Medium	Low	Low-Medium	Medium

Measures: Avoidance, Management and Mitigation <u>revised and/or additional measures</u>

- Clear signage should be visible to include warnings of a possible fire hazard.
- The most efficient fire suppression system must be installed.
- The Battery Management System should include all means necessary to prevent fires at the BESS.

12.3.6. Effectivity of Plant

Project Phase	IMPACT: EFFECTIVITY OF PV PLANT (ADDITION OF BATTERY STORAGE FACILITY)								
	Activity / Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Operation	Efficacy of PV plant	Higher effectivity of PV plant	N/A	High Positive	High Positive	High Positive	High Positive	N/A	High Positive
Cumulative Impacts	Efficacy of PV plant	Cumulative positive impact on effectivity of plant	N/A	High Positive	High Positive	High Positive	High Positive	N/A	High Positive

12.4. POTENTIALLY SIGNIFICANT IMPACTS

Impacts with a rating of Medium-high or High are impacts which are regarded as potentially significant, rated without any mitigation measures.

In this impact assessment, the following impact was regarded as potentially significant impacts:

i. Visual Impact.

12.4.1. Cumulative impacts

i. The visual impact can have a cumulative effect if mitigation measures are not properly implemented.

12.4.2. Nature of impact

i. This impact can have a negative impact on the sense of place of the surrounding areas.

12.4.3. Extent and duration of impact

i. The extent is on the development area as well as surrounding properties. The duration is for the life of the development.

12.4.4. Probability of occurrence

i. The probability is possible.

12.4.5. Degree to which impact can be reversed.

i. This impact is reversible as the solar park can be decommissioned and the area can be restored to its natural state.

12.4.6. Degree to which impact can cause irreplaceable loss of resource.

i. The negative visual impact will not cause the irreplaceable loss of any resources in the area.

12.4.7. Degree to which impact can be mitigated.

i. Successful mitigation is possible.

13. ADVANTAGES AND DISADVANTAGES ASSOCIATED WITH PROPOSED CHANGES

The biggest advantage of the changes as listed above is that it does not lead to an increase in the development footprint. Therefore, all potential impacts are still the same as previously identified and assessed, without changing the development footprint.

The effectiveness of the PV plant is increased significantly as it can now also deliver power during periods of low and no sunlight. The increase in efficiency and efficacy of the solar plant as the resource (sunlight) is optimized is thus significant.

An advantage of increased panel height is better efficiency in operation of the PV plant with new technology.

A disadvantage of the changes is that the height of the panels will increase with change in configuration from landscape to portrait. The increase in height leads to a significant visual impact, although it can still be mitigated to a large extent.

All requirements and specifications as included in the current EA will be met and implemented including all mitigation measures to be implemented to minimize and avoid any negative environmental impacts that may occur because of the development of the Solar Park.

Sensitive areas must be avoided and honoured by implementing sufficient buffer areas.

14. CONCLUSIONS AND RECOMMENDATIONS

This Final Impact Report describes the amendments which are being applied for, which constitutes a Part 2 Amendment Application in terms of Regulation 31 of the EIA Regulations, 2014, as amended, for the development of Bolobedu Solar Park.

The purpose of this report is to provide the relevant authorities and interested and affected parties with sufficient information regarding the potential impacts of the changes to the development, which was previously authorised.

Amendments to the amended EA, now being applied for include:

1. The technology and height of panels (change in maximum height from 3.1m **to 4.5m**) installed from the ground. The number of panels and solar trackers is dependent on the type of module used.

2. Addition of a **Battery Energy Storage System (BESS)** for the storage of part of the electric energy generated by the PV solar plant, within the already authorised footprint and fenced area of the solar park.

3. Change in the name of the applicant from of Ms Mikateko Gail Khosa **to Ms. Joe C Dean**

4. Change in Generating Capacity from 75MW to 130MW without changing the development footprint size of 200ha.

The potentially significant negative impacts that have been identified should be mitigated through the implementation of the mitigation measures highlighted in this report. It is suggested that the proposed mitigation measures, will effectively lower the impacts to acceptable levels.

It is the professional opinion of AGES Limpopo that the proposed changes to the development specifications do not present any fatal flaws in terms of negative impacts to the environment and therefore will not have any significant detrimental impacts to render the project unfeasible.