Du Plessis Dam Solar PV1 Battery Energy Storage System

Draft Motivational Report in support of a Part 2 Environmental Amendment Application

DEFF Ref Nr: 14/12/16/3/3/2/456

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Applicant

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CHAPTER 1: PROJECT INFORMATION

1.1 Background and Locality

An Environmental Authorisation (EA) was issued for the construction of the **75 MW Du Plessis Dam Solar Photovoltaic PV1 Energy Plant** on the Remainder of the Farm Du Plessis Dam No 179 in the Emthanjeni Municipality in De Aar, Northern Cape province. The approved site is 220 hectares in extent.

The EA was issued on 28 September 2015 with reference number 14/12/16/3/3/2/456. The EA was subsequently amended on 12 August 2020 with reference number 14/12/16/3/3/2/456AM1. The EA is valid until 29 September 2025.

It is proposed to amend the project description by adding a Battery Energy Storage System (BESS) to the approved solar photovoltaic energy plant and this application is therefore for a **Part 2 EA Amendment**. This Motivational Report is in support of the EA Amendment Application Form.

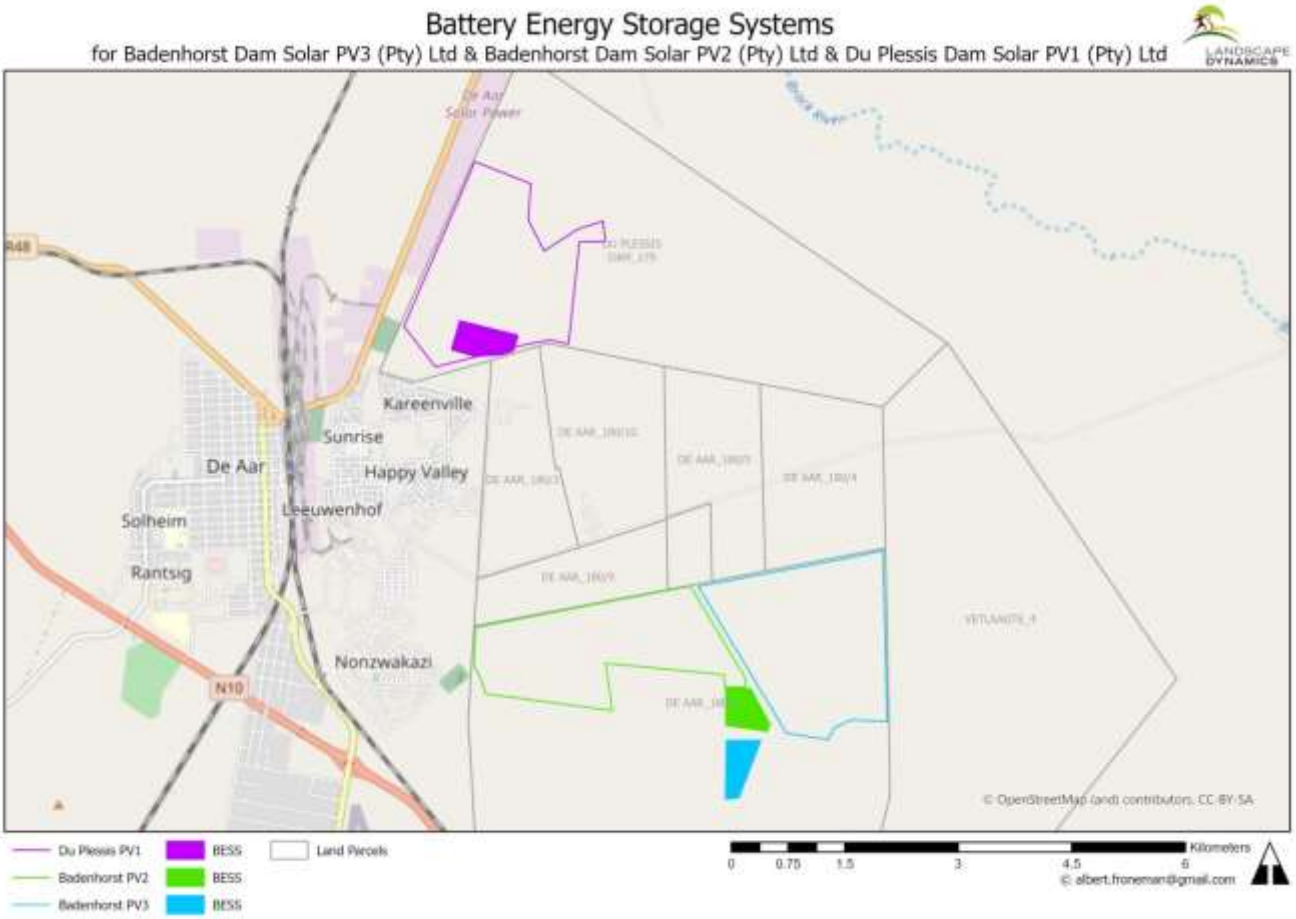
The Department of Environment, Forestry & Fisheries (DEFF) was the Competent Authority (CA) which issued the above-mentioned EA and is therefore also the CA for this application.

Mulilo Renewable Project Developments (Pty) Ltd managed the below-mentioned applications, and received Environmental Authorisations for the following three solar photovoltaic energy generation projects:

Applicant	Property	EIA Reference Number
Badenhorst Dam Solar PV3 (Pty) Ltd	Remainder of Portion 1 of the Farm De Aar No 180	14/12/16/3/3/2/483
Badenhorst Solar PV2 (Pty) Ltd	Remainder of Portion 1 of the Farm De Aar No 180	14/12/16/3/3/2/504
Du Plessis Dam Solar PV1 (Pty) Ltd	Remainder of the Farm Du Plessis Dam No 179	14/12/16/3/3/2/456

The three sites are in close proximity to each other and a BESS will be added to each of the three solar PV plants respectively. All three BESS sites are situated within the approved laydown areas of the three solar projects that were assessed and approved as part of each project's current EA.

The position of the sites in relation to each other and the town of De Aar can be seen on the map below.



1.2 Legal requirement

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National Environmental Management Act (Act 107 of 1998)

This application is done in terms of the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) and the Environmental Impact Assessment Regulations published in Government Notice No R982, December 2014, as amended.

Applicable to this EA Amendment application is Section 31 of NEMA, which states that an Environmental Authorisation may be amended 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 change in the nature of impact* where such level or change in 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.

NEMA Listed Activities

An EA can only be amended if the proposed development does not trigger any new listed activities, in other words if all applicable NEMA listed activities has been appropriately assessed.

In the case of this project, the following applies:

The EIA commenced under the 2010 Environmental Impact Assessment Regulations but the EA was issued in 2015, in other words after the Regulations were amended in 2014. The following listed activities were authorised:

2010 EIA REGULATIONS

Government Notice R544: Listing Notice 1

- Activity Nr 10: Construction of infrastructure for the distribution of electricity with a capacity of 33kV and less than 275kV
- Activity 11: Construction of infrastructure within 32m from a watercourse
- Activity 18: The infilling, depositing or removal of more than $5m^3$ from a watercourse

Government Notice R545: Listing Notice 2

- Activity 1: The construction of infrastructure for the generation of electricity where the electricity output is 20MW or more
- Activity 15: Physical alternation of vacant land of 20 hectares of more

Government Notice R546: Listing Notice 3

- Activity 4: The construction of a road wider than 4m outside urban areas
- Activity 14: Clearance of 5 hectares or more vegetation where 75% or more of vegetation constitutes indigenous vegetation outside urban areas
- Activity 16: Construction of infrastructure of $10m^2$ or more within 32m from a watercourse outside urban areas and within CBAs

2014 EIA REGULATIONS

Similar listed activities under the 2014 Regulations (and authorised in the EA) are:

Government Notice R983: Listing Notice 1

- Activity 11: Construction of infrastructure for the distribution of electricity with a capacity of 33kV and less than 275kV
- Activity 12: Construction of infrastructure of $100m^2$ or more within 32m from a watercourse
- Activity 19: The infilling, depositing or removal or more than $5m^3$ from a watercourse
- Activity 27: The clearance of 1 hectare or more of indigenous vegetation
- Activity 28: Industrial developments where the land was used for agricultural purposes

Government Notice R984: Listing Notice 2

- Activity 1: The construction of infrastructure for the generation of electricity where the electricity output is 20MW or more
- Activity 15: Clearance of 20 hectares or more of indigenous vegetation

Government Notice R985: Listing Notice 3

- Activity 4: The construction of a road wider than 4m outside urban areas
- Activity 14: Development of infrastructure of $10m^2$ or more within 32m from a watercourse

2017 EIA REGULATIONS

The current EIA Regulations were published in 2017 and the following activities could possibly be applicable to the proposed BESS development:

Government Notice R327: Listing Notice 1

- Activity 27: The clearance of 1 hectare or more of indigenous vegetation
- Activity 28: Industrial developments where the land was used for agricultural purposes

Government Notice R325: Listing Notice 2

- Activity 1: The construction of infrastructure for the generation of electricity where the electricity output is 20MW or more
- Activity 15: Clearance of 20 hectares or more of indigenous vegetation

Government Notice R324: Listing Notice 3

- Activity 4: The construction of a road wider than 4m outside urban areas

Activities relating to the "Development of infrastructure for the storage of dangerous goods" are not applicable to BESS's. This statement is in line with recent correspondence shared by DEFF with SAWEA indicating that the Battery Energy Storage Systems are *not* seen as 'dangerous goods' and those NEMA activities are therefore *not* applicable.

When these proposed BESS components are being added to the project description of already approved sites and considering that all listed activities have been assessed during the original EIA studies and new activities are being triggered, an amendment to the existing EA application can be made.

1.3 Proposed BESS Description

The following information was obtained from a document called *Technical Engineering Report-Battery Energy Storage Systems: Analysis of the current state of electrical energy storage systems*, dated 5 August 2020 (Morse, WJ. 2020) compiled by Mulilo Renewable Projects Development (Pty) Ltd and is attached as Appendix B.

Site position

The BESS site is situated within the previously authorised laydown area is 19.6 hectares in extent. The final footprint of the BESS is likely to be significantly less, however a larger area allows for micro-siting of the BESS components to avoid possible site sensitivities and potential to implement larger buffers if necessary.

The authorised laydown area is approximately 72 hectares in size and will be large enough to house the BESS as well as construction activities for the solar PV plant. Also refer to Appendix A for maps of the site area.

Description

The BESS will comprise of multiple battery units or modules housed in shipping containers and/or an applicable housing structure which is delivered pre-assembled to the project site. Containers are usually raised slightly off the ground and can be stacked if required. Supplementary infrastructure and equipment may include power cables, transformers, power converters, buildings & offices, HV/MV switch gear, inverters and temperature control equipment that may be positioned between the battery containers.

The BESS has the following high level characteristics

- Footprint area required: <20 hectares (approximately 440m x 440m)
- Height: Battery Array <10m
- Height: Substation & Powerline <25m
- Voltage <132kV
- Power Output ~150MW
- Energy Capacity ~2500MWh
- Chemistry Lithium Ion (All NMC, LCO, LMO, NMC, LFP, NCA, LTO)
- Charge & Discharge Duration 5-16 hours
- Construction Duration 6-12 months

BESS Hybrid Facility in CA USA

Computer render of a similar scale Solar PV & BESS Hybrid that is proposed for this project

Technology

Different battery storage technologies are used all over the world for grid stabilisation, load levelling and to provide uninterrupted power supply. The selection of a storage system can significantly influence a project's impacts on the environment and overall operations. Technical parameters such as battery lifetime, efficiency, depth of discharge (DoD) and/or power density, have been taken into consideration in the current development stage to select the adequate BESS and avoid unnecessary impacts and costs throughout the project's lifecycle.

Despite there being many forms of BESS (flywheels, compressed air, thermal, electrochemical), and with pumped hydro energy storage being widely used in conjunction with hydro plants, the most mature and commonly used systems for utility scale solar plants are lithium ion solid-state batteries. There are however other technologies for electrical energy storage systems and can be categorised as their storage class, namely Mechanical, Chemical, Electrical, Thermal or Electrochemical systems.

The battery technology being considered for the BESS would be based on Lithium Ion solid state battery chemistry which consists of multiple battery cells that are assembled together to form modules. Each cell contains a positive electrode, a negative electrode and an electrolyte.

Over the past 5 years lithium-ion battery technology has not only maintained, but increased its market dominance as the preferred technology in the transformation of the power grid, replacing gas Peaker plants, and co-located at large solar PV or wind generation facilities which is currently witnessing a massive adoption internationally.

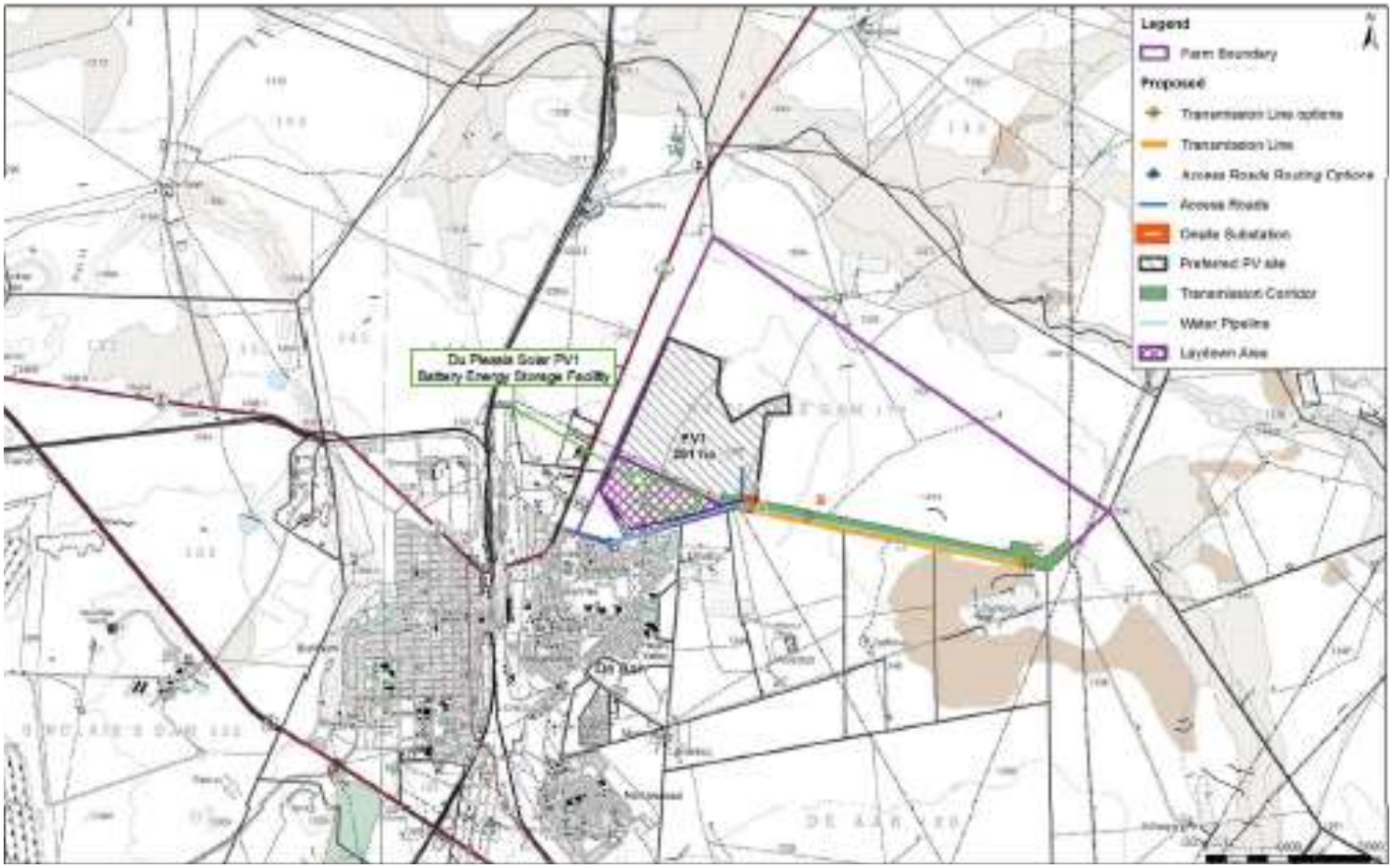
Lithium ion battery storage technology has the most appropriate properties and characteristics that meet the stringent requirements of the System Operator, as well as offering rapid construction, declining costs, and an energy tariff that does not burden the end user when stabilising intermittent renewable energy generation.

1.4 Site Selection Process

Selecting the best site for a development forms an integral part of all EIA processes. In the case of this project, the following is applicable:

Authorised areas

The BESS site will be situated within the laydown area which was assessed and authorised as part the Du Plessis Dam PV1 EIA application. An extensive site selection process for the authorised Du Plessis Dam PV1 project was conducted during the EIA process and the best alternative site was authorised. It is logical to place the BESS within the already assessed and approved footprint of the PV project.



The Du Plessis Dam solar PV site and the laydown area site positions as authorised within the property boundaries of the Remainder of the Farm Du Plessis Dam No 179 in De Aar

BESS Site Selection

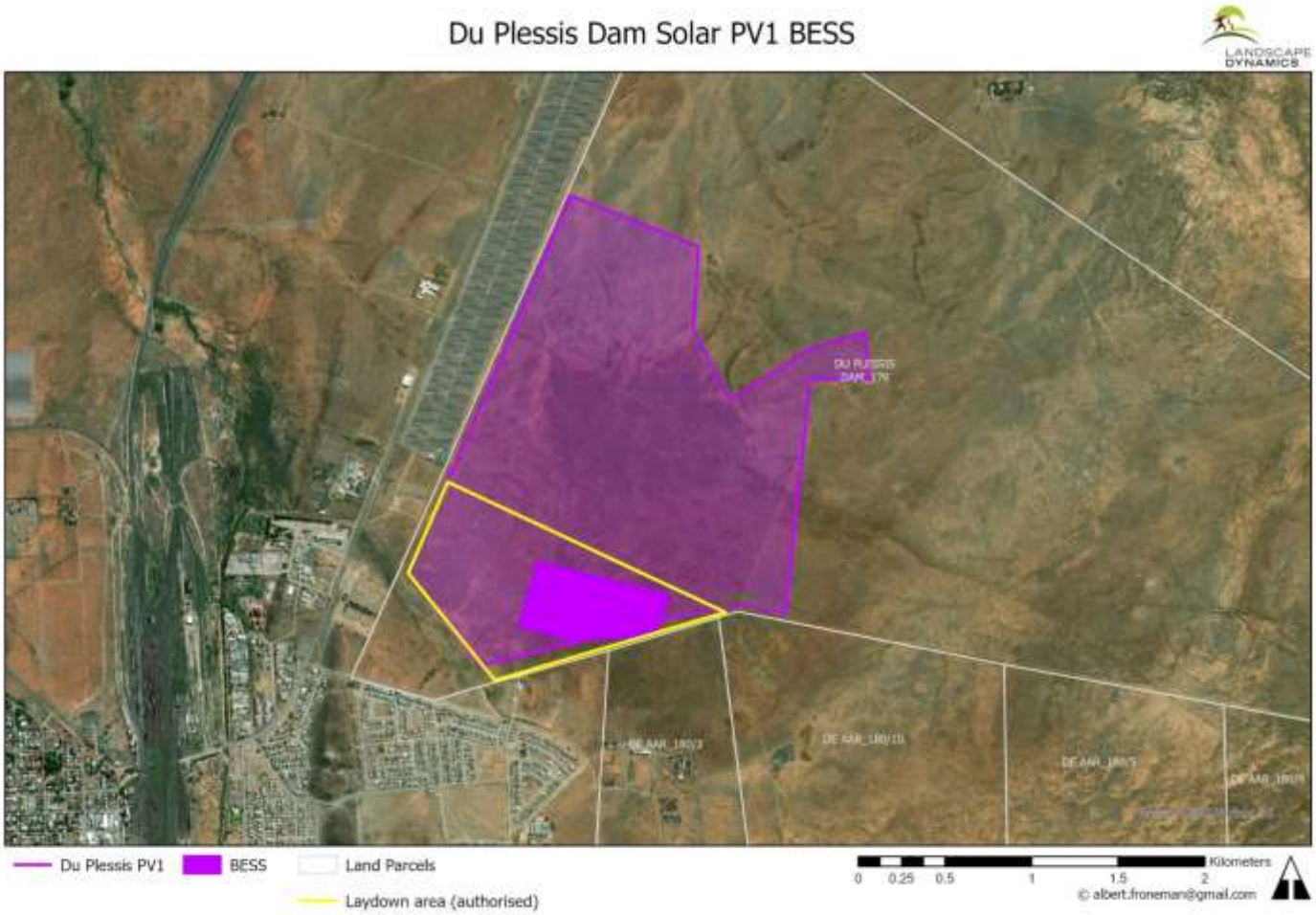
The laydown area is an obvious area to use for the BESS site because

- it is already authorised and therefore the site already underwent a thorough site selection process;
- it is already authorised and therefore the site already underwent thorough specialist assessment;
- it will not impact on the generation capacity of the PV plant; and
- it is situated in close proximity to the already authorised substation site; thereby addressing the technical requirement in the most effective manner.

The specialist studies further guided the site selection process. The specialists who conducted the respective studies for this project confirmed that the proposed BESS site will not cause significant additional impact when situated within the laydown area at the sites as proposed. Where required, additional mitigation measures were provided.

Conclusion of Site Selection Process

There are no site specific attributes that should specifically be avoided and no additional mitigation measures are proposed that could influence the position of the proposed site.



CHAPTER 2: NEED AND DESIRABILITY

2.1 Need and Desirability

2.1.1 Need

The following information was obtained from the document *Technical Engineering Report-Battery Energy Storage Systems: Analysis of the current state of electrical energy storage systems*, dated 5 August 2020 (Morse, WJ. 2020) compiled by Mulilo Renewable Projects Development (Pty) Ltd and is attached as Appendix B.

Since solar and wind technology depend on whether the sun is shining or the wind is blowing respectively, these technologies can only address the demand when these sources are available. There is a growing need for renewable energy technologies, such as solar and wind, to be able to supply a reliable source of electricity to the grid. This more variable power generation pattern has significantly increased the need for flexibility in the electricity grid.

Battery Energy Storage systems allow for fluctuating renewable energy sources to be utilised in a dispatchable manner, much like conventional thermal based generation systems. They also provide a means to de-couple generation of electricity from its use (i.e. provide electricity to the grid during peak demand in evenings) and therefore minimise supply and demand related issues.

Ultimately, energy storage can contribute to better use of renewable energy in the electricity system, lower cost of the overall energy mix and reduce harmful emissions since it can store clean renewable energy during low demands and replace fossil fuel based peaking stations usually limited to only high demand periods due to running costs.

The need for the project can further be explained by means of the South African **Integrated Resource Plan (IRP)**. The IRP is an electricity roadmap that aims to accurately forecast the country's electricity demand and how this demand will be met in a cost-effective, environmentally sustainable manner whilst facilitating poverty alleviation. It has been suggested that the adoption of electrical Battery Energy Storage System (BESS) technologies could provide a cost-effective way of improving South Africa's electricity mix.

The IRP was gazetted by the Minister of Mineral Resources and Energy, Mr Gwede Mantashe, on 18 October 2019, updating the energy forecast for South Africa from the current period to the year 2030.

In summary, it is an electricity capacity plan which aims to provide an indication of the country's electricity demand, how this demand will be supplied and what it will cost. The IRP 2019 further states the following on renewables and energy storage:

- "South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. The extent of decommissioning of the existing coal fleet due to end of design life, could provide space for a completely different energy mix relative to the current mix. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity. "
- "Renewable Energy: Solar PV, and wind present an opportunity to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Renewable technologies also present huge potential for the creation of new industries, job creation and localisation across the value chain. "
- "Energy Storage: There is a complementary relationship between Smart Grid systems, energy storage, and non-dispatchable renewable energy technologies based on wind and solar PV. The traditional power delivery model is being disrupted by technological developments related to energy storage, and more renewable energy can be harnessed despite the reality that the timing of its production might be during low-demand periods. "
- "Storage technologies, including battery systems, are developments which can address this issue, especially in the South African context where over 6 GW of renewable energy has been introduced, yet the power system does not have the requisite storage capacity or flexibility."

2.1.2 Desirability

The following tables address further issues as highlighted in the DEFF Need & Desirability Guidelines (2014).

Is this project part of a **national programme** to address an issue of national concern or importance?
The development was initially planned to be tendered into the REIPPP but is now being targeted for the Risk Mitigation Independent Power Producer Program RMIPPP which has been declared a strategic Infrastructure Program (SIP).
Do location factors favour this land use (associated with the development proposal) at this place? (This relates to the contextualisation of the proposed land use on the proposed site within its broader context.)
The proposed BESS development is perfectly situated because • *It is directly adjacent to the area where the electricity will be generated and* • *The site was thoroughly assessed by applicable specialists during the EIA process for the solar PV farm*

Will the development proposal or the land use associated with the development proposal applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?

The BESS proposal was assessed by the following specialists:

- *Ecologist*
- *Aquatic specialist*
- *Ornithologist*
- *Heritage consultant*
- *Visual impact specialist*
- *Consulting engineer (stormwater)*
- *Chemical engineer (high level risk analysis)*

It was concluded that all impacts can be mitigated to acceptable levels and that the project could go ahead on condition that the Environmental Management Programme (EMPr) (attached as Appendix E) should be implemented at all times.

Will the development impact on people's health and well-being (*e.g.,* in terms of noise, odours, visual character and 'sense of place'*, etc.*)?

Dust and noise will be created during the construction phase but mitigation measures are in place to minimise these temporary impacts. The development is situated on rural farm land which lowers the significance of impact associated with noise and dust.

The proposed BESS development will alter the visual character and sense of place in a negative way, but when seen in context with the, directly adjacent, authorised 75MW PV plant the addition of the BESS will be acceptable in terms of visual impact.

Is the development the best practicable environmental option for this land/site?

The, 'environment' should be seen as the sum total of one's surroundings, which include the natural, social and economic environments. Taking all constraints into account, the development as proposed underlines the principles as advocated by the term 'triple bottom line' (people, planet, profit) and this development proposal is in support of the goals of economic, social and ecological integration and sustainability.

What will the benefits be to society in general and to the local communities?

The BESS project will contribute to, amongst others, energy security and blackout relief, benefiting the entire South Africa. Temporary and permanent employment opportunities will be created and the work force will as far as possible be sourced from the local communities.

Will the benefits of the proposed land use/development outweigh the negative impacts of it?

Negative impacts associated with the proposed development could be mitigated to levels that will be acceptable within the receiving environment. The positive impact of energy security, blackout relief, increase capacity, reduction in the need to use diesel and other fossil fuels for peaking and baseload power far outweighs the negative impact that this project could have.

Describe how the **general objectives of Integrated Environmental Management** as set out in Section 23 of the NEMA have been taken into account:

Current procedures and/or organisational structures are not necessarily achieving integrated decision-making and/or co-operative governance and, as a result, there is a failure to properly achieve the objectives of IEM as set out in Section 23 of NEMA. EIA's however often focus on the immediate harm a project will cause rather than any benefits it might create in the long term to sustainable development.

The stated objectives of Section 23 are to ensure integrated decision-making and co-operative governance so that NEMA's principles and the general objectives for integrated environmental management of activities can be achieved. The goals are to

a) promote the integration of the principles of environmental management set out in section 2 into the making of all decisions which may have a significant effect on the environment;
b) identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in section 2;
c) ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them;
d) ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;
e) ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment; and
f) identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2.

For this project the following actions were taken to reach the general objectives of Integrated Environmental Management as set out in Section 23 of NEMA:

a) *Applicable environmental, economic and social aspects have been assessed, thereby ensuring an integrated approach in order to balance the needs of all whom would be affected by this development.*
b) *Mitigation measures have been supplied in the EMPr in order to ensure that all identified impacts are mitigated to acceptable levels.*
c) *The EA amendment proposal has to be evaluated and approved by DEFF and no construction may commence prior to the issuing of the Environmental Authorisation.*
d) *The procedures which are followed during the public participation programme are based on the NEMA EIA Regulations 2014, as amended.*
e) *DEFF will take all information as represented in this report into consideration and may request further information should they feel that further studies/information is required before an informed decision can be made.*
f) *The project team (inclusive of the specialists) is confident that the mitigation measures as supplied in the EMPr are reasonable and will be the best way to manage anticipated impacts.*

Describe how the principles of environmental management as set out in Section 2 of the NEMA have been taken into account

Chapter 2 of NEMA provides a number of principles that decision-makers have to consider when making decisions that may affect the environment, therefore, when a Competent Authority considers granting or refusing environmental authorisation based on an Environmental Impact Assessment, these principles must be taken into account.

The NEMA principles with which this application conforms are described as follows —

1. *Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.*
2. *Development must be socially, environmentally and economically sustainable.*
3. *Sustainable development requires the consideration of all relevant factors.*

The social, economic and environmental impacts of activities, including disadvantages and benefits, were considered, assessed and evaluated, and informed decision-making by the authority is hereby made possible.

CHAPTER 3: ADVANTAGES AND DISADVANTAGES

3.1 Advantages associated with the BESS

The main advantage of a BESS as an ancillary facility to a renewable energy generation project, the Du Plessis Dam PV1 solar plant, is obvious in terms of long term impact on the environment, as much less pressure on non-renewable energy sources will occur.

The following information was obtained from the document *Technical Engineering Report-Battery Energy Storage Systems: Analysis of the current state of electrical energy storage systems*, dated 5 August 2020 (Morse, WJ. 2020) compiled by Mulilo Renewable Projects Development (Pty) Ltd and attached as Appendix B.

A Battery Energy Storage System (BESS) is a set of technologies which aim is to decouple energy generation from demand. The systems allow for excess electricity to be "stored" and released during periods of high electricity demand, providing cost-saving opportunities to consumers, and ensuring a steady and safe electricity supply.

BESS are flexible and can be used in many different ways, from ensuring energy security to blackout relief, all the way to energy arbitrage. Specifically, the adoption of energy storage could offset the need to use diesel and other fossil fuels for peaking and baseload power, provide backup power for commercial and industrial operations during blackouts, and increase the capacity of South Africa's electricity grid to successfully integrate renewable electricity generation sources, especially intermittent power sources such as solar and wind.

By adopting BESS on a commercial scale, the System Operator can decrease its energy imports, improve the efficiency of the energy system, and keep prices low by better integrating variable renewable energy sources.

Based on both a global shift to this form or supply mix as well as the critical state of the South African electrical supply, incorporating BESS into renewable energy developments offers a unique solution which addresses one of the country's most critical issues, being an electricity supply deficit, that is preventing solutions urgently needed in all post COVID-19 economic recovery plans.

Bulk Energy Services are supplied by the BESS and can be describe as follows:

Time-shifting of electric energy (arbitrage)
Energy is stored at times of the day when electricity is in less demand and therefore less valuable (typically during night time hours) to allow the subsequent production and sale of electricity to the market at peak times when it is more valuable.

Schedulable Capacity
Stored energy is used to meet generation requirements during peak electricity consumption hours allowing grid operators and utilities to meet demand while incrementally deferring or reducing the need for new generation capacity.

Re-dispatch (> 15 min reserves)
Stored energy is used to serve load immediately in response to an unexpected contingency event, such as an unplanned generation outage or increased demand for periods longer than 15 minutes.

Other applications include Ancillary Services (frequency and voltage support, bottleneck management / congestion relief and back-start capabilities) Grid infrastructure (transmission and distribution upgrade deferrals) and Customer Energy Management Services (power quality and reliability as well as energy and demand charge management).

In summary, the BESS will allow the approved PV project to be more reliable and efficient, thereby assisting the project to provide clean renewable power to the electricity mix, thereby reducing the use of carbon-based non-renewable electricity and thus ultimately assisting in mitigating the negative effects of climate change.

3.2 Disadvantages / risks associated with the BESS

From an environmental perspective, the proposed amendment to include BESS in the project description of the already authorised PV plant will have very few disadvantages/risks. The specialists' studies obtained have shown that the BESS will not result in any new impacts (apart from a new low visual impact) that were not already assessed in the EIA for the solar PV plant. The only potential disadvantages or risks, relate more to potential safety risks.

The information below was derived from the *Safety Health and Environmental Risk Assessment* undertaken for this project by ISHECON Chemical Process Safety Engineers. The study is attached as Appendix C7.

Risks associated with the proposed BESS

- The most significant hazard with battery units is the possibility of thermal runaway and the generation of toxic and flammable gases.

- This type of event also generates heat which may possibly propagate the thermal runaway event to neighbouring batteries if suitable state of the art technology is not employed.
- The flammable gases generated may ignite leading to a fire which accelerates the runaway process and may spread the fire to other parts of the installation.
- If the flammable gases accumulate within the container before they ignite, they may eventually ignite with explosive force.
- Due to a variety of causes, thermal runaway could happen at any point on route to the facility, during construction or operation / maintenance at the facility or during decommissioning and safe-making for disposal.
- Due to the containerised approach as well as the separation between containers and therefore the likely restriction of events to one container at a time, the main risks are close to the containers i.e. to transport drivers, employees at the facilities and first responders to incidents.
- In terms of a worst conceivable case container fires, the significant impact zone should be limited to within 10m of the container and mild impacts to 20m. **Impacts in the public areas of De Aar are not expected.**
- In terms of a worst conceivable case explosion, the significant impact zone should be limited to with 10m of the container and minor impacts such as debris within 50m. **Impacts in the public areas of De Aar are therefore not expected.**
- In terms of a worst reasonably conceivable toxic smoke scenario, provided the units are placed suitably far apart to prevent propagation from one unit to another and large external fires are prevented, the amount of material burning should be limited to one container at any one time. In this case, beyond the immediate vicinity of the fire, the concentrations of harmful gases within the smoke should be low. **Therefore, the risks posed by the BESS to the residential areas of De Aar are negligible**

Regarding the disadvantages as mentioned above, the Risk Assessment concluded that the latest international standards (IEC, UL NPA etc.) for battery designs include **many preventative and mitigation measures to reduce these risks to tolerable levels**

The risk assessment concluded that with suitable preventative and mitigation measures in place none of the identified potential risks are high, i.e. from a SHE perspective no fatal flaws were found with the proposed BESS installations at De Aar.

CHAPTER 4: SPECIALIST INPUT

4.1 Specialist studies: Amendment Letters

The specialists mentioned below conducted the studies during the EIA process for the 75MW Du Plessis Dam Solar Photovoltaic PV1 Energy Plant. Since the proposed BESS site falls within the authorised laydown area, the specialists were requested to compile amendment letters with the following Terms of Reference:

- Compile a statement confirming if additional impact that was not assessed in the original studies is foreseen and if so, to provide mitigation measures for inclusion in the EMPr – keeping in mind that the BESS will be constructed within the authorised (and therefore assessed) laydown area. However, the laydown area would only be used during the construction period so the impact would have been temporary but, with the new BESS the impact will be permanent.
- Provide a new impact rating, if required, considering the additional BESS component.

4.1.1 Avifauna

An amendment letter was compiled by Mr Andrew Jenkins from Avisense Consulting and is attached as Appendix C1. A summary thereof follows below.

The inclusion of the BESS equipment will increase the destructive footprint by about 7% and may add marginally to the disturbance impacts associated with both construction and operation of the plant. However, noting that the final approved development area covered by the existing authorisation is about 60% smaller than the area assessed in the corresponding bird impact study, any changes in the impact profiles of the development is effectively rendered negligible.

In conclusion, there is no need to amend the currently applicable bird impact ratings and there are no additional mitigation requirements to add to the existing EMPr.

Note that post-construction monitoring of birds should be done to complement the pre-construction avifauna work already completed, to fully document the actual impact of the two developments and to improve our general understanding of the impacts of solar PV plant construction and operation on local bird populations. *Note from EAP: Post-construction bird monitoring stipulations are included in the existing EMPr.*

4.1.2 Aquatic

An amendment letter was compiled by Ms Toni Belcher from BlueScience (Pty) Ltd and is attached as Appendix C2. A summary thereof follows below.

Aquatic Biodiversity Combined Sensitivity

The wider area in which the site is located is considered of 'Very High Aquatic Biodiversity Combined Sensitivity'. This is due to the fact that the area is considered a Strategic Water Source Area for groundwater (De Aar Region) as well as the Freshwater Ecosystem Priority Areas (FEPAs) and the Critical Biodiversity Area (CBAs) that have been identified along the larger Brak River and its tributary draining northwards from De Aar.

There are no FEPA Wetlands mapped in the immediate area of the proposed BESS. FEPA Wetlands are only mapped along the Brak River more than 4 km to the north of the proposed BESS that are unlikely to be impacted by the activities.

Findings of previous studies

Below are the findings of the previous freshwater impact assessment undertaken for the site:

The Brak River tributaries within the study area were considered to be in a largely natural ecological state, with a low ecological importance and sensitivity. The expected impacts of the then proposed activities were:

- *Solar energy facility* will result in some modification of a few minor freshwater features/drainage lines on the site.
- *Overhead transmission lines/corridors* will cross two minor freshwater features/drainage lines.
- *Substations* - The Central substation as well as PV1 and possibly PV2 substations are located at least 75m outside of the wide depressions that are indicated as freshwater features/drainage lines.
- *Access routes and water pipeline* will cross the two drainage channels crossed by the transmission lines.
- *Laydown camp:* The laydown camp was located outside of any identified freshwater features therefore the impact on freshwater features is very low for this component. This is the area currently proposed for the BESS.

Consideration of the Aquatic Ecosystems likely to be impacted by the proposed BESS

A minor watercourse that drains into the tributary of the Brak River that drains northwards from De Aar is located approximately 250m to the south-west of the BESS site.

At the time of the original freshwater assessment in 2012, this feature was no more than an ephemeral drainage channel that originated from the Kareenville sports facilities in the north-eastern extent of the town and drained in a north-westerly direction to join a tributary of the Brak River that drains through the town and past the wastewater treatment works before discharging

into the Brak River. Subsequent to that assessment, this drainage feature has been subject to long term spillage of sewage that has created artificial wetland like characteristics in the drainage feature. Should the spillage be repaired, the feature is highly likely to return to a dry drainage channel.

The current ecological condition of the drainage feature, largely as a result of the long-term sewage spillage (since 2013), is considered to be in a severely modified ecological condition and is of low ecological importance. It is highly unlikely that the proposed activities that are more than 200m away from the drainage feature would result in any change to the bed, banks, course or characteristics of the watercourse (Section 21(i) water use), nor will it impede or divert flow in the watercourse (Section 21 (c) water use). For this reason, the proposed activity is not deemed to pose a risk of impacting on the current ecological condition of the watercourse and is not deemed a water use activity.

Mitigation measures proposed

Due to the fact that the proposed BESS site is located within the footprint of the original proposed development area assessed, the potential impacts and the recommended mitigation measures contained in the original assessment would apply to the Battery Energy Storage System.

The proposed activity, provided the recommended mitigation measures are complied with, will not result in any increase in the potential cumulative impact to the aquatic ecosystems in the area. Of particular importance is the need to undertake adequate stormwater management at the BESS site to ensure that there is no stormwater runoff intensity or water quality impacts to the adjacent drainage feature.

Note from EAP: Mitigation measures are included in the EMPr as submitted during the EIA phase. These include stormwater management measures provided by the hydrologists of Zutari (included in Appendix C4 and also addressed in Paragraph 4.4 below) to address increased run-off associated with the new BESS structures.

Conclusions and Recommendations

The proposed BESS is not likely to result in any increase in impact to the adjacent aquatic ecosystems to that already assessed for the original approved Solar PV Energy Facilities, which was deemed to be very low. The closest aquatic feature is a minor ephemeral drainage feature more than 250m to the south-west of the site. This drainage feature is in a highly degraded ecological condition as a result of long-term sewage spillage that has taken place in the feature since 2013.

The proposed activity is highly unlikely to impact on this drainage feature. As such the proposed activity is thus not considered a water use and it is my recommendation that it does not require any water use authorisation. In addition, the proposed activity will not result in the potential cumulative impact to the aquatic ecosystems in the area.

4.1.3 Heritage

An Amendment Letter was compiled by Mr John Gribble from ACO Associates and is attached as Appendix C3. A summary thereof follows below.

The integrated Heritage Impact Assessment (HIA) considered archaeological heritage resources, the historical built environment, cultural landscapes, scenic routes, sense of place and graves.

FINDINGS OF THE HIA CONDUCTED IN 2013

Archaeology
The HIA recorded the presence of the following archaeological sites and materials on the farm Du Plessis Dam:

- A widespread occurrence of pre-colonial archaeological material across the farm, the bulk of which were low density scatters of mainly Middle Stone Age (MSA) artefacts that are of little or no significance and which were not recorded;
- Sites of greater archaeological value, worthy of mitigation, included:
    - Two dense scatters of MSA lithics; and
    - Several scatters of Later Stone Age (LSA) stone artefacts, the most significant of which contained burnt bone fragments and may have some depth of archaeological deposit to it. With excavation, the site may yield temporal data. With one exception, all the LSA scatters were either on top of low rises or else along the base of a rocky ridge.
- A patch of ground bedrock, a rare and possibly unique archaeological feature in the De Aar area, which is the result of people using another stone to grind some sort of material, perhaps seeds or ochre;
- A number of historical archaeological sites, in some cases overlapping with LSA sites on areas of high ground and usually associated with low packed stone features. The frequent presence of gun cartridges suggests that many of these historical sites relate to the South African War. While none are particularly important, they add to our understanding of the war and the defence of the railway junction at De Aar in that they demonstrate that almost every low hill in the area was likely to have been used at some point during the war as a look out station; and
- A ruined historical farmstead and dump associated with a spring. This complex of sites was assessed by the HIA to be the most significant site recorded on Du Plessis Dam.

Built Environment
The HIA identified the ephemeral stone features covered under archaeology above as the only "built" items that might be directly impacted by the proposed PV facility.

No buildings will be directly affected, and no highly significant buildings were noted in the study are that could be subject to indirect (visual) impacts.

Cultural landscapes

The HIA assessed the landscape around De Aar and on Du Plessis Dam to be only minimally altered by humans. It noted that De Aar lies immediately alongside the proposed PV facility but concluded that although the facility would pose a negative visual impact to the context of the town, the part of town being impacted is entirely modern.

The many small scatters of artefacts related to the South African War were assessed to be an archaeological cultural landscape because it is was landscape features that conditioned the placement of these sites. The HIA concluded, however, that far more significant South African War sites are known from across the Karoo and that the impacts of the proposed PV facility on this aspect of the cultural landscape were not significant.

Scenic Routes and Sense of Place

The landscape around De Aar is one of great natural beauty and has a very distinctive character: wide-open grasslands punctuated by typical flat-topped Karoo hills. Any road traversing the area can be considered a scenic route. The addition of solar panels (with an industrial character) to a predominantly natural/rural landscape will alter the sense of place and result in a loss of context. The HIA found, however, that the presence of other renewable energy facilities in the area – both constructed and planned - will produce a new cultural landscape with an industrial character.

Graves

No unequivocal graves were located during the field assessments for the HIA but a few suspicious mounds of rocks were noted in places, particularly at the very tail end of the old dam where two, or possibly three, elongated mounds of stones aligned east-west were recorded. The HIA stressed that pre-colonial graves are often completely unmarked and can be located anywhere where the soil is suitable for digging a grave.

Assessment of impacts

The HIA made the following assessment of impacts on heritage resources:

- Archaeological sites with research value were located in two main areas: along the dolerite ridge that runs from northwest to southeast across the western part of the farm and on the low ridge in the north-eastern corner of the farm.
- The HIA significance ratings for sites in this area were thus elevated in the HIA and mitigation measures were proposed.
- Impacts to the cultural landscape would be experienced during construction and operation but then, with rehabilitation, would revert to the status quo (assessed as the No-Go alternative) after decommissioning; and
- The possible graves, although all located outside of the proposed Alternative 1 development area, were within the transmission line corridors for Alternatives 1 and 2 and would need to be avoided to ensure no impacts. Alternatively, they would need to be tested, as appropriate.

The following heritage mitigation measures were proposed:

- Where archaeological sites cannot be avoided, mitigation in the form of excavation and collection of artefacts should be carried out;
- The historical homestead and all surrounding features and artefacts must be avoided (this site is too significant to be effectively mitigated in a commercial context);
- If any human remains are encountered during the development, they should be cordoned off and protected from further harm until they can be inspected and removed by an archaeologist under a permit issued for that purpose; and
- Once the exact lines have been identified for the linear components of the project, they should be examined from the desktop then subjected to a walk-down if deemed necessary.

Heritage Specialist Impact Statement

The authorised extent of PV1 excludes the important historical farm complex identified in the HIA, but the LSA scatters and the historical 'look out' sites possibly associated with the South African War on the rocky ridges are within the authorized boundary of the facility. None of these sites, however, are located in the area proposed for the installation of the BESS.

The installation of the BESS will occasion no changes to the identified impacts of the Du Plessis Dam Solar PV 1 facility on archaeology, the historical built environment or graves, provided the mitigation measures recommended in the HIA are implemented. *Note from EAP: Reference is made to the mitigation measures as supplied in the HIA as submitted during the EIA phase.*

With regard to cultural landscape, scenic routes and sense of place, although the BESS will be installed close to the urban edge of De Aar, the 25m stacked height of the unit has the potential to have a marked visual impact within the surrounding landscape which is largely flat and featureless in this area.

It is our assessment that the impact significance of the installation of the BESS to its maximum height is medium (negative). If, however, the units can be installed without stacking, the impact significance cultural landscape, scenic routes and sense of place of the installation of the BESS and the project as a whole will remain at low (negative), as assessed in the HIA. *Note from EAP: The stacking height of 2 containers is 10m and not 25m as stated by the heritage consultant. The stacking height will not exceed 10m so stacking would be acceptable a cultural perspective. Recommendations as made in the Visual Impact Assessment are included in the updated EMPr.*

If the mitigation measures recommended in the HIA and in this Impact Statement are implemented, the overall impact of the installation of the BESS on heritage resources is tolerable and generally of low significance.

From a heritage resources perspective, therefore, the proposed amendments are considered acceptable.

4.1.4 Stormwater Management Plan

An Amendment Letter was compiled by *Zutari (previously Aerocon) (Mr Martin Kleynhans)* and is attached as Appendix C4. A summary thereof follows below.

The original study indicated that there would be increases in runoff due to the proposed solar development. The increased runoff and erosion potential can be mitigated by using multiple stormwater outlets, energy dissipaters and attenuation (detention) ponds if necessary. However, it should be noted that once a detailed survey and design of the stormwater infrastructure has been undertaken there may be a need for on-site attenuation of the flood peak for the volume that exceeds the predevelopment flow especially where increased runoff in the downstream watercourse could cause excessive erosion, impact downstream dwellings, sensitive ecological areas, road and railway crossings and other infrastructure.

Presumably the BESS platforms will be gravelled or paved with an appropriate storm water drainage system included, so that the batteries can be housed and maintained in an orderly fashion. Hence the permeability of the BESS platforms will be lower, and the runoff higher, than that of the equivalent solar PV area which would have been constructed on the in-situ soil.

The previous study estimated that the runoff coefficient (Rational Method C-value, which defines the proportion of the rainfall that will runoff during the design storm causing the flood downstream) for the 1:5 year return interval event, would be 0.14 for the predevelopment state while the runoff coefficient for the sites developed with solar panels would be 0.23. For the 1:20 year return interval, the C- value for the predevelopment state of the sites was estimated to be 0.16 and for the development with PV panels the C-value varied to a value as high as 0.33.

If the BESS platform area is surfaced with compacted gravel or paved, then the runoff coefficient is expected to increase to a value of the order of 0.75. This suggests an increase in the runoff peaks by a factor of about five over the predevelopment state, and by a factor of between two and three for the alternative development state with PV panels. Thus, a significant increase in runoff peaks compared to the predevelopment state can be expected; an increase which will also be larger than if the same area had been developed with solar PV panels.

The increased peak runoff could cause erosion, impact dwellings, sensitive ecological areas, road and railway crossings and other infrastructure downstream. But this impact can be fully mitigated to any desired return interval through the inclusion of the measures detailed in the original hydrology reports including attenuation (detention) ponds, the design of which can be undertaken during the detailed design phase and which can be used to reduce the peak runoffs back to the predevelopment levels at the desired flood return interval before they exit the site.

Therefore, the proposed amendment would have a marginal effect on the impact profile from a stormwater runoff perspective, a review of the assessment is deemed to not be required and the proposed amendment would not materially change the impact rating for the development.

4.2 Specialist studies: Impact Assessments

4.2.1 Ecological Assessment

An Ecological Assessment was undertaken by *Botaneek (Mr Nick Helme)* and is attached as Appendix C5. A summary thereof follows below.

Study area and regional context

The study area lies within the Nama Karoo bioregion and the vegetation type throughout the area is Northern Upper Karoo, which covers vast parts of the central Karoo region. The Nama Karoo bioregion has a moderately distinct but rather species poor flora, with few regionally endemic plant species, and relatively very few plant Species of Conservation Concern, thanks partly to very low levels of habitat loss to agriculture, mining and urban development.

No Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) or Other Natural Areas (ONAs) are mapped in or close to the study area.

Sensitivity and overview of the vegetation

The Northern Upper Karoo vegetation type is classified as a **Least Threatened** habitat on a national basis. This vegetation type is one of the most widespread vegetation types in the country and is relatively homogenous throughout its vast range, with a low number of vegetation type endemics and very few plant Species of Conservation Concern. The vegetation unit is thus not considered to be a national conservation priority. The vegetation on site is in fairly good condition, although heavily grazed in parts. There is a footpath crossing the site, leading to and from the dolerite outcrop. No plant Species of Conservation Concern (SoCC) nor Protected species were recorded on site, and none are likely to be present.

The entire site is deemed to be of **Medium Botanical Sensitivity**. Key informants of this assessment include the Least Threatened nature of the vegetation unit, its widespread extent, the intact nature of the vegetation, and the lack of any plant SoCC.

Terrestrial fauna

Based on the habitat on site it can be concluded that the vertebrates are likely to be representative of the region in general. Given the relatively small site and the homogenous nature of the habitat few vertebrates are likely to be resident, but various species may cross the site or use it for foraging. There are no permanent wetlands or rocky outcrops – habitats which would notably increase the vertebrate diversity and sensitivity. Two possible threatened mammals may cross the site on occasion – Cape Fox and Black Footed Cat, but these are very unlikely to be resident, and even less likely to be impacted by the proposed BESS as both are highly mobile and will move off when disturbance commences.

Overall terrestrial faunal sensitivity is likely to be **Medium**.

Impacts

Construction phase impact

- Permanent loss of all natural vegetation within the site development footprint
- Temporary disturbance (<5 yrs) of natural vegetation adjacent to the building footprints

- Minor populations of certain animals (termites, ants) may be lost within the development footprint, but no vertebrates are likely to be permanently lost within the development footprint.
- Significance of this loss is Low negative before and after mitigation.
- No plant or terrestrial animal Species of Conservation Concern are likely to be impacted or lost.
- No loss of mapped CBAs will occur.
- The extent of the ecological impact is deemed to be local and regional.

Primary operational phase botanical impact

- Habitat fragmentation
- Disruption and minor loss of current ecological connectivity across the development footprint areas.
- A secondary operational phase impact is the spread of alien invasive vegetation, facilitated by the soil disturbance caused by construction.

- Loss of ecological connectivity in the study area and associated habitat fragmentation as a result of the proposed development will occur, but is unlikely to be a major ecological issue in the region, as the development footprint is relatively small and very large areas of similar habitat will remain undisturbed in the region and nearby. This impact is likely to be Low negative before and after mitigation.
- The soil disturbance caused by construction is likely to facilitate the spread of alien invasive vegetation in and around the development areas, but the significance of this is Low negative before mitigation and Very Low negative after mitigation, as the magnitude of the invasion is likely to be low.
- On balance the likely operational phase impacts of the proposed development are Low negative before and after mitigation.

Mitigation

Note from EAP: The mitigation proposed in this ecological assessment, namely the removal of alien invasive species has been included in the EMPr during the original EIA process.

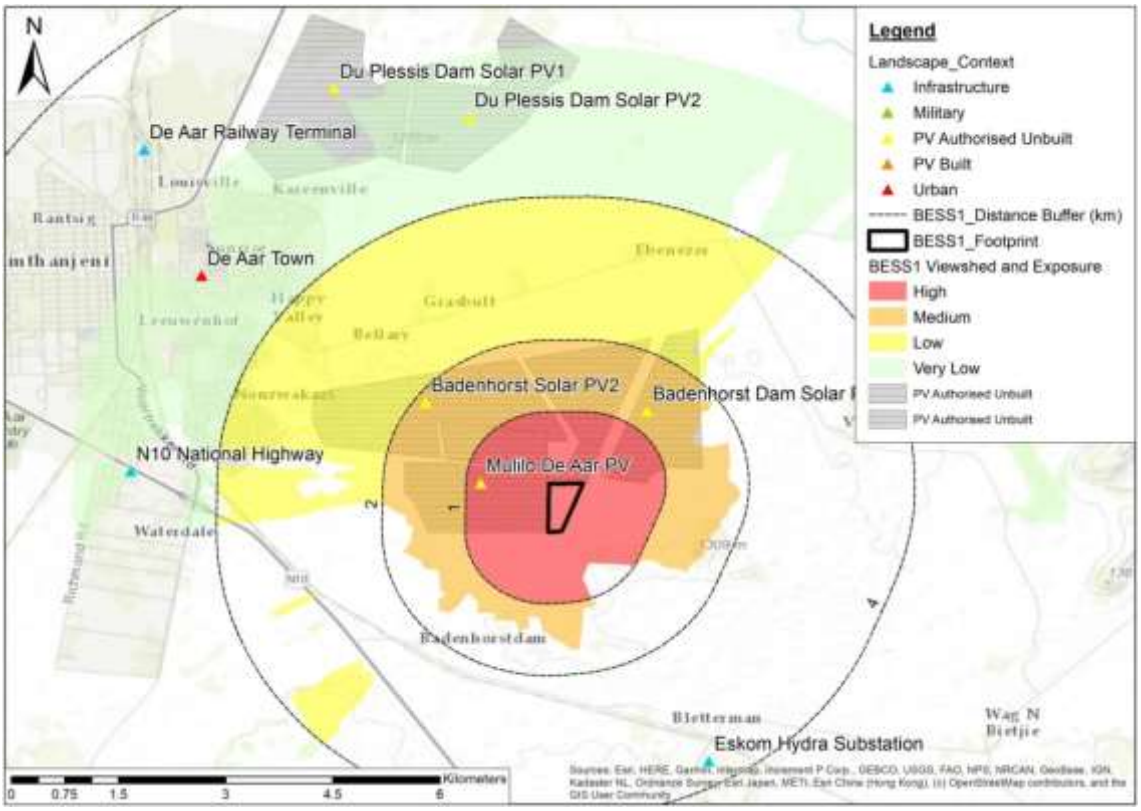
Conclusion

The proposed development would have a Low negative botanical and faunal impact before and after mitigation.

4.2.2 Visual Impact Assessment

A Visual Impact Assessment (VIA) was undertaken by *VRM Africa (Mr Steven Stead)* and is attached as Appendix C6. A short summary thereof follows below.

Project Zone of Visual Influence

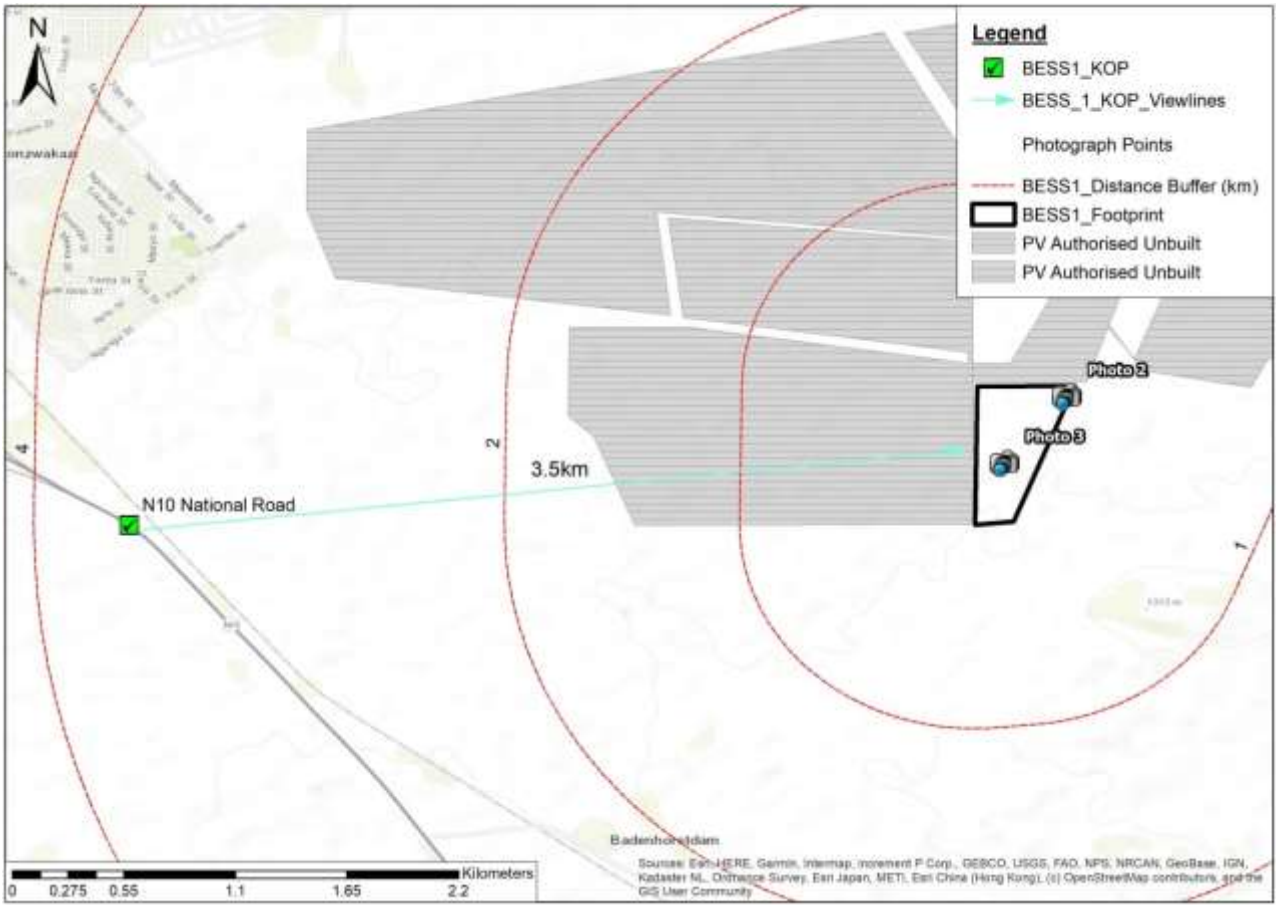


The map above reflects the extent of the viewshed, divided up into categories that indicate the **visual exposure** to the property. Due to the flat terrain surrounding the site, the High Exposure area affords clear visibility from all portions of land surrounding the site. This area is most likely to experience some change to the landscape character, where clear views of the landscape change will take place at a size and scale that will dominate the attention of the casual observer. The landuse in this area is farming and has no receptors. The Medium Exposure area also extends around the site due to the flat terrain, but with the higher ground to the southeast starting to reduce visibility. This area is also rural agricultural and affords no receptors. The yellow area in the map depicts the viewshed with Low Exposure. This area is shaped to the north due to higher terrain restricting views to the south. Receptors within this area would include residents of Nonzwakazi to the west and Bellary to Ebenezer to the north, as well as the N10 National Highway.

The **Zone of Visual** Influence is defined as Medium as some expansion of the visibility will be created by the flat terrain in the wide valley. The **visual absorption capacity (VAC)** is currently low due to the lack of development of the property and the agricultural landuses. However, the site is surrounded by an authorised PV project and once constructed, will result in a significant change to the surrounding landscape context and as such the VAC is rated as High (i.e. the receiving landscape is able to visually absorb the proposed BESS landscape change in the near future).

Receptors and Key Observation Points (KOPs)

KOPs are defined as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed.



Name	Km	Zone	Exposure	KOP	Motivation
N10	3km	Middle ground	Medium	Yes	Receptors making use of the N10 are approximately 3.5 km from the site and will have Medium exposure to the landscape modifications, potentially influencing the local sense of place.
Nonzwakazi informal settlement	3km	Middle ground	Medium	No	The project is located approximately 3.5km from the Nonzwakazi informal settlement. The built nature of the local urban sense of place is likely to limit receptor sensitivity to landscape change.

Scenic Quality Assessment

The dominant landscape was rated for Scenic Quality and was rated Medium-Low as a visual resource. The grasslands do add to the rural agricultural sense of place, but the adjacent power line corridor detracts from the local sense of place.

Receptor Sensitivity Assessment

The site is remote with no close proximity receptors. The urban nature of the De Aar receptors located 3km to the west is likely to reduce their sensitivity to landscape change.

Visual Resources Management Classes

The Visual Inventory for this BESS project is rated Class IV. This means that best practice in visual design should be incorporated into the landscape change to ensure that the new landscape change does not detract from the (currently) surrounding rural agricultural landscape context.

Conclusion

The visual impact of this proposed development must also be assessed in the context of the other renewable energy projects within the De Aar area that are in various stages of approval. De Aar has some of the highest renewable energy resource levels in the world, with good existing road infrastructure and accessibility to the national grid. The area surrounding the proposed BESS site to the north, west and partially to the south, has been authorised for the development of PV. The semi-industrial nature of the landuse to the southeast of the BESS currently degrades the sense of place for the local residents along Wilger Street. This semi-industrial sense of place will be further emphasised once the authorised PV is built up around the BESS. The PV will also partially screen the BESS structures. Given the existing semi-industrial sense of place, and the 500m distance to the portion of the BESS not visually screened by PV panels, **the visual impact of the proposed development found that the proposed BESS landscape change impacts are likely to be Medium without mitigation, and Low with mitigation** (mitigation measures are provided in Chapter 6.1.2).

4.2.3 High Level Risk Assessment

A *Safety Health and Environmental Risk Assessment* was undertaken by ISHECON Chemical Process Safety Engineers. The study is attached as Appendix C7 and a short summary thereof follows below.

Risks

This assessment of risk comprises:

- Identification of the likely hazards and hazardous events related to the operation of the installation using a checklist approach.
- Estimation of the likelihood/probability of these hazardous events occurring
- Estimation of the consequences of these hazardous events.
- Estimation of the risk and comparison against certain acceptability criteria.

The facility and the project were divided into the sections/phases and using a checklist approach the hazards in each section/phase were identified. Each identified hazard was then analysed in terms of causes, consequences, expected and suggested preventive and mitigation measures to be in place.

Each hazard was qualitatively assessed using a qualitative risk ranking system applied widely in industry and finally, a very rough approximation of the probable impact zones for fires, explosions and toxic gas releases from thermal run-away events at the batteries as well as an approximation of the risks levels was undertaken using DNV-GL software PHAST RISK 6.7.

Findings

The findings as mentioned below are also provided in Chapter 3, paragraph 3.2 and are repeated for ease of reference.

The tables in Chapter 6: Impact Assessment contain all the recommendations. Below are a few extracted items that are possibly of highest risks and therefore a priority.

- The most significant hazard with battery units is the possibility of thermal runaway and the generation of toxic and flammable gases.
- This type of event also generates heat which may possibly propagate the thermal runaway event to neighbouring batteries if suitable state of the art technology is not employed.
- The flammable gases generated may ignite leading to a fire which accelerates the runaway process and may spread the fire to other parts of the installation.
- If the flammable gases accumulate within the container before they ignite, they may eventually ignite with explosive force.
- Due to a variety of causes, thermal runaway could happen at any point on route to the facility, during construction or operation / maintenance at the facility or during decommissioning and safe-making for disposal.
- Due to the containerised approach as well as the separation between containers and therefore the likely restriction of events to one container at a time, the main risks are close to the containers i.e. to transport drivers, employees at the facilities and first responders to incidents.
- In terms of a worst conceivable case container fires, the significant impact zone should be limited to within 10m of the container and mild impacts to 20m. **Impacts in the public areas of De Aar are not expected.**
- In terms of a worst conceivable case explosion, the significant impact zone should be limited to with 10m of the container and minor impacts such as debris within 50m. **Impacts in the public areas of De Aar are therefore not expected.**
- In terms of a worst reasonably conceivable toxic smoke scenario, provided the units are placed suitably far apart to prevent propagation from one unit to another and large external fires are prevented, the amount of material burning should be limited to one container at any one time. In this case, beyond the immediate vicinity of the fire, the concentrations of harmful gases within the smoke should be low. **Therefore, the risks posed by the BESS to the residential areas of De Aar are negligible.**

- Due to the location of the BESS on Du Plessis farm there may, during a worst-case battery fire and under worst-case wind and weather conditions, be some low concentration smoke that travels as far as the outskirts of De Aar. **However, the risks associated with this noxious smoke to persons in the residential areas of De Aar can be considered broadly acceptable, i.e. public risks are extremely low.**

At a large facility without installation of the state-of-the art battery technology that includes protective features, there can be significant risks to employees and first responders. **The latest international standards (IEC, UL NPA etc.) for battery designs include many preventative and mitigation measures to reduce these risks to tolerable levels**.

The risk assessment concluded that with suitable preventative and mitigation measures in place none of the identified potential risks are high, i.e. from a SHE perspective no fatal flaws were found with the proposed BESS installations at De Aar.

Recommendations

The following recommendations are applicable and have been included in the updated EMPr:

- There are numerous different battery technologies, but using one consistent battery technology system in De Aar would allow for easy of training, maintenance, emergency response and could significantly reduce risks in a remote location.
- Due to the large size of the De Aar BESS installations, e.g. over 500 containers each, the risks posed to employees and emergency first responders can be significant if the state-of-the-art containerised battery technology is not used.
- Prior to bringing any battery containers into the country:
    - An Emergency Response Plan should be in place that would be applicable for the full route from the ship to the site. This plan would include details of the most appropriate emergency response to fires both while the units are in transit and once they are installed and operating.
    - An End-of-Life plan should be in place for the handling, repurposing or disposal of dysfunctional, severely damaged batteries, module and containers.
- The site layout and spacing between the containers should mitigate the risk of a fire or explosion event spreading from one container to another.
- Under certain weather conditions the noxious smoke from a fire could travel some distance from the unit. The smoke will most likely be acrid and could cause irritation, coughing, distress etc. Close the source of the smoke the concentration of toxic gases may be high enough to cause irreversible harmful effects. Location of the facilities needs to ensure a suitable separation distance from public facilities/residences etc.
- It is suggested once the technology has been chosen and more details are available, that this risk assessment be updated.

Further mitigation measures as well as preventative measures are provided in Chapter 6. These recommendations are also included in the updated EMPr.

CHAPTER 5: PUBLIC PARTICIPATION

5.1 Objectives of the Public Participation Programme

The main aim of public participation is to ensure transparency throughout the environmental process. The objectives of public participation are the following:

- To identify all potentially directly and indirectly affected stakeholders, government departments, municipalities and landowners;
- To communicate the proposed project in an objective manner with the aim to obtain informed input;
- To assist the Interested & Affected Parties (IAPs) with the identification of issues of concern, and providing suggestions for enhanced benefits and alternatives;
- To obtain the local knowledge and experience of IAPs;
- To ensure that all reasonable alternatives are identified for assessment.
- To communicate the proceedings and findings of the specialist studies;
- To ensure that informed comment is possible;
- To ensure that all concerns, comment and objections raised are appropriately and satisfactorily documented and addressed.

5.2 Public Participation Process Followed

Interested & Affected Parties Register

Significant measures were taken to ensure that all stakeholders that could have been affected or have an interest in this project were identified. The IAP Register (attached as Appendix D4) consists of directly and indirectly affected landowners, stakeholders and government departments.

Newspaper advertisement

A combined newspaper advertisement advertising the 3x sites as explained in Chapter 1 will be placed in a local newspaper when the report has been distributed for public comment. Proof thereof will be provided in the Final Motivational Report.

Onsite notices

An onsite notice was placed on 29 May 2020 at the entrance to the site next to the R48 road as well as in Kweper Street in the adjacent community. Photographs thereof follow on the next page.

Onsite notice at the entrance to the Du Plessis Dam farm on the R48 road

Onsite notice in Kweper Street in the adjacent community

Distribution of the Draft Motivational Report

The Draft Motivational Report (this document) will now be distributed to everybody on the IAP Register. Proof thereof will be submitted in the Final Motivational Report.

The EA Amendment Application Form and Motivational Report will be submitted to DEFF for registration of the project and their comment on the project.

Final Motivational Report

Comment received on the Draft Motivational Report will be included in the Final Report and submitted to DEFF for their approval and amendment of the Environmental Authorisation. The IAPs will be informed of their right to appeal DEFF's decision.

CHAPTER 6: IMPACT ASSESSMENT

6.1 Impact assessment and Mitigation Measures

6.1.1 Specialist studies where new mitigation measures were not proposed

The following specialists (refer to Chapter 4) confirmed that the BESS as proposed will not create additional impact that was not assessed during the EIA process for the 75MW solar PV plant and additional mitigation measures for the inclusion in the updtaed EMPr were not proposed. For ease of reference, the following conclusions apply:

Avifauna
There is no need to amend the currently applicable bird impact ratings and there are no additional mitigation requirements to add to the existing EMPr.

Aquatic
The proposed BESS is not likely to result in any increase in impact (incremental or cumulative) to the adjacent aquatic ecosystems to that already assessed for the original approved solar PV facilities (deemed to be very low). *Note from EAP: Mitigation measures as proposed is already included in the EMPr as submitted during the EIA phase.*

Heritage
The installation of the BESS at the location proposed will occasion no changes to the identified impacts of the Du Plessis Dam Solar PV1 facilities on heritage resources, provided the mitigation measures recommended in the HIA are implemented. *Note from EAP: Reference is made to the mitigation measures as supplied in the HIA as submitted during the EIA phase.*

Ecological Assessment
The proposed development would have a Low negative botanical and faunal impact before and after mitigation. *Note from EAP: Mitigation measures as proposed are already included in the EMPr as submitted during the EIA phase.*

6.1.2 Specialist studies where new mitigation measures have been proposed

The Visual Impact Assessment and High Level Risk Assessment provided impact assessment tables resulted from new specialists' studies which had not previously been undertaken. The proposed mitigation measures are included in the updated EMPr.

Visual Impact Assessment

The nature of the visual impact associated with a BESS landscape change is rated ***Negative***. The following visual impacts could take place during the lifetime of the proposed project:

Construction Phase

- Loss of site landscape character due to the removal of vegetation and the construction of the BESS structures and associated infrastructure.
- Wind-blown dust due to the removal of large areas of vegetation.
- Possible soil erosion from temporary roads crossing drainage lines.
- Windblown litter from the laydown and construction sites.

Operation Phase

- Massing effect in the landscape from a large-scale modification.
- On-going soil erosion.
- On-going windblown dust.

Decommissioning Phase

- Movement of vehicles and associated dust.
- Wind-blown dust from the disturbance of cover vegetation / gravel.

Cumulative Effects

- A long term change in landuse setting a precedent for other similar types of solar energy projects.
- Change to local sense of place from cumulative inter-visibility of multiple PV projects.

Reversibility

- Due to the limited necessity for major earthworks in the construction of the BESS project, impacts associated with the proposed project are defined as *Reversible*. The existing agricultural landscape could be re-established to some degree with the removal of all the structures.

Impact Rating Criteria

The following impact rating criteria were used when the visual impacts were assessed.

Extent	Geographical area of influence. **Site Related (S):** extending only as far as the activity **Local (L):** limited to i*mmediate surroundings.* **Regional (R):** affecting a larger metropolitan or regional area **National (N):** affecting large parts of the country **International (I):** affecting areas across international boundaries

Duration	Predicted lifespan **Short term (S):** duration of the construction phase. **Medium term (M):** duration for screening vegetation to mature. **Long term (L):** lifespan of the project. **Permanent (P):** where time will not mitigate the visual impact.
Magnitude	Magnitude of impact on views, scenic or cultural resources **Low (L):** where visual and scenic resources are not affected. **Moderate (M)**: where visual and scenic resources are affected **High (H)**: where scenic and cultural resources are significantly affected.
Probability	Degree of possible visual impact: **Improbable (I):** possibility of the impact occurring is very low. **Probable (P):** distinct possibility that the impact will occur. **Highly probable (HP):** most likely that the impact will occur. **Definite (D):** impact will occur regardless of any prevention measures.
Significance	A synthesis of nature, duration, intensity, extent and probability **Low (L):** will not have an influence on the decision. **Moderate (M):** should have an influence on the decision unless it is mitigated. **High (H):** would influence the decision regardless of any possible mitigation.
Confidence	Key uncertainties and risks in the VIA process, which may influence the accuracy of, and confidence in, the VIA process.

Impact Activity	**Phase**	**Mitigation**	**Nature**	**Extent**	**Duration**	**Severity**	**Probability**	**Significance without**	**Significance with**
BESS	Cons.	W/Out	-ve	Local	Short	Med	P	Med	
		With	-ve	Local	Short	Low	P		Low
	Ops.	W/Out	-ve	Local	Long	Med	P	Med	
		With	-ve	Local	Long	Low	P		Low
	Close	W/Out	-ve	Local	Short	Med	P	Med	
		With	-ve	Local	Short	Low	P		Low
	Cuml. Risk	W/Out	-ve	Local	Long	Med	P	Low	
		With	-ve	Local	Long	Low	P		Low

Mitigation

The following proposed mitigation measures which did not form part of the original EMPr have been included in the updated EMPr:

Construction Phase

- Topsoil should be dealt with in accordance with the EMPr.
- The buildings should be painted a mid-grey, or grey-brown colour.
- To reduce colour contrast, if permitted by the Original Equipment Manufacturer, the BESS structure should preferably be painted a light-brown colour so as to blend with the surrounding arid region landscapes. *Note from EAP: The containers cannot be painted a colour that absorbs heat as this will void warrantees.*

- Fencing should be simple, diamond shaped (to catch wind-blown litter) and appear transparent from a distance. The fences should be checked on a monthly basis for the collection of litter caught on the fence.
- Signage on the N10 should be moderated.
- Lights at night have the potential to significantly increase the visual exposure of the proposed project, therefore it is recommended that general mitigation be implemented to reduce light spillage.

Operation Phase

- Control of lights at night to allow only local disturbance to the current semi-rural night sky landscape context.
- Light spillage management to ensure that security lighting at night is not visually intrusive. Lighting for security should be downward and inward facing and not include overhead security lighting options.
- Continued erosion control and management of dust.

Closure Phase

- All structures should be removed and where recycled in terms of National best practice guidelines.
- Building structures should be broken down (including foundations).
- The rubble should be managed according to NEM:WA and deposited at a registered landfill if it cannot be recycled or reused.

Conclusion of the VIA

Visual impact summary table

Action	Description
Reviewing the Legal Framework	In terms of the spatial planning defined for the area, the proposed project has a good policy fit. The project will contribute to economic growth and diversification, social development projects, economic development in the region, sustainable development and affordable energy without detracting from significant natural or cultural landscapes. The project has a good policy fit in terms of landscape planning as the area has been identified as a renewable energy development area.
Site Survey	The topography of the area is relatively flat; although there are a few ridge-shaped hills and larger flatter plateaus receiving landscape is likely to extend the visibility of the proposed development. The current land use is grassland agriculture and other than the Eskom powerline adjacent to the site, no other man-made modifications were identified on the site. The current grasslands landscape reduces the visual absorption capacity, but the site is surrounded by an authorised/ unbuilt PV project, which will increase the ability of the receiving landscape to visually absorb the proposed BESS landscape change.

Determining the Zone of Visual Influence and Key Receptors Locations	The Zone of Visual Influence is defined as *Medium* as some expansion of the visibility will be created by the flat terrain in the wide valley. As the area is rural, no high exposure receptors were identified in the viewshed. The only sensitive receptor identified is the N10 National Highway which I located approximately 3,5km to the west of the site. As the N10 is an important tourist view corridor, this receptors was identified as a Key Observation Point.
Site Scenic Quality and Receptor Sensitivity to Landscape Change	The Scenic Quality of the area is *Medium to Low* as the adjacent power line corridor detracts from the local rural agricultural sense of place. Receptor Sensitivity is rated *Low* as the site is remote with no close proximity receptors. The urban nature of the De Aar receptors located 3km to the west is likely to reduce their sensitivity to landscape change. Due to the lower scenic quality and low receptor sensitivity to landscape change, a Class IV Visual Objective as assigned to the site. This allows for large scale landscape modifications, but aligned with best practice in landscape planning that would require recognition of the rural landscape zoning of the site and surrounds that would need to inform design to some degree.
Assessing Potential Visual Impacts	A contrast rating from the N10 National Highway found that the expected Degree of Contrast created by the proposed landscape change is likely to be *Medium to Low* (once the PV project has been established). **As such, the assessment of the proposed development found that Visual Impacts are likely to be Medium without mitigation, and Low with mitigation.**

The visual impact of this proposed development must also be assessed in the context of the other renewable energy projects within the De Aar area that are in various stages of approval. De Aar has some of the highest renewable energy resource levels in the world, with good existing road infrastructure and accessible to the national grid. The area surrounding the proposed BESS site to the north, west and partially to the south, has been authorised for the development of PV. The semi-industrial nature of the landuse to the southeast of the BESS currently degrades the sense of place for the local residents along Wilger Street. This semi-industrial sense of place will be further emphasised once the authorised PV is built up around the BESS. The PV will also partially screen the BESS structures. Given the existing semi-industrial sense of place, and the 500m distance to the portion of the BESS not visually screened by PV panels, the Visual Impact of the proposed development found that the proposed BESS landscape change impacts are likely to be Medium without mitigation, and Low with mitigation.

Given the low impacts, it is recommended that, from a visual perspective, the project should be authorised, with or without colour mitigation.

High Level Risk Assessment

NOTE – the likelihood (L), consequence (C) and Evaluation ratings in ALL the tables below **assume that the suggested preventative and mitigation measures <u>HAVE BEEN IMPLEMENTED</u>. <u>Without these measures in place the risks will be higher</u> and may even be unacceptably high**.

The preventative and mitigation measures as mentioned below have been included in the updated EMPr

CONSTRUCTION PHASE

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
AREA / SYSTEM: Construction Phase including importation and transport to site as well as storage at ports and on site prior to commissioning
REFERENCE /DRAWING NO: Technical Engineering Study on Developing Battery Electrical Energy Storage Systems

No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
HEALTH RISKS										
H1	Chronic Chemical or Biological Toxic Exposure	Construction materials such as cement, paints, solvents, welding fumes, truck fumes etc.	The construction phase will be managed according to all the requirements of the Occupational Health and Safety Act 85 of 1993 specifically the Construction Regulations. SHEQ policy in place. A detailed construction risk assessment prior to work. SHE procedure in place. PPE to be specified. SHE appointees in place. Contractors safety files in place and up to date. All necessary health controls/ practices to be in place, e.g. ventilation of welding and painting areas. SHE monitoring and reporting programs in place.	3	Illness.	Emergency response plan to be in place prior to beginning construction and to include aspects such as appointment of emergency controller, provision of first aid, first responder contact numbers.	1	4	Low	
		Human pathogens and diseases, sewage, food waste.	All necessary good hygiene practices to be in place, e.g. provision of toilets, eating areas, infectious disease controls.	2	Illness and at worst without mitigation, possibly extending to fatalities.	Policies and practice for dealing with known vectors of disease such as Aids, TB, COVID 19 and others.	3	9	Medium	
		Snakes, insects, wild and domesticated	Prior to construction determine the dangerous species in the area and what responses are	2	Effects can vary from discomfort to	First aid and emergency response to consider the necessary anti-venom,	3	9	Medium	

QUALITATIVE RISK ASSESSMENT RECORD
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No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
		animals and harmful plants.	needed to bites/exposure/attacks. Awareness training for persons on site, safety induction to include animal hazards.		fatalities for venomous snakes or bee swarms etc.	anti-histamines, topical medicines etc. Due to isolated locations some distance from town, the ability to treat with anti-venom and extreme allergic reactions on site is critical to mitigate the impacts.				
H2	Noise	Drilling, piling, generators, air compressors	The construction phase will be the noisy phase of the project. No extreme construction envisaged, normal road, single storey building type construction similar to what would take place in a residential area.	4	Adverse impact on hearing of workers. Nuisance factor in near -by residential areas, e.g. BESS 3.	Health risk assessment to determine if equipment continuous noise exceeds 85dB at workstation and 61dB at boundary of the site Employees to be provided with hearing protection if working near equipment that exceeds the noise limits. Due to rural nature of sites, construction is unlikely to continue at after sunset. BESS 1 and 2 located 3km from residential areas.	1	7	Medium	
H3	Environmental	Heat during the day. Enclosed containers. Cold in winter.	Construction site facilities to comply with Occupational Health and Safety Act 85 of 1993 specifically the thermal, humidity, lighting and ventilation requirements of the Environmental Regulations for Workplaces.	2	Heat stroke. Hypothermia.	Adequate potable water to be provided during all phases of the project. Bore hole, bowser and tank or small water treatment plant may be required to provide potable water for the plants during all phases of the project.	2	5	Low	
H4	Psychological	Large projects bring many contractor workers into a small isolated community.	Depending on size of contract and scope, project may need to provide temporary accommodation, regular/periodic transport to town and nearby cities.	3	Lack of sufficient accommodation, entertainment etc. Increase in alcohol abuse, violence.	Local community involvement and preferably use of local persons as contract workers on the project.	2	8	Medium	Note. In small isolated communities, use of locals for construction projects is critical for community safety and upliftment.
H5	Ergonomics	Lifting heavy equipment. Awkward angles during construction.	Training in lifting techniques. Ensure that despite the isolated location all the necessary equipment is available (and well maintained) during construction. Otherwise employees may revert to unsafe practices. Isolated location, maintenance of construction equipment to ensure safe operation is critical.	2	Back and other injuries.	First aid provision on site.	3	9	Medium	

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No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
			Ensure this is in place prior to project beginning. Development of local service providers.							
SAFETY RISKS										
S1	Fire	Damaged on route e.g. dropped in port (drops do happen about 1/2000 containers) and importing 500 containers it is possible that one will be dropped, traffic accident on-route. Involvement in an external fire e.g. at the port or on route.	Design includes abuse tests such as drop test, impact, rapid discharge etc. Propagation tests for systems, e.g. heat insulating materials between cells/modules. Factory acceptance test prior to prior to leaving manufacture. Batteries are usually stored at 50% charge to prolong life, but may be shipped fully discharged. This level of detail should be understood so as to assess the risk during transport and storage. Port Authorities need to be alerted to the overall project and the hazardous nature of the contents. Port emergency response in particular need training on mitigating battery hazards. Prior to bring any containers into the country a full Emergency response plan should be in place for the full route from the ship to the site. Data indicates installed facility events are 0.001/year. Transport of +500 units assumed to take 4 weeks each so f= 0.04 once in 25 years so L=2.	2	Injuries due to radiation especially amongst first responders and bystanders. Fatalities unlikely from the heat radiation as not highly flammable nor massive fire (refer to noxious smoke in S3 below for the major impact).	Emergency plan to determine: What gases would be released in a fire Are there inhalation hazards Extinguishing has two important elements, put out fire and to provide cooling. Different approaches for small fire – put out, and large fires cool with copious quantities of water. Inert gases and foam may put out the initial fire but fail to control thermal runaway or to cool the batteries resulting in reignition. What initial fire extinguishing medium should be used? Are there any secondary gases or residues from use of extinguishers? If water is appropriate, may need outside connections to inside sprinklers First responders need to know what media to use, especially if water totally unsuitable and if there are no connection points for water etc. Must the container be left unopened or opened? PPE to be specified including possible exposure to chemicals and fumes as well as radiate heat. Containment of residues/water/damaged equipment. Suitable safe making a disposal plan considering after the event, how do responder deal with partially charged damage units, contaminated surfaces (e.g. HF residues).	3	9	Medium	Note. If, as per Tesla indications, the containers are classified as IMDG Class 9 – the containers will not receive any special care in the ports and may be stored next to flammables.
S2	Explosion	Flammable gases	During transport this is only likely to happen due	1	Potential fatalities	For simplicity one transport route	4	10	Medium	

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No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
		generated by thermal run away reach explosive limits. Ignition on hot surfaces, static.	to possible inappropriate emergency response, e.g. opening containers when they may be the type that should be left to burn out.		amongst first responders. Damage to container, transport truck or other nearby items, e.g. other container in the port.	would be preferable. The route needs to be assessed in terms of responding local services, rest places for drivers, refuelling if required, break down services available etc. Once an import route has been chosen, e.g. Cape Town port and up the N1, then key emergency services on route could be given awareness training in battery fire/accident response. Emergency response planning and training referred to above may be important for key locations such as the Du Toitskloof tunnel.				
S3	Acute Chemical or Biological Toxic Exposure	Damaged batteries release fumes, leak electrolyte, are completely broken exposing hazardous chemicals. Thermal runaway and hazardous fumes released.	Transport in accordance with Regulation 8 of the National Road Traffic Act 93 of 1996, Dangerous Goods. Not permitted to transport prescribed goods in manner not consistent with the prescriptions, e.g. consignor and consignee responsibilities. Prescription found in SANS 10228/29 and international codes for battery transport etc. Transport in sealed packages that are kept upright, protected from movement damage etc. Also packaged to ensure no short-circuiting during transport. Transport to prevent excessive vibration considerations as battery internal may be damaged leading to thermal run-away during commissioning. Likelihood similar to fire above.	2	Impacts can vary from mild skin irritation from exposure to small leaks to serious corrosive burns or lung damage.	Pre-assembled containers will most likely be supplied. These will be fitted with the necessary protective measures by the supplier considering marine and road transport as well as lifting, setting down etc. Route selection to consider possible incidents along the way and suitable response, e.g. satellite tracking, mobile communication, 24/7 helpline response. Standard dangerous goods requirements for Hazmat labels, Trem cards, driver trained in the hazards of the load.	3	9	Medium	
S4	Acute physical Impact or violent release of	Construction moving equipment, heavy loaded, elevated loads, working at heights.	Refer to item H1 above for OHS Act issues. Standard construction site rules regarding traffic, reversing sirens, rigging controls, cordoning off excavations etc. Civil and building structures to National Building	2	Injury or possibly fatality. Damage to equipment. Delays in starting	Emergency response plan to be in place before construction begins.	3	9	Medium	

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REFERENCE /DRAWING NO: Technical Engineering Study on Developing Battery Electrical Energy Storage Systems

No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
	energy		Regulations and building Standards Act 103 of 1977 SANS 10400 and other relevant codes. Other constructions such as roads, sewers etc also to relevant SANS standards. All normal procedures for working at heights, hot work permits, confined space entry, cordon off excavations etc to be in place before construction begins.		the project, financial losses.					
S5	Generation impact	Use of electrical machines, generators etc.	Standard maintenance of condition of electrical equipment and safe operating instructions.	1	Electrocution.	Ability to shut off power to systems in use on site.	4	10	Medium	
		Hot dry area static generation is highly likely.	If persons are decanting fuels or dealing with other highly flammable materials care should be taken regarding possible static discharge.	1	Ignition and burns.	If decanting fuels ensure installations are to standard with regards static.	3	6	Medium	
		Lightning strike.	Lightning strike rate in De Aar is relatively low, but not impossible. Advised stop outside work during thunder storms.	1	Injury and death. Damage electrical equipment. Possible start for thermal run away within containers.	Lighting conductors will likely be required for the final installation.	4	10	Medium	
ENVIRONMENTAL RISKS										
E1	Emissions	Dust from construction and generally hot dry area.	May need to use dampening on roads etc. as per normal construction practices. There will be packaging materials that will need to be disposed of after the entire system is connected and commissioned as well as after regular maintenance.	4	Adverse impact on employee health. Nuisance factor in residential areas if close, e.g. BESS 3.	May need PPE (dust masks) for specific construction workers. There will need to be waste segregation (e.g. electronic equipment, chemicals) and management on the site.	1	7	Medium	
E2	Pollution	Diesel for equipment, paints and solvents. Transformer oil spills.	Normal construction site practices for preventing and containing fuels/paint/oil etc spills. Sewage and any kitchen liquids - containment and suitable treatment/disposal.	3	Environmental damage.	Spill clean-up procedures to be in place before commencing construction.	1	4	Low	
E3	Waste of resources	Battery containers damaged	Handling protocols to be provided by supplier.	3	Loss of production capacity.	End of Life plan needs to be in place before any battery containers enter the country as there may be damaged battery unit from day 1.	2	8	Medium	
GENERAL RISKS										

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
AREA / SYSTEM: Construction Phase including importation and transport to site as well as storage at ports and on site prior to commissioning
REFERENCE /DRAWING NO: Technical Engineering Study on Developing Battery Electrical Energy Storage Systems

No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
G1	Aesthetics	Bright surfaces reflecting light. Tall structures in a flat area.	Design indicate structure limited to 25m for electrical infra structure. Container singe storey as physical space is not a constraint that would require stacking of containers. Containers likely to be painted white, not left as reflective steel.	2	Irritation.	None.	1	2	Low	
G2	Financial	Defective technology. Extreme project delays.	Design by experienced contractors using internationally recognized and proven technology. Project management with deviation monitoring.	2	Financial loss	Project insurance for construction phase.	2	5	Low	
G3	Security	On route, potential hi-jacking of valuable but hazardous load. On site, theft of construction equipment and battery installation facilities.	Fencing around electrical infrastructure to SANS standard and Eskom Guidelines. The hazardous nature of the electrical and battery equipment should be clearly indicated – e.g. Skull and Cross Bones or other signs. Isolated location both helps and hinders security.	4	Theft. Injury to burglars. Damage to equipment possibly setting off thermal runaway.	Night lighting unlikely to be provided, but could be considered.	2	12	Medium	
G4	Emergencies	Fires, explosions, toxic smoke, large spills, traffic accidents, equipment/structural collapse. Inadequate emergency response to small event leads to escalation.	All safety measures listed above. Small events not handled correctly and escalate into larger events.	1	Injuries turn to fatalities, small losses become extended down time.	If batteries are stored at 50% charge, thermal run away can happen while in storage on site waiting for installation. In addition, if involved in an external fire thermal run away can happen even with uncharged batteries. Except during shipping, ideally the units should not be stored any closer to each other than they would be in the final installation so that propagation is prevented. The company in charge of the containers at each stage in the transport process needs to be very clear so that responsibility for the integrity of the load and protection of the persons involved in transfer and coordination of emergency response on-route. E.g. if purchased from	4	10	Medium	

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
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No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
						Tesla where does hand over occur to the South African contractor / owner, at the factory door in USA, at the port in RSA, at the site fence. For example, who will be accountable if there's thermal runway event on a truck with a container that stops in a small town for driver refreshments.				
G5	Legal compliance	Field is evolving quickly with new guides, codes and regulations happening at the same time as evolving technology.		1	Unknown hazards manifest due to using "cheaper supplier or less developed technology".	Use only internationally reputable battery suppliers who comply with all known regulations/guideline at the time of purchasing. Ensure only latest state of the art battery system are used.	4	10	Medium	

OPERATIONAL PHASE

From the details of some of the accidents that have happened it is clear that many potential problems manifest during the commissioning phase when unit are first powered up to test functionality. This phase is critical and all controls, procedures, mitigation measures etc that would be in place for full operation should be in place before commissioning commences.

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
AREA / SYSTEM: Operation Phase including commissioning, maintenance, planned and unplanned shut downs, re-start
REFERENCE /DRAWING NO: Technical Engineering Study on Developing Battery Electrical Energy Storage Systems

No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
HEALTH RISKS										
H1	Chronic Chemical or Biological Toxic Exposure	Operation and maintenance materials such as spare batteries, paints, solvents, welding fumes, oils etc.	The operation and maintenance phase will be managed according to all the requirements of the Occupational Health and Safety Act 85 of 1993. SHEQ policy in place. A detailed risk assessment of all normal operating and maintenance activities on site to be compiled, and form the basis of operating instructions, prior to commencing commissioning. SHE procedure in place, e.g. PPE specified, management of change, integrity monitoring. SHE appointees in place. All necessary health controls/ practices to be in place, e.g. ventilation of confined areas, occupational health monitoring if required and reporting programs in place.	3	Illness.	Emergency response plan for full operation and maintenance phase to be in place prior to beginning commissioning and to include aspects such as appointment of emergency controller, emergency isolation systems for electricity, provision of PPE for hazardous materials response, provision of shelter in place facilities for staff at the main office building, provision of first aid, first responder contact numbers.	1	4	Low	
		Human pathogens and diseases, sewage, food waste.	The number of persons on site will reduce significantly after construction and would likely be limited to half a dozen or so at any one time. Never the less all necessary good hygiene practices need to continue to be in place, e.g. provision of toilets, eating areas, infectious disease controls.	1	Illness and at worst without mitigation, possibly extending to fatalities.	Policies and practice for dealing with known vectors of disease such as Aids, TB, COVID 19 and others.	3	6	Medium	
		Snakes, insects, wild and domesticated animals and harmful plants.	Prior to construction determine the dangerous species in the area and what responses are needed to bites/exposure/attacks. Awareness training for persons on site, safety induction to include animal hazards.	2	Effects can vary from discomfort to fatalities for venomous snakes or bee swarms etc.	First aid and emergency response to consider the necessary anti-venom, anti-histamines, topical medicines etc. Due to isolated locations some distance from town, the ability to treat with anti-venom and extreme allergic reactions on site is critical to mitigate the impacts.	3	9	Medium	
		Compromised battery compartments vapours accumulate in the containers, solids/liquids on	Batteries sealed. Individual batteries in modules which are also sealed. Pre-packed in the container. Maintenance procedures will be in place. PPE will be specified for handling batteries and	3	Dermatitis, skin /eye/lung irritation.	Possible detectors with local alarms if exceed STEL etc prior to entry for inspection. Labelling of batteries Confined space entry procedures? There needs to be careful thought	2	8	Medium	

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
AREA / SYSTEM: Operation Phase including commissioning, maintenance, planned and unplanned shut downs, re-start
REFERENCE /DRAWING NO: Technical Engineering Study on Developing Battery Electrical Energy Storage Systems

No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
		surfaces.	other equipment on site..			given to procedures to be adopted before entry into a container under normal circumstances (confined space) but particularly after a BMS shut down where there may be flammable or toxic gases present, a fire etc. Any situation could await those entering. SDSs to be available on site. Operating manuals to be provided including start-up, shut-down, steady state, monitoring requirements. Maintenance manuals with make safe, decontamination and repair procedures. Proposed maintenance schedules daily, weekly, monthly, annual etc. Provided portable equipment for calibration and for testing/verification of defective equipment, e.g. volt/current meters, infrared camera.				
H2	Noise	Moving parts inside containers, cooling systems etc.	Design to ensure continuous noise does not exceed 85dB in the containers or at any other location on site or 61 dB at the site boundary, e.g. emergency generator, air compressor etc. Employees to be provided with hearing protection if working near equipment that exceeds the noise limits.	2	Adverse impact on hearing of workers. Nuisance factor in near -by residential areas, e.g. BESS 3.	BESS 1 and 2 located 3km from residential areas.	1	2	Low	
H3	Environmental	Heat during the day. Batteries generate heat within enclosed containers. Cold in winter.	Container facilities to comply with Occupational Health and Safety Act 85 of 1993 specifically the thermal, humidity, lighting and ventilation requirements of the Environmental Regulations for Workplaces. Battery life optimal at temperature also optimal for humans. Lighting to be provided inside the containers, possibly linked to the door opening.	2	Heat stroke. Hypothermia.	Adequate potable water to be provided during all phases of the project. Night work is unlikely unless there is major outage, suitable lighting to be provided. PPE for operations and maintenance staff to be suitable for the weather conditions.	3	9	Medium	
H4	Psychological	Isolated work	Staff rotation to other sites may be necessary.	3	Low performance,	Performance monitoring of	1	4	Low	

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
AREA / SYSTEM: Operation Phase including commissioning, maintenance, planned and unplanned shut downs, re-start
REFERENCE /DRAWING NO: Technical Engineering Study on Developing Battery Electrical Energy Storage Systems

No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
		station and monotonous repetitive work.			system productivity suffers.	inspections / maintenance tasks in particular will be necessary.				
H5	Ergonomics	Lifting heavy equipment. Awkward angles during maintenance, stretching reaching top high level batteries and bending to low level batteries. Working ta height if equipment located on top of container or elevated electrical equipment (e.g. pylons).	Training in lifting techniques.	2	Back and other injuries.	If batteries are at height, ensure suitable safe (electrically and physically) ladders are available. Working at height procedure to be in place.	3	9	Medium	
SAFETY RISKS										
S1	Fire	Involvement in an external fire e.g. veld fire, maintenance vehicle fire, electrical systems fire. Excessive dust ingress insulates causing heat to build up. Manufacturing defects or contamination. Damage to battery leading to shorting and heating. High humidity condensation of water shorting Ingress of water	Grass cutting and fire breaks around the site to prevent veld fires. No combustible materials to be stored in or near the battery containers. Design codes from USA and standards of practice UL9540, NFPA 855 and DNV GL RP 43. Detailed FMEA/Hazop/Bowtie to done during design at the component level and system levels. Safety integrity level rating of equipment (failure probably) with suitable redundancy if required. Site Acceptance Testing as part of commissioning of each model and the overall system. BMS should be checking individual cell voltage as well as module/rack, container, system voltages/current etc. BMS tripping the cell and possibly the module, rack, container if variations in voltage. Diagnostics easily accessible.	4	Contaminated run off. Radiation burns unlikely to be severe as not highly flammable materials. No affected bystanders. Damaged equipment. Fire spreads to other units or offsite if grass/vegetation not controlled.	Refer to construction phase above and apply. LEL gas detector for flammable and shut down system. Emergency plan from transport and construction phase to be extended to operational phase and to include the hazards of the electrically live system. Procedure to address extinguishing, ventilating, entering as appropriate or not. 24/7 help line for local authorities in De Aar – fire, spills etc PPE include fire retardant, chemically resistant, nitrile gloves, antistatic acid resistant boots, fill face shields, BA sets.	2	12	Medium	Note. Refer to Appendix A for an initial approximation of worst case possible fire impact zones.

QUALITATIVE RISK ASSESSMENT RECORD
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REFERENCE /DRAWING NO: Technical Engineering Study on Developing Battery Electrical Energy Storage Systems

No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
		shorting. Flooding of containers. Excessive electrical loads - surges Mechanical damage, impact deformation. Operator abuse Low temperature – plating of lithium on the anode and shorting BMS failure or software failure. Thermal separation or insulation or spacers damaged, propagation. Thermal run away and resultant battery compromised and fire. Incorrect extinguishing. medium, escalate the fire.	Diagnostics able to distinguish cell from module faults. Battery life starts to be impacted above 40 deg C and significant impacts above 50 deg C with thermal run away starting at 65-70 deg C. BMS trips system at 50 deg C. Suitable ingress protection level provided, e.g. IP55 - 66. If air cooling into container, suitable dust filters to be provided. Smoke detectors linked to BMS and alerts in the main control room. Effects of battery aging to be considered. Abuse tests conducted by supplier. Temperature monitoring to be in place. Data needs to be stored for trend analysis. Regular infrared scanning. Fire resistant barrier between the batteries and the PCS side if in the same container, or separate containers. Data indicates an event frequency of 0.001 and with +500 units per installation this would mean an event every two years (L=4). Most events will be small not resulting in injuries but this is possible if the event is not controlled.			Separation of site diesel tank, transformers etc from battery packs, Lightning protection – low strike rate but flat open areas. IR scanning to determine if batteries are still smouldering / are sufficient cooled to handle. Very NB batteries thought to be extinguished can re-ignite days/weeks later. Some suggest after batteries are removed then still be submerged in outdoor water troughs. Fire water for cooling adjacent equipment – BESS units. 100m hydrants. Can use fogging nozzles to direct smoke. Clean up after event Lingering HF and other toxic residues in the soil and on adjacent structures. Smoke or gas detector systems that are not part of the original battery container package, need to be linked to the main control panel for the entire system so that issues can be detected and responded to rapidly Suitable fire extinguishing medium, and cooling mediums and adequate supply of both is critical. De Aar is a very dry area and water supply may be an issue. A planned fire response to prevent				

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
AREA / SYSTEM: Operation Phase including commissioning, maintenance, planned and unplanned shut downs, re-start
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No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
						escalation to an explosion is critical. Protective systems are only as good as their reliability and functionality testing is important, e.g. testing that the high temperature trips actually work.				
		Power Conversion System (PCS – DC to AC) cooling failure electrical fire	Failure of cooling on PCS or fires on other electrical equipment such as cooling system pump motors etc, and failure to trip the entire system and raise the alert.	3	Fire starts in PCS or another section or room and spreads to battery area.	Modern design put the PCS in another part of the container with a fire rated wall separating it from the battery. Alternately the PCS is another container altogether.	2	8	Medium	
S2	Explosion	Flammable gases generated by thermal run away reach explosive limits. Ignition on hot surfaces, static. Lithium Cobalt Oxide generates O2 during decomposition - escalation	This is only really likely do happen due to possible inappropriate emergency response, e.g. opening containers when they may be the type that should be left to burn out. Modern state of the art containers have ventilation systems for vapours. Undertake a hazardous area classification of the inside of the container to confirm the rating of electrical equipment. Might be zone 2 due to possible leaks of electrolyte or generation of flammable gases un thermal run away.	1	Potential fatalities amongst first responders. Damage to container, transport truck or other nearby items, e.g. other container in the port.	Emergency response plan and employee training referred to above is critical Suitable training of emergency responders in De Aar is critical. .	4	10	Medium	NOTE. Refer to Appendix A for an initial approximation of worst case possible explosion impact zones.
S3	Acute Chemical or Biological Toxic Exposure	Damaged batteries release fumes, leak electrolyte, are completely broken exposing hazardous chemicals. Hazardous fumes released on thermal run away see fire above.	Batteries contained, modules contained and all inside a container that acts as bund. Refer to fire above as all the protective measures apply to prevent toxic smoke. Fumes tend to be directed upwards by the structure of the container.	2	Impacts can vary from mild skin irritation from exposure to small leaks to serious corrosive burns or lung damage. For BESS 3 the effects may extend slightly into the north eastern sections of the town	Refer to fire above as all the measures apply to mitigate toxic smoke. 24/7 helpline response. Standard dangerous goods requirements for Hazmat labels. All operators/maintenance staff trained in the hazards.	3	9	Medium	NOTE Refer to Appendix A for an initial approximation of worst case possible noxious smoke impact zones.

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
AREA / SYSTEM: Operation Phase including commissioning, maintenance, planned and unplanned shut downs, re-start
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No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
					of De Aar, i.e. sport club.					
S4	Acute physical Impact or violent release of energy	Moving equipment, pumps, heavy batteries at elevation, nip points, working at heights. Traffic accidents.	Apart from pumps, no major moving parts during operation. Maintenance equipment to be serviced and personnel suitably trained in the use thereof. Normally just small vehicles on site, bakkies, grass cutting, cherry-pickers etc. Possibly large cranes if whole container or elevated structure removed/replaced. Traffic signs, rules etc in place on site.	2	Injury. Fatality in unlikely worst case, e.g. traffic accidents or fall from heights. Damage to equipment.	All normal working at heights, hot work permits, confined space entry, cordon off unsafe areas/works etc to be in place. Emergency response plan.	3	9	Medium	
S5	Generation impact	Electrical equipment in container and high voltages systems outside for connection to the grid. Electrified fences.	Codes and guidelines for electrical insulation. PPE to suit. Low voltage equipment (e.g. batteries) separated from high voltage (e.g. transmission to grid). Trained personnel – IEE 1657 – 2018. Eskom Operating Regulations for high voltage systems including access control, permit to work, safe work procedures, live work, abnormal and emergency situations, keeping records. Electromagnetic fields, impact on other equipment e.g. testing devices, mobile phones – malfunction, permanent damage. Software also needs maintenance, patches, updates.	1	Electrocution. Mild impacts for low voltage systems, possibly fatal on high voltage systems.	Consider suitably located E-stops for the container and the other equipment on site.	4	10	Medium	
		Hot dry area static generation is highly likely.	PPE to consider static accumulation for entering the battery containers especially after a high temperature shut down where there could possibly be flammable materials.	1	Ignition and burns.	The procedures for responding to alarm and auto shut down on containers, needs to consider that there may be a dangerous environment in side and how to protect personnel who may enter to respond.	3	6	Medium	
		Lightning strike.	Lightning strike rate in De Aar is relatively low, but not impossible. Advise stop outside work during thunder storms.	1	Injury and death. Damage electrical equipment. Possible start for thermal run away within containers.	Lighting conductors will be required for the installation.	4	10	Medium	

QUALITATIVE RISK ASSESSMENT RECORD
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No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
ENVIRONMENTAL RISKS										
E1	Emissions	Refrigerant release. Maintenance waste, e.g. packaging, oils etc.	Refrigerant is asphyxiant if released indoors it can accumulate and displace oxygen.	1	Fatal impact	Especially after any warning alarms have gone off, but possibly even normally the container could be treated as entering a confined space and similar procedures could be in place, e.g. do not enter alone, gas testing prior to entering, ensure adequate ventilation.	4	10	Medium	
E2	Pollution	Spills from batteries, coolant. Fire water runoff control.	Normal site practices for preventing and containing diesel/paint etc spills. Sewage and any kitchen liquids - containment and suitable treatment/disposal. Procedures for dealing with damaged/leaking batteries as well as clean-up of spills.	3	Localized environmental damage.	Spill clean-up procedures to be in place before bringing container on site, including spill kits – non-combustible materials, hazmat disposal. Reportable Quantities NEMA	2	8	Medium	
E3	Waste of resources	Similar to construction phase.	End of Life plan to be on place.							
GENERAL RISKS										
G1	Aesthetics	Bright surfaces reflecting light. Tall structures in a flat area.	Design indicate structure limited to 25m for electrical infra structure. Container singe storey as physical space is not a constraint that would require stacking of containers. Containers likely to be painted white, not left as reflective steel.	2	Irritation.	None.	1	2	Low	
G2	Financial	Defective technology.	Design by experienced contractors using internationally recognized and proven technology.	1	Financial loss	Project insurance.	3	6	Medium	
G3	Security	On site, theft or damage to equipment and battery installation facilities.	Fencing around electrical infrastructure to SANS standard and Eskom Guidelines. Isolated location both helps and hinders security. There should be clear labelling on fences and containers that they have highly hazardous contents – e.g. Skull and Cross Bones or other signs.	4	Theft. Injury to burglars. Damage to equipment possibly setting off thermal runaways.	If no night lighting provided consider motion detection lights and CCTV.	2	12	Medium	

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PLANT: De Aar BESS
AREA / SYSTEM: Operation Phase including commissioning, maintenance, planned and unplanned shut downs, re-start
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No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Comments
		Cyber security attacks aim at the National Grid.	Cyber security needs monitoring. Remote access to system needs to be negotiated and controlled. Pass word controls, levels of authority etc. Protection of the National grid from Cyber-attacks accessing through the BESS.		Ransom of the national grid.	Cyber emergency procedures.				
G4	Emergencies	Fires, explosions, toxic smoke, large spills, traffic accidents, equipment/structural collapse. Inadequate emergency response to small event leads to escalation.	All safety measures listed above. Storage of spare batteries (e.g. in stores o site or elsewhere) also needs to consider possible thermal run away.	1	Injuries turn to fatalities, small losses become extended down time.	Escape door open outwards, doors hooked open when persons inside. More than one exit from containers.	4	10	Medium	
G5	Legal compliance	Field is evolving quickly with new guides, codes and regulations happening at the same time as evolving technology.		1	Unknown hazards manifest due to using "cheaper supplier or less developed technology".	Use only internationally reputable battery suppliers who comply with all known regulations/guideline at the time of purchasing. Ensure only latest state of the art battery system are used.	4	10	Medium	

The risk assessment concluded that with suitable preventative and mitigation measures in place none of the identified potential risks are high, i.e. from a SHE perspective no fatal flaws were found with the proposed BESS installations at De Aar.

DECOMMISSIONING PHASE

Batteries have a limited lifespan and if there are damaged units, there could already be "waste" batteries on the first day of commissioning. An End-of-Life plan needs to be in place before the first batteries are brought on site.

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
AREA / SYSTEM: De-commissioning Phase including Re-Purposing
REFERENCE /DRAWING NO: Technical Engineering Study on Developing Battery Electrical Energy Storage Systems

No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Recommendations
HEALTH RISKS										
H1	Chronic Chemical or Biological Toxic Exposure	Batteries reached end of life and may leak.	End of Life shutdown procedure including a risk assessment of the specific activities involved. Re-purpose the units with associated Environmental impact considered. Recycle the parts. Disposal according to local regulations and other directives such as the European Batteries Directive. End of life can be predefined and the monitoring can be in place to determine if it has been reached. Affected by temperature and time, cycles.	4	Environment damage from heavy metal ions.		2	12	Medium	
H2	Noise	As for above phases								
H3	Environmental	As for above phases								
H4	Psychological	As for above phases								
H5	Ergonomics	As for above phases								
SAFETY RISKS										
S1	Fire	Transport of used/damaged batteries poses more risk of damage occurring and thermal runaway.	Used / damaged batteries requires specific procedures as they may be more sensitive than new batteries Confirm if batteries should be stored long term in a discharged state or 50% charge.	2	Thermal run away on-route or at new location.	Procedures for handling damaged or discharged batteries, modules, racks etc. Considering that they may have damage and be prone to thermal run away, leaks and other failures.	3	9	Medium	
S2	Explosion	As for above phases								

QUALITATIVE RISK ASSESSMENT RECORD
PLANT: De Aar BESS
AREA / SYSTEM: De-commissioning Phase including Re-Purposing
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No	Hazardous event	Causes	Suggested preventative measures	L	Consequences	Suggested protective, mitigation measures	C	R	Evalua -tion	Additional Recommendations
S3	Acute Chemical or Biological Toxic Exposure	As for above phases								
S4	Acute physical Impact or violent release of energy	As for above phases								
S5	Generation impact	As for above phases								
ENVIRONMENTAL RISKS										
E1	Emissions	As for above phases								
E2	Pollution	As for above phases								
E3	Waste of resources	As for above phases								
GENERAL RISKS										
G1	Aesthetics	As for above phases								
G2	Financial	As for above phases								
G3	Security	Possible theft of batteries set aside of re-purposing or disposal								
G4	Emergencies	As for above phases								
G5	Legal compliance	Disposal of hazardous "waste" is rife with difficulties and numerous regulations that need to be complied with.	Refer to EoL plan above.							

CONCLUSION

The latest containerised battery designs include many preventative and mitigation measures to reduce these risks to tolerable levels.

CHAPTER 7: CONCLUSION

7.1 Assumptions, Uncertainties, and Gaps in Knowledge

Assumptions
It is assumed that all documentation and information obtained from the different stakeholders, professional team members and specialists are accurate, unbiased and valid.

Uncertainties
The development proposal in relation to its environment was thoroughly investigated by various specialists and professionals and there are therefore no uncertainties with regards to the development as proposed.

Gaps in knowledge
Extensive relevant specialist and engineering studies were undertaken for this project and it is highly unlikely that any missing information could influence the outcome of this project.

7.2 Environmental Impact Statement

A Final Environmental Impact Statement will be provided after the completion of the Public Participation Programme and will be included in the Final Motivational Report.

At this stage, the following however applies:

The following specialist studies were conducted:

- Amendment letters were obtained from the ornithologist, aquatic specialist, heritage consultant and stormwater engineer. **They concluded that the proposed BESS project will not change the impact ratings as given during the EIA process and no new mitigation measures were proposed**.
- An Ecological Impact Assessment was undertaken and it was concluded that the proposed development would have a **Low negative botanical and faunal impact before and after mitigation**. Mitigation as proposed was included in the EMPr during the EIA process.
- A Visual Impact Assessment was conducted and **it was concluded that impacts are likely to be Medium without mitigation, and Low with mitigation**. Proposed mitigation measures have been included in the updated EMPr.
- **The High Level Risk Assessment concluded that the latest containerised battery designs combined with proposed preventative and mitigation measures will reduce the risks to tolerable levels**.

7.3 Why the Amendment Should, or Should Not be Authorised

Reasons for authorisation will be provided after the completion of the Public Participation Programme and will be included in the Final Motivational Report.

7.4 Recommendation by the Environmental Assessment Practitioner

Recommendations that should be included in the amended EA will be provided after the completion of the Public Participation Programme and will be included in the Final Motivational Report.

7.5 Affirmation by the Environmental Assessment Practitioner

We, Susanna Nel & Annelize Grobler, herewith affirm the following:

- The information contained in this report is to the best of our knowledge and experience correct.
- All relevant comment and input provided by the stakeholders and IAPs will be included and addressed in the Final Motivation Report.
- Input and recommendations from the specialist reports are provided in and integrated with the Motivation Report.
- All information made available by the EAP to IAPs and any responses thereto as well as comment and input from IAPs will be provided in the Motivation Report.

Susanna Nel
DATE: 8 September 2020

Annelize Grobler
DATE: 8 September 2020

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