HCVAfrica

HIGH CONSERVATION VALUE

FINAL MOTIVATION REPORT AND EMPR

FOR THE RICHTERSVELD WIND FARM LOCATED APPROXIMATELY 30KM SOUTH EAST OF ALEXANDER BAY AND 55KM NORTH OF PORT NOLLOTH WITHIN THE RICHTERSVELD LOCAL MUNICIPALITY IN THE NORTHERN CAPE PROVINCE (DFFE REF: 12/12/20/1967/AM5)

JUNE 2023

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LIST OF ACRONYMS

DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation (previously known as Department of Water Affairs (DWA))
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
I&AP	Interested and/or Affected Party
IEM	Integrated Environmental Management
DFFE	Limpopo Department of Economic Development, Environment and Tourism
MSDS	Material Safety Data Sheet
NCR	Non-Compliance Reports
NEMA	National Environmental Management Act (Act No. 107 of 1998)

LIST OF APPENDICES

Appendix A	Certified copies of EA
Appendix B	Terrestrial Revised Sensitivity Report

1 STRUCTURE OF THIS EMPR

This Draft Environmental Management Programme (EMPr) is in fulfilment of section 24N of NEMA and the NEMA: EIA Regulations (2014), as amended, and is compiled in line with the contents of Appendix 4 of GN R No. 326 indicated in Table 1-1 below.

Table 1–1: NEMA EIA listed activities

NEMA EIA REGULATIONS (2014) AS AMENDED: CONTENTS OF THE EMPr	Location in this report
Appendix 4: Section 1 (a) Details of- (i) the EAP who prepared the EMPr; and (ii) the expertise of the EAP, including a curriculum vitae	Section 3
Appendix 4: Section 1 (b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Sections 4 and 6
Appendix 4: Section 1 (c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Section 4
Appendix 4: Section 1 (d) A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including- (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities.	Section 6
Appendix 4: Section 1 (f) A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to – (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	Section 6
Appendix 4: Section 1 (g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Section 6 and 8
Appendix 4: Section 1 (h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).	Section 7
Appendix 4: Section 1 (i)	Section 7 and 10

An indication of the persons who will be responsible for the implementation of the impact management actions	
Appendix 4: Section 1 (j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented.	Section 10
Appendix 4: Section 1 (k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).	Section 10
Appendix 4: Section 1 (l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 10
Appendix 4: Section 1 (m) An environmental awareness plan describing the manner in which- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the Environment.	Section 11
Appendix 4: Section 1 (n) Any specific information that may be required by the competent authority.	N/A

In addition, the EMPr is also aimed at being aligned with the generic environmental management programme requirements as stipulated by the Department of Environmental Affairs (DEA – now the DFFE) on 22 March 2019 in Government Gazette No 42323.

2 INTRODUCTION

Richtersveld Wind Farm (Pty) Ltd (the Proponent) appointed HCV Africa to prepare a Part 2 Amendment Application in terms of Regulation 31 of the National Environmental Management Act (Act 107 of 1998) (NEMA), as amended. The Proponent holds an existing Environmental Authorization (EA) (DEAT/EIA/12668/2011, including subsequent amendments thereto).

Table 2-1: Environmental Authorisations to date

Reference Number of EA:	DEAT/EIA/12668/2011
Date EA issued:	28/05/2012
Reference Number of all amendments authorized, including the dates of approval:	DEA Reference: 12/12/20/1967 (11/09/2012) DEA Reference: 12/12/20/1967 (14/06/2013) DEA Reference: 12/12/20/1967/AM1 (30/09/2015) DEA Reference: 12/12/20/1967/AM3 (23/06/2017) DFFE Reference: 12/12/20/1967/AM4 (15/03/2022)

Proposed changes to the project description (both layout and technical design) by the Proponent necessitates the need to amend its existing EA as required in terms of NEMA. The Minister of the Department of Forestry, Fisheries and the Environment (DFFE) is the Competent Authority (CA) as contemplated in Section 24C(2)(a)(i) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended by section 4 of the National Environmental Management Laws Amendment Act, 2022 (Act No. 02 of 2022).

HCV Africa fulfils all the requirements as an independent EAP in terms of the NEMA and the associated NEMA: EIA Regulations (2014), as amended (hereinafter called “the EIA Regulations”).

2.1 Purpose of this EMPr

An Environmental Management Programme (EMPr) is a stand-alone document used to prescribe management mechanisms/methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits of a development. An EMPr bestows a ‘Duty of Care’ on those who cause, have caused or may in future cause pollution or degradation of the environment.

It should be noted that this EMPr is a dynamic document which should be updated as required on a continuous basis. Any amendments made must be submitted to the Environmental Control Officer (ECO), the Project Manager and the Competent Authority for approval prior to implementation.

2.2 Structure of this EMPr

This EMPr provides management measures towards mitigation of environmental Impacts for three main development phases, namely:

- Pre-construction
- Construction and
- Operations

The impact management actions described in this EMPr are largely based on the findings and recommendations of the specialist reports which are attached as appendices to the EA Report.

2.3 Checks and corrective action

Checking and corrective action form part of the environmental management function and are aimed at ensuring that the necessary environmental management activities are being implemented and that the desired outcomes are achieved.

2.4 Legal requirements

The list of applicable legislation provided below is intended to serve as a guideline only and is not exhaustive: -

- The Constitution of the Republic of South Africa Act 108 of 1996;
- National Environmental Management Act 107 of 1998, as amended;
- National Environmental Management: Biodiversity Act 10 of 2004;
- Hazardous Substances Act 15 of 1973;
- National Heritage Resources Act 25 of 1999;
- National Environmental Management: Waste Management Act 59 of 2008;
- National Water Act (Act 36 of 1998);
- Conservation of Agricultural Resources Act (Act No. 43 of 1983);
- Health Act 63 of 1977;
- Occupational Health and Safety Act 85 of 1993; and
- Relevant provincial legislation, Municipal by-laws, Powers and ordinances.

2.4.1 The NEMA EIA Regulations (2014, as amended)

The purpose of these Regulations is to regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.

2.4.2 Part 2 EA Amendment Regulations

In terms of Regulation 31 and 32 of the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations 2014, as amended, states that:

'An environmental authorisation may be amended by following the process prescribed in this Part if the amendment will result in a change to the scope of a valid environmental authorisation where such change will result in an increased level or 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.

32. Process and consideration of application for amendment

(1) *The applicant must within 90 days of receipt by the competent authority of the application made in terms of regulation 31, submit to the competent authority—*

(a) a report, reflecting—

(i) an assessment of all impacts related to the proposed change;

(ii) advantages and disadvantages associated with the proposed change; and

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

(iv) any changes to the EMPr; which

report—

(aa) had been subjected to a public participation process, which had been agreed to by the competent authority, and which was appropriate to bring the proposed change to the attention of potential and

registered interested and affected parties, including organs of state, which have jurisdiction in respect of any aspect of the relevant activity, and the competent authority, and

(bb) reflects the incorporation of comments received, including any comments of the competent authority; or

(b) a notification in writing that the report will be submitted within 140 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the report, which changes or information was not contained in the report consulted on during the initial public participation process contemplated in subregulation (1)(a) and that the revised report will be subjected to another public participation process of at least 30 days.

In the event where subregulation (1)(b) applies, the report, which reflects the incorporation of comments received, including any comments of the competent authority, must be submitted to the competent authority within 140 days of receipt of the application by the competent authority.

2.5 General duty of care

The Applicant shall comply with the general duty of care principles in terms of good international industry practice (GIIP) and also enshrined in section 2 of NEMA. Although, the principles were taken into account during the formulation of this EMPr and included in the EMPr where relevant, the ultimate duty of care throughout the Project lifespan remains with the Applicant.

Duty of care requires that the Applicant is responsible for managing environmental, health and safety related impacts throughout the lifespan of the Project. The Applicant shall take all reasonable and practical steps to prevent harm to the receiving environment (biological, physical, social).

There are three general aspects of the duty of care principle:

- sustainable use of natural resources;
- conservation of biological diversity; and
- avoidance of harm to people.

Duty of care therefore requires that the Applicant should take reasonable measures to prevent, minimise and rectify pollution and environmental degradation.

2.6 Availability of the EMPr

Once completed and signed, the holder of the EA must make the EMPr available to the public in accordance with the requirements of Regulation 26(h) of the EIA Regulations.

3 DETAILS OF THE EAP

Per APPENDIX 4 of GN R 326, an environmental management programme must include:
a) Details of –
i. The EAP who prepared the environmental management programme; and
ii. The expertise of the EAP to prepare an environmental management programme, including a curriculum vitae.

3.1 EAP details

Details of the EAP:

Trading name	HCV Africa
Contact person	Nelius Scheepers (EAP)
Postal address	Postnet Suite #364, Private Bag X11326, Nelspruit, 1200
Cell	0828833004
Email	0828833004

3.2 EAP experience

In terms of the EIA Regulations (2014), as amended, an EAP is an individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental management instruments introduced through regulations. The EAP must be independent, objective and have expertise in conducting environmental impact assessments. Such expertise should include knowledge of all relevant legislation and of any guidelines that have relevance to the proposed activity.

An EAP or person compiling a specialist report or undertaking a specialised process, must perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant and disclose to the applicant and competent authority all material information in the possession of the EAP or person compiling a specialist report or undertaking specialised process, that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority in terms of these regulation; or the objectivity of any report, plan or document to be prepared by the EAP or person compiling a specialist report or undertaking a specialised process, in terms of these regulations for submission to the competent authority.

In fulfilment of this requirement, the author of this report (Nelius Scheepers) is an experienced Environmental Management professional with over 22 years of experience in agri-business, oil and gas, mining, major civil infrastructure projects, and industrial manufacturing. Nelius is a registered Professional Natural Scientist (Reg No. 400138/03), a Registered Environmental Assessment Practitioner (EAPSA 2019/1948) an internationally registered Environmental Auditor (IEMA Reg No. 0051570).

One of his key speciality areas is as Project Manager for large-scale, complex EIA/ESIA/ESHIA projects. He successfully managed environmental assessment projects for multi-national clients in Africa, the Middle East and Asia. Environmental Assessments were executed in compliance with in-country legislation and international standards (e.g. Equator Principles, IFC and Asian Development Bank) and other lender requirements.

Nelius is an internationally registered and experienced environmental auditor who can critically review projects, operations, ESIA, project documentation, environmental performance, and ESMS. Nelius performed numerous environmental compliance audits, environmental management system audits, and IFC due diligence audits. He has worked on projects in South Africa, Swaziland, Botswana, Zambia, Mozambique, DRC, Tanzania, Uganda, Ethiopia, Namibia, Angola, Cameroon, Myanmar, Uzbekistan, Qatar, and Saudi Arabia.

Nelius' qualifications are as follows:

- M.Sc. Water Resource Management and Environmental Management, University of Pretoria, South Africa, 2000;
- B.Sc. (Hons) Wildlife Management, University of Pretoria, South Africa, 1999; and
- B.Sc. Ecology, University of Pretoria, South Africa, 1998.

Nelius has advanced knowledge of Integrated Environmental management (IEM) tools and principles, the principles and fundamental criteria of the Environmental Conservation Act, the principles and fundamental criteria of the National Environmental Management Act (NEMA), provincial policies and regulations including draft and future legislation.

3.3 Independence requirement

The requirement for independence of the environmental practitioner is aimed at reducing the potential for bias in the environmental process. Neither HCV Africa/the EAP, nor any of its sub-practitioners have any interests in secondary or downstream developments that may arise from the authorisation of the proposed project. Furthermore, Nelius Scheepers is bound by the codes of conduct for EAPASA as well as SACNASP, and upon registering the project, has signed a declaration affirming the following:

- HCV Africa/EAP will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- HCV Africa/EAP declares that there are no circumstances that may compromise its objectivity in performing such work;
- HCV Africa/EAP has expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- HCV Africa/EAP will comply with the Act, regulations and all other applicable legislation;
- HCV Africa/EAP has no, and will not engage in, conflicting interests in the undertaking of the activity;
- HCV Africa/EAP undertake to disclose to the applicant and the competent authority all material information in its possession that reasonably has or may have the potential of influencing, any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- HCV Africa/EAP will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- HCV Africa/EAP will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- HCV Africa/EAP will keep a register of all interested and affected parties that participated in a public participation process;
- HCV Africa/EAP will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
- All the particulars furnished by me in this report are true and correct; and
- HCV Africa/EAP will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations.

4 PROPOSED ACTIVITY

Per APPENDIX 4 of GN R 326, an environmental management programme must include: (b) A detailed description of the aspects of the activity that are covered by the draft environmental management programme as identified by the project description;
(c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.

4.1 Existing authorisations

The proposed Project scope was authorised and approved on 28 May 2012, and was subsequently amended by the following:

- DEA Reference: 12/12/20/1967 (11/09/2012)
- DEA Reference: 12/12/20/1967 (14/06/2013)
- DEA Reference: 12/12/20/1967/AM1 (30/09/2015)
- DEA Reference: 12/12/20/1967/AM3 (23/06/2017)
- DEA Reference: 12-12/20/1967/AM4 (15/03/2022)

4.2 Part 2 amendment

The purpose of this statutory process is to conduct a Part 2 EA amendment according to the NEMA EIA Regulations (2014), as amended for the proposed changes in technical and layout design of the proposed activity.

This Part 2 amendment where the change in scope occurs is conducted in terms of sections 32(1) and 32(2) of the NEMA EIA Regulations, 2014 as amended. Section 32(2) provides the legislative framework in terms of which this amendment is prepared, and this includes the following:

- An application to be made to the Competent Authority (CA) following which the allowance of a ninety (90) day prescribed timeframe to submit this report, including a 30-day process of public participation.
- This report must present an assessment of all impacts related to the proposed change(s), an evaluation of the advantages and disadvantages associated with the proposed change(s), proposed mitigation measures to avoid/manage impacts associated with the proposed change(s) and identify changes required to the EMPr, if any.

4.3 NEMA listed activities

4.3.1 Listed activities and the Part II amendment

This Part II amendment does not trigger any new NEMA Listed activities in terms of the EIA Regulations, 2014 as amended.

4.3.2 Addition of BESS storage

Based on personal communication with the Competent Authority on 20 April 2023, it was advised as follows:

> *"Where a battery is fully assembled, such is not deemed a container for the storage, or storage and handling of a dangerous good. The relevant listed activities related to such storage would therefore not be triggered for such assembled batteries.*
>
> *Although a battery is not regarded as a facility or infrastructure for the storage, or storage and handling of a dangerous good, there may indeed be instances where a battery is not fully assembled and the electrolyte (or substances making up such electrolyte) intended for such battery, may potentially be stored on site, in a container (e.g. tanks), prior to filling. In such instances, such facility*

or infrastructure will indeed be regarded as a facility or infrastructure for the storage, or storage and handling of a dangerous good, for the purposes of the EIA Regulations, as these would have as its purpose then, not the storage of energy, but indeed the storage of that substance, if indeed a dangerous good (as defined) is being stored in containers and meets the relevant threshold.

Where electrolyte is indeed stored in containers, AND such electrolyte meets the definition of dangerous goods as per the EIA Regulations, 2014 (as amended) AND the relevant threshold of the listed or specified activity is met or exceeded, AND in the case of Listing Notice 3 also occurs in an identified geographical area, such listed or specified activity will be triggered and will require environmental authorisation."

It thus follows that the addition of BESS to the Part II amendment does not trigger any additional listed activities as:

- The batteries are fully assembled and thus not regarded as a container for the storage of a dangerous good;
- No electrolyte is stored on site as batteries are fully assembled/enclosed and used exclusively for the storage of energy.

4.4 Project locality and extent

The proposed Project scope was authorised and approved on 28 May 2012, and was subsequently amended by the following:

- DEA Reference: 12/12/20/1967 (11/09/2012)
- DEA Reference: 12/12/20/1967 (14/06/2013)
- DEA Reference: 12/12/20/1967/AM1 (30/09/2015)
- DEA Reference: 12/12/20/1967/AM3 (23/06/2017)
- DEA Reference: 12-12/20/1967/AM4 (15/03/2022)

4.4.1 Locality

The EA originally authorised Korridor Wes Farm (Rooibank (Farm 7/2); and Farm Re/1 for the proposed development. It is currently only proposed to make use of Farm Part of Wes Korridor Wes Farm (Witbank (Farm 6/2) given the change to the project layout.

Table 4-1: Coordinates of site infrastructure components

Project aspect/component Turbine positions	Coordinates
Turbine 1	28°45'39.30"S 16°39'45.15"E
Turbine 2	28°45'47.23"S 16°40'0.80"E
Turbine 3	28°45'37.86"S 16°40'14.66"E
Turbine 4	28°45'41.48"S 16°40'52.76"E
Turbine 5	28°45'38.52"S 16°40'27.32"E
Turbine 6	28°45'29.01"S 16°42'33.43"E
Turbine 7	28°44'58.15"S 16°41'18.21"E
Turbine 8	28°46'5.17"S 16°40'7.68"E
Turbine 9	28°44'36.04"S 16°41'11.92"E
Turbine 10	28°44'37.85"S 16°41'39.19"E
Turbine 11	28°45'38.87"S 16°39'32.72"E
Turbine 12	28°44'57.79"S 16°41'2.98"E
Turbine 13	28°45'12.70"S 16°39'26.26"E

Project aspect/component	Coordinates
Turbine positions	
Turbine 14	28°46'0.29"S 16°39'53.00"E
Turbine 15	28°45'56.18"S 16°39'38.67"E
Turbine 16	28°45'12.09"S 16°39'12.57"E
Turbine 17	16°39'12.57"E 16°39'52.33"E
Turbine 18	28°45'28.98"S 16°42'59.27"E
Turbine 19	28°44'55.92"S 16°39'38.16"E
Turbine 20	28°44'56.68"S 16°40'48.25"E
Turbine 21	28°44'54.40"S 16°42'34.64"E
Turbine 22	28°44'13.24"S 16°40'50.72"E
Turbine 23	28°44'37.49"S 16°40'42.04"E
Turbine 24	28°44'12.39"S 16°41'4.24"E
Turbine 25	28°44'13.84"S 16°41'18.38"E
Turbine 26	28°45'40.47"S 16°40'40.14"E
Turbine 27	28°45'28.98"S 16°42'46.37"E
Turbine 28	28°44'54.48"S 16°42'20.63"E
Turbine 29	28°44'13.47"S 16°41'32.01"E
Turbine 30	28°44'13.11"S 16°41'45.27"E
Turbine 31	28°44'36.88"S 16°41'25.61"E
Turbine 32	28°44'54.00"S 16°42'48.20"E
Bend points of WEF development site perimeter	
Point A	28°45'11.24"S 16°39'4.96"E
Point B	28°44'27.92"S 16°40'25.45"E
Point C	28°44'3.66"S 16°40'40.07"E
Point D	28°44'4.11"S 16°42'52.91"E
Point E	28°44'22.10"S 16°43'54.32"E
Point F	28°48'26.72"S 16°43'34.39"E
Point G	28°48'20.83"S 16°40'35.11"E
On site substation corner coordinates	
Corner A	28°44'30.76"S 16°40'49.30"E
Corner B	28°44'29.26"S 16°40'52.27"E
Corner C	28°44'32.16"S 16°40'53.95"E
Corner D	28°44'33.61"S 16°40'50.99"E
BESS corner coordinates	
Corner A	28°44'28.56"S 16°40'56.93"E
Corner B	28°44'28.56"S 16°41'2.40"E
Corner C	28°44'32.54"S 16°41'2.30"E
Corner D	28°44'32.50"S 16°40'57.02"E
Pylon positions	

Project aspect/component	Coordinates
Turbine positions	
Pylon positions will be finalised with Eskom and included in the final layout map to be authorised by the DFFE before commencement as part of condition 11 of the RoD.	
Centre point coordinates for batching plant, keystone storage area, O&M building, reference masts, storage area and temporary facilities/laydown area.	
These areas are being finalised by the applicant as there is a possibility to use already disturbed mining areas west of the proposed project across the R382. These areas will be included in the final layout plan to be authorised by the DFFE as part of condition 11 of the RoD.	

4.4.2 Title and ownership

The landowner of the relevant properties is the Richtersveld SIDA IHUB Communal Property Association (CPA/01/328/A) (Add landowner agreement / proof of ownership and consent).

4.4.2.1 Project components: Current Authorised Layout and technical aspects

4.4.2.1.1 Summary of project technical changes

The change to the project described in the sections above are summarised in Table 4-2.

Table 4-2: Summary of project technical changes

Technical aspect	Approved	Proposed
Number of turbines	70	32
Power output per turbine	2MW – 3 MW	5 MW - 7 MW
Total project power output	210 MW	224 MW
Hub height	100 m	130 m
Rotor diameter	117 m	175 m
Vertical disturbance area	752,592m^2	769,790m^2 (2.9% increase)
Turbine disturbance footprint (per turbine)	400m^2	362m^2
Total turbine disturbance footprint (all turbines)	28,000m^2	11,584m^2
Laydown area (per turbine)	2,500m^2	3,300m^2
Laydown area (all turbines)	175,000m^2	105,600m^2
Access roads	12m	Road reserve of 5m – 12m Internal roads during construction of 12m wide Internal roads during operation 4m – 6m
BESS	N/A	125 MW
Project layout	See Figure 4-2 illustrating the old versus new layout positions.	

4.4.3 Proposed layout changes and changes to technical aspects

The Part 2 amendment includes, among other things, changes to the physical layout of the turbines on the Project footprint. The updated layout is illustrated in Figure 4-1.

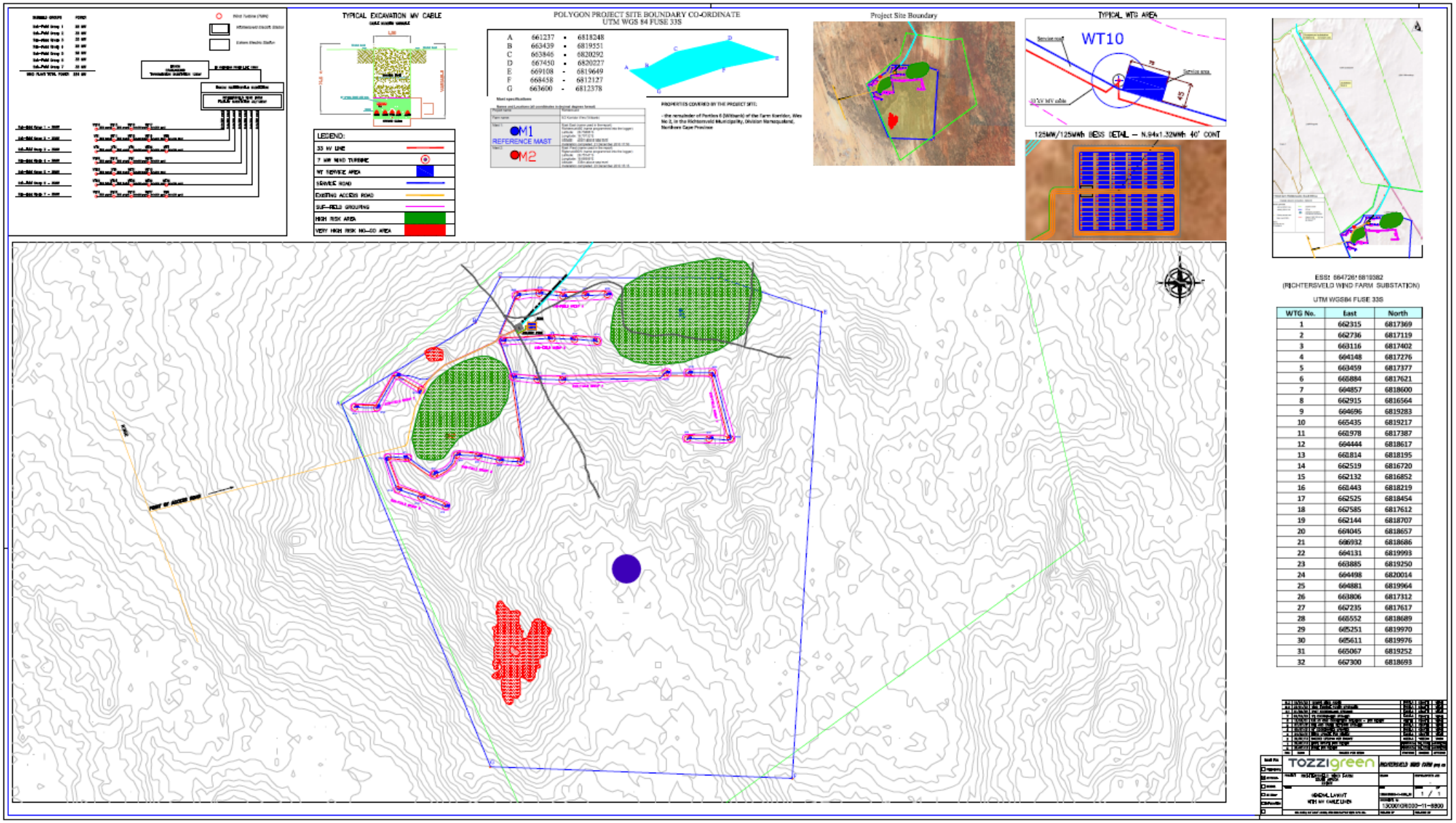

Figure 4-1: Richtersveld Wind Farm (Pty) Ltd. project location and new layout with BESS included

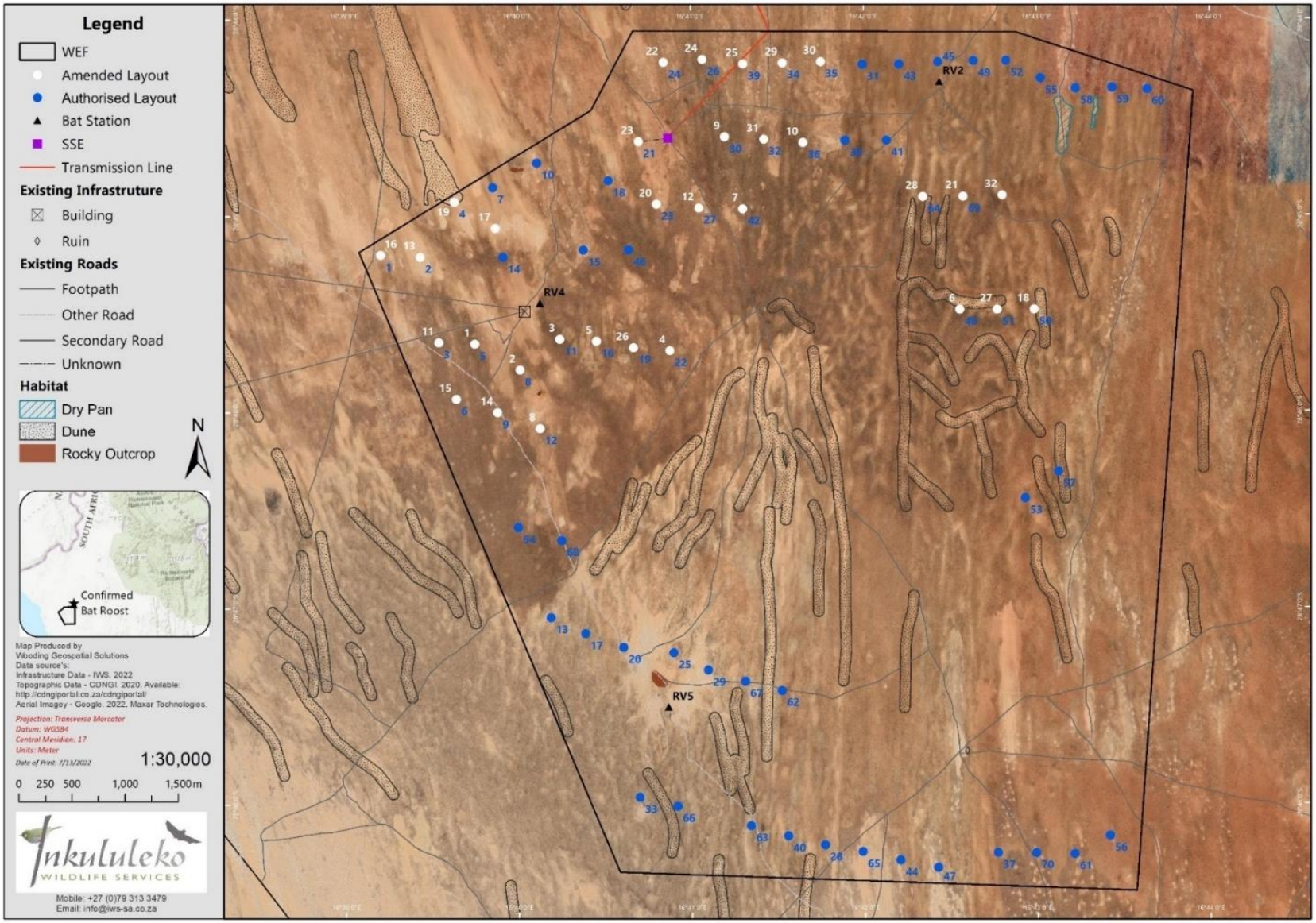

Figure 4-2: Richtersveld Wind Farm (Pty) Ltd. current layout versus authorised layout

4.4.3.1 Battery Energy Storage System

The proposed Battery Energy Storage System (BESS) will consist of multiple battery units (with an approximate capacity of 125 MW) housed in containers which will be delivered pre-assembled to the project site. These containers are usually raised slightly of the ground and can be stacked if necessary.

The BESS will consist of Lithium-Ion (Li-ion) batteries as these batteries are the most common stationary batteries in the market today. According to the regulations, the proposed battery storage facility installation will not trigger any listed activities as it is to be within the existing authorised footprint of the project. In addition, the activities related to the storage of dangerous goods will not be triggered by the installation. This is because a battery is not considered a container and the electrolytes used within the battery storage facilities function like transformers within substations, converting high voltage electricity to lower voltage for further distribution. The battery's function is not for the storage or handling of dangerous goods.

Furthermore, battery storage does not trigger any listed activities relating to the generation of electricity as this technology does not 'generate' electricity, it simply stores electricity generated by the renewable energy facility of the Richtersveld Wind Farm.

4.4.3.2 Number of turbines and output generation capacity

The EA authorised the construction of seventy (70) wind turbines with an output of between 2 MW – 3 MW per turbine, with a total energy generation capacity for the facility of up to 210 MW. The revised project description now reduces the total number of turbines to thirty two (32), with an output of approximately 5 MW – 7 MW per turbine. The change in the total number of turbines provides a potential generation capacity of 224 MW.

4.4.3.3 Hub height of turbines

The Hub Height of the new thirty two (32) proposed wind turbines will increase from the approved 100m to a proposed 130m.

4.4.3.4 Rotor diameter of turbines

The rotor diameter from tip of blade to tip of blade of the approved wind turbines is 117m in extent and is increased to a rotor diameter from tip of blade to tip of blade of 175m in extent.

4.4.3.5 Vertical disturbance area

It is anticipated that there will be an imperceptible increase in the vertical bat/bird collision area because of the reduced number of turbines but having an increased diameter of the rotor blades. The expansion of the vertical disturbance area is calculated to be approximately 2.29%.

4.4.3.6 Wind turbine and laydown area disturbance footprint

The approved seventy (70) wind turbine total disturbance footprint is approximately: 70 x 400 m² = 28,000 m² (for wind turbine foundations) and 70 x 2,500 m² = 175 000 m² for the laydown area footprint, thus totalling 203,000 m², equalling approximately 20,30ha. The proposed disturbance footprint for the thirty two (32) wind turbines is: 32 x 362 m² = 11,584 m² (for wind turbine foundations) and 32 x 3,300 m² = 105,600 m² for the laydown area footprint, thus totalling 117,184 m² in extent, equalling approximately 11.7ha.

4.4.3.7 Change in the layout plan

With modifications to turbine numbers the layout plan has also been modified and sensitivities identified in the original EIR have been avoided as far as possible (Figure 4-2). Furthermore, the original identified ecological site sensitivities have been confirmed by specialist updates to the project area.

4.4.3.8 Access road

A new access road from the west to the east between points C and D in the vicinity of turbine #WT11. The road reserve would have a width of approximately 5-12m. Internal roads are assumed to be up to 12 m wide during construction and reduced to 4-6m during operations. The total road length of all internal roads and access road is 19.25km.

4.5 Project motivation

4.5.1 Need and desirability

The DEA (2017) Guideline on Need and Desirability (DEA) provides under the strategic context for the consideration of need and desirability the following:

- National policies and strategies support growth in the economy;
- These policies take cognisance of strategic concerns such as climate change, food security, as well as the sustainability in supply of natural resources and the status of our ecosystem services; and
- To achieve our Constitutional goal of a better quality of life for all now and in future, through equitable access to resources and shared prosperity, it is essential that society improves on the efficiency and responsibility with which we use resources, and improve on the level of integration of social, economic, ecological and governance systems.

The DEA&DP Guideline (2013) states that the essential aim of need and desirability is to determine the suitability (i.e., is the activity proposed in the right location for the suggested land-use/activity) and timing (i.e., is it the right time to develop a given activity) of the development. Therefore, need and desirability addresses whether the development is being proposed at the right time and in the right place.

The need and desirability aspect of this Project was clearly motivated and agreed to by the DEA (now the DFFE) by way of the EA issued for this project in May 2012. The following is extracted from the ERM EIR (November 2011):

Global dependence on fossil fuels, rising fossil fuel prices and concern regarding the impacts of climate change has resulted in increasing international pressure on countries around the world to increase their share of energy from renewable sources. Targets for the promotion of renewable energy now exist in more than 58 countries around the world and wind energy is emerging as an important component of the energy market in a number of countries. Globally, wind turbines currently generate more than 1 percent of global electricity.

At the Copenhagen Conference in December 2009 South Africa's president also set a target for the reduction of CO_2 (4) emissions, as laid out in the Integrated Resource Plan (IRP 2010) (5) which sets a target reduction of CO_2 emissions by 34 percent by 2020, a goal that the renewable energy sector plays a major role in achieving. This goal was reiterated by Minister Edna Molewa at the December 2010 Climate Change Conference in Cancun, Mexico.

Emergency load shedding in South Africa during 2007 and 2008 highlighted the challenges facing South Africa in terms of electricity generation, transmission and distribution. The Integrated Resource Plan (IRP) for electricity supply, drafted at the time, acknowledged the role that independent power producers (IPPs) (including those harnessing renewable energy resources) can play in ensuring sustainable electricity generation, and sets a goal that 30 percent of all new power generation will be derived from IPPs.

The intention of the applicant in establishing wind energy facilities is to contribute to South Africa's goal of developing wind resources to generate electricity, thereby reducing the country's dependence on non-renewable fossil fuel resources and contributing to climate change mitigation. The proposed Richtersveld Wind Farm project would contribute to providing a future of increased energy security and sustainability whilst providing energy to facilitate South Africa's continuing development.

The applicant has indicated that the Richtersveld site was particularly suited for wind energy development due to the strength of the prevailing wind resources. Topography such as hills and ridges have a significant influence on average wind speed and represent areas of greater electricity generation relative to the number of turbines and the disturbance footprint. Richtersveld Wind Farm (Pty) Ltd emphasises that since the environmental impact is often proportional to the number of wind turbines, the *environmental impact per unit of electricity generated* or the "environmental efficiency" is optimised where the wind farm is constructed in a particularly windy area. This is particularly relevant where the need

to maximise the benefit of reducing harmful carbon dioxide emissions from coal fired power stations must be balanced by the need to minimise the negative consequences of wind farms, and this is best achieved by selecting sites with maximum environmental efficiency.

It is trite that South Africa is still faced with debilitating electricity load shedding in 2022, and that not enough has been done to tie green energy into the national electricity grid. During the Conference of Parties (COP26) it was stated that:

- South Africa's current reliance on coal power is a serious problem, and Eskom, not only the 12th-biggest carbon emitter in the world, but it has also faced significant issues keeping the lights on in South African homes, with several technical issues resulting in scheduled power cuts of up to four hours a day in recent week.
- Also significant is that South Africa's coal mining and processing efforts have led it to be the biggest emitter of sulphur dioxide in the world, indicating the gravity of its negative impact on the local and global environment.
- In November 2021 a deal was struck at the COP26 Climate Conference, where European Union member states and the United States have partnered with South Africa to help move the middle-income country away from coal power and towards green energy sources.
- This green funding will go towards establishing renewable energy sources in the country, repurposing coal power stations (which the country aims to phase out in the next 15 years), investing in new sustainable energy sectors including green hydrogen and electric vehicles, and making the country's economy less reliant on fossil fuels.

It is against this background and the South African Government's aim to secure 17 800 MW of renewable energy by 2030, through the IRP, that need and desirability for the Project was considered from an international, national and regional perspective.

4.5.2 Motivation for these changes and alternatives considered

The main reason for the proposed amendments is a change in turbine technology that requires fewer but larger turbines that generate higher MW outputs. This change in technology decreases the total site footprint of the thirty two (32) wind turbines versus the original planned seventy (70) wind turbines by approximately forty one (41%) percent. Furthermore, the decrease in the number of wind turbines increases the vertical collision impacts of birds and bats with approximately two comma two nine (2,29%) percent. The decrease / reduction in the total laydown area disturbance footprint is approximately forty six (46%) percent.

It is possible the layout (dimensions, quantities, and components) may change during detailed design phase.

5 STRUCTURE OF THE EMPR

Generally, an EMPr is divided into four (4) phases of development. Each phase has specific issues unique to that period of the construction. The impacts are identified and given a brief description. The phases of the development are then identified as below:

5.1 Pre-construction phase

This section of an EMPr provides management principles for the planning and design phase of a project. This will ensure that any requirements and best practise mechanisms are built into the planning / design phase to be developed in the construction and operational phase.

5.2 Construction phase

The construction phase refers to the actual construction of the development and includes all earthworks for foundations of the turbines, erection of the turbines and transmission lines, BESS, and other relevant infrastructure. In terms of this application, this phase relates to the remedial work that will have to be performed to implement the recommendations of the specialist.

5.3 Operational phase

This section of an EMPr provides management principles for the operation and maintenance phase of a project. Environmental actions, procedures and responsibilities required from the applicant during the operation and maintenance phase are specified.

The Applicant must ensure that the Operational Phase maintains the underpinning principles 'Duty-of-Care-to-the-Environment' and ideals of sustainable development.

5.4 Closure and decommissioning phase

Decommissioning refers to the process of removing the operating assets of any development after completion of the operating life cycle. Renewable energy is a long term commitment to produce electricity for distribution. This means that enterprise is a long term one and it is thus not known when, if at all, closure may occur. However, since this is an unknown coefficient, specific management recommendations are not included with this EMP. In the event that decommissioning is required, all relevant legal processes must be complied with.

6 IMPACT MITIGATION AND / OR MANAGEMENT MEASURES

Per APPENDIX 4 of GN R 326, an environmental management programme must include:
(d) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
(i) Planning and design;
(ii) Pre-construction;
(iii) construction activities;
(iv) Rehabilitation of the environment after construction and where applicable post closure; and
(v) where relevant, operation activities;
(e) a description and identification of impact outcomes required for the aspects contemplated in (d).
(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable include actions to –
(i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
(ii) Comply with any prescribed environmental management standards or practices;
(iii) Comply with any applicable provisions of the Act regarding closure, where applicable;
(iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.

6.1 Impacts and mitigation: Avifauna

The following impacts were assessed as part of this impact assessment:

- Construction and decommissioning phases:
  - Habitat destruction and disturbance
- Operational phases:
  - Increased priority species collision with wind turbines
  - Habitat disturbance

In the previous EIR, these were rated as follows:

Impact	Significance rating pre-mitigation	Significance rating post-mitigation
Construction and decommissioning phases		
Habitat destruction and disturbance	Moderate	Minor-Moderate
Operational phase		
Increased priority species collision with wind turbines	Moderate	Minor-Moderate
Habitat destruction and disturbance	Moderate-Major	Moderate

6.1.1 Construction and decommissioning phases

Habitat destruction and disturbance

It is further expected that displacement due to disturbance, and habitat loss may also occur during construction, operation and decommissioning phases of the project. Displacement was recorded for some raptors species at South African wind farms for Martial Eagles *Polemaetus bellicosus* and is known for breeding pairs and fledglings hawks in the USA (Kolar and Bechard 2016). There is insufficient data from South Africa to know if other species may be displaced through disturbance. For habitat loss it is unlikely to be a negative aspect given the small footprint size of the roads and hard stands in relation to the total area of the wind farm. Impacts pre-mitigation is rated as moderate and would decrease to minor post-implementation of mitigation measures (see Table 6-1).

It is anticipated that habitat loss may occur during all phases of the project but typically will be experienced during construction. Impacts pre-mitigation is rated as moderate and would decrease to minor post-implementation of mitigation measures (see Table 6-1). All turbines in high risk areas have been re-positioned by the design team in light of the extensive avian data from 2012 and 2013. All now lie outside the designated high-risk areas. This should substantially reduce risk to the Priority birds on site.

6.1.2 Operational phase

Collision with the wind turbines

The results of the modelling of fatalities indicate that avian fatalities due to collisions during the operational phase are expected to *increase exponentially* at 1.3-fold from an average 9.1 fatalities/turbine (95% Confidence Interval 8 to 11) to 21 (95% Confidence Interval 11 to 42) fatalities/turbine/year as hub heights are increased from 100m to 130m.

These figures indicate a 130% increase in fatalities is expected on average ([9.1-21]/9.1) per turbine. However, at the same time, the number of turbines will decrease from the authorised 70 to 32 turbines.

The forecast of total avian fatalities is 636 birds for the 70 turbines for the operational life of the facility with 100m hub height, but 672 birds for the 32 turbines for the operational life of the facility with a 130m hub height. This represents a 5.7% increase in fatalities during the total operational phase for the new project scenario.

As this is within the confidence limits of the models presented here, and is not expected to substantially increase fatalities as long as the recommendations/mitigation measures are implemented. Impacts pre-mitigation is rated as major and would decrease to moderate post-implementation of mitigation measures (see Table 6-1).

Habitat destruction and disturbance

As is detailed under Construction/Decommissioning Impacts identified are summarised in Table 6-1.

Table 6-1: Impact assessment – Avifauna

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Fatalities due to collisions of priority bird species	O	N	L	H	H	R	H	M	Moderate	Monitor fatalities Behaviour monitoring of priority species. Landowner management to implement responses. Implement shut-down on demand when a Black Harrier fatality occurs or paint blades in a striped manner to improve visibility to raptors. No Priority birds may be persecuted in any form. That is, either directly (shooting,	Moderate

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
										trapping, nest removal) or indirectly (poisoning).	
Disturbance due to displacement	COD	N	L	H	H	L	L	M	Moderate	Behaviour monitoring of priority species. Landowner management to implement responses. No Priority birds may be persecuted in any form. That is, either directly (shooting, trapping, nest removal) or indirectly (poisoning).	Minor

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Habitat loss	COD	N	L	H	H	L	L	M	Moderate	Behaviour monitoring of priority species. Landowner management to implement responses. No Priority birds may be persecuted in any form. That is, either directly (shooting, trapping, nest removal) or indirectly (poisoning).	Minor

6.1.3 Mitigation measures

6.1.3.1 Monitoring programme

At a minimum, 70% of all turbines shall be surveyed over a 2-week period, at 3-4 turbines per day, with a search radius around each turbine base of 70-100m. This must be undertaken year-round for two years.

For every fatality observed the following shall be recorded:

- Photographs of the fatality;
- GPS reading of the exact position;
- Species killed;
- Turbine number where fatality occurred;
- Other relevant site and climatic data; and
- Formulate the above in a report to management and submit a copy to Birdlife South Africa's Renewable Energy division.

Live bird monitoring (especially Priority species) shall include:

- Nests of other Priority species must be reported, and monitored, if found on site;
- Monitor during construction and operational phases;
- Start this monitoring in winter for the larger species and then spring followed by summer (e.g., June, September, December);
- Formulate a short report to report on findings, inter alia:
- the activity status of the nest (active/inactive) and stage (eggs, nestling, success/failure);
- special attention must be made for flights near spinning turbines (avoidance behaviour, attraction to, or impact by the blades);
- report any deaths detailing time, turbine number, behaviour, identity of the adult or juvenile, resident, or floater; and
- All deaths must be accompanied by photographs of the carcass in situ, with GPS point clearly marked.

Monitoring should be supervised by either the Environmental Control Officer (ECO) or a suitably qualified ornithologist who is responsible for supervising search teams and identifying remains of collision victims.

6.1.3.2 Landowner management

A fast response time is required if the turbines are killing Red Data species or other Priority species. The response time must be within one month of the date of the fatality occurring. This applies to both the wind farm and the landowner's management practices. A suitably qualified avian specialist must be employed to identify avian carcasses to determine if they are Priority species, and thus whether mitigation actions are required.

No Priority birds may be persecuted in any form. That is, either directly (shooting, trapping, nest removal) or indirectly (poisoning).

6.1.3.3 Special requirements for Black Harrier fatalities

Population viability assessments of Black Harrier populations in the Birdlife South Africa Black Harrier guidelines (Cervantes, Peralta et al. 2022) indicate that the global population consists of only 1 300 birds and highly sensitive to even one wind farm death of an adult bird.

Given that eight Black Harriers have been killed by South African wind farms up to April 2021 (Perold et al. 2020) and that the harriers regularly occur on the Richtersveld site, it is essential that monitoring is undertaken for at least 24 months.

Should the first tier of mitigation – turbines located outside recognised high-sensitivity areas – fail to reduce the collision-frequency of Red Data or Priority species (that is: just one, or more, Black Harrier fatality per turbine per year, or more than one other Red Data species killed at a turbine per year) then either:

- shut-down on demand (observer-driven or automated); or

- striped-blade mitigation;
- must be implemented in a short time frame (of one month or less).

Given the multiple tiers of mitigation already put in place from extensive observation and modelling of this population, fatalities are not expected. However, experience has shown that even WEFs with no record of certain species passing through the farm before construction can experience avian fatalities.

Thus, the adaptive response recommended for Richtersveld Wind Farm (Pty) Ltd is to:

- Investigate, over 12 months, which turbines are responsible for more than one eagle or raptor death;
- Investigate weather conditions at the times of the deaths;
- Investigate the time and seasons when most deaths occur (this has been found to peak in October-November when adult harriers are providing food for their young, and soar into the blade-swept zone to gain height (Simmons et al. 2020); and
- If patterns emerge from a statistical assessment of the factors involved, then additional mitigation measures – in the form of shutting down individual problem turbines at specified times of day in specified seasons and weather conditions – is recommended.

6.2 Impacts and mitigation: Bats

The following impacts have been assessed as part of this impact assessment:

- Construction and decommissioning phases:
  - Roost disturbance or destruction
  - Terrestrial and aerial habitat loss and associated displacement of bats
- Operational phases:
  - Bat fatalities (operational phase)
  - Terrestrial and aerial habitat loss and associated displacement of bats

In the previous EIR, these were rated as follows:

Impact	Significance rating pre-mitigation	Significance rating post-mitigation
Construction and decommissioning phases		
Roost disturbance or destruction	Moderate	Minor
Terrestrial and aerial habitat loss and associated displacement of bats	Moderate	Minor
Operational phase		
Collision Risk/Bat Fatalities	Major	Moderate
Terrestrial and aerial habitat loss and associated displacement of bats	Minor	Minor
Indirect impacts	Minor	Minor

Infrastructure amendments, which are expected to reduce potential impacts on bats include the:

- Fewer number of (32, previously 70) turbines and, therefore, 38 fewer turbine towers, and fewer turbine lights – which otherwise might attract bats to vertical disturbance areas.
- Slightly higher reach of the lowest blade tip (42,5 m, not 41,5 m above ground level [a.g.l.]) – which is expected to reduce the fatality risk of low-flying bat species very slightly.
- 111 416 m^2 (55%) smaller total turbine terrestrial disturbance footprint of 91 584 m^2 – not 203 000 m^2.
- Potentially smaller total terrestrial disturbance footprint of the WEF road network - depending on the width and total length of all proposed new roads, and existing roads to be upgraded, under authorization, and for amendment.

Infrastructure amendments, which are expected to increase potential impacts on bats include the:

- 2.27% Larger total rotor swept/vertical disturbance area (769 696 m^2, not 752 570 m^2).

Layout amendments, which are expected to reduce potential impacts on bats include the:

- Positioning of all turbines (including their full rotor diameter, plus a 2 m pressure buffer) outside of all High sensitive areas - except for Turbine 17, which will encroach by approximately 20 m into the 500 m buffer around a rocky outcrop if fitted with 87.5 m blades. Under the authorized layout, eight turbines (viz. Turbines 7, 10, 20, 25, 29, 55, 58 and 59) are proposed in or will encroach into High sensitive areas.
- >50% smaller turbine "area of influence" (the minimum convex polygon around all turbines and their blades) of the amended project, compared to that of the authorized project.

No layout amendment is expected to increase potential impacts on bats, relative to the authorized layout.

6.2.1 Impact assessment tables

Impact identified are summarised in Table 6-2.

Table 6-2: Impact assessment – Bats

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R; Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Direct impact: Roost disturbance or destruction	COD	N	L	H	H	L	M	M	Moderate	Avoid High sensitive areas. And relocate Turbine 17 by at least 20 m to avoid the 500 m buffer around a rocky outcrop. Minimize the road network to minimize the clearing and disturbance of natural areas. Minimize artificial lighting on site. Make sure that turbines can be fitted with bat detectors and deterrent devices.	Negligible
Direct impact: Terrestrial and aerial habitat loss and associated displacement of bats	COD	N	L	H	H	L	H	M	Moderate		Minor
Direct impact: Bat fatalities from collision or barotrauma	O	N	L	H	H	R	H	M	Major		Minor

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	**Duration** Temporary – T; Short term – S Medium term – M; Long term – L	**Likelihood** Unlikely – U; Low – L, Medium – M; High – H; Definite – D	**Frequency** Low – L; Medium – M; High – H	**Extent of impact** Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	**Scale** Negligible – N; Low – L; Medium – M; High – H	**Receptor sensitivity** Low – L, Medium – M; High – H;			
Indirect impact: Decline or loss of bat populations	O	N	L	H	H	R	H	M	Major	Minimize degradation of terrestrial habitat by implementing and maintaining effective erosion, stormwater, and potential invasive alien plant control measures.	Minor
Indirect impact: Decline or loss of bat ecosystem services	O	N	L	H	H	R	H	M	Moderate	Implement curtailment of all turbines in February and March (when major peaks in the activity of Egyptian Free-tailed Bats were most common), between sunset and sunrise, below a cut-in wind speed of 6.9 m/s, when atmospheric temperature is ≥8.5 °C. Perform operational bat monitoring as soon as the first turbine is operational - as per the latest South	Minor

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	**Duration** Temporary – T; Short term – S Medium term – M; Long term – L	**Likelihood** Unlikely – U; Low – L, Medium – M; High – H; Definite – D	**Frequency** Low – L; Medium – M; High – H	**Extent of impact** Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	**Scale** Negligible – N; Low – L; Medium – M; High – H	**Receptor sensitivity** Low – L, Medium – M; High – H;			
										African guideline for this (Aronson et al. 2020 or later). Adaptively manage and mitigate bat fatalities by consulting the South African bat monitoring guidelines for operational wind farms (Aronson et al. 2020 or later), the South African bat fatality threshold guidelines (MacEwan et al. 2018 or later), and the best available relevant scientific information. Submit quarterly progress and annual bat fatality monitoring reports to SABAAP (the South African Bat Assessment Association Panel), EWT	

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	**Duration** Temporary – T; Short term – S Medium term – M; Long term – L	**Likelihood** Unlikely – U; Low – L, Medium – M; High – H; Definite – D	**Frequency** Low – L; Medium – M; High – H	**Extent of impact** Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	**Scale** Negligible – N; Low – L; Medium – M; High – H	**Receptor sensitivity** Low – L, Medium – M; High – H;			
										(the Endangered Wildlife Trust), and the DEFF (the national Department of Environment, Forestry and Fisheries). Forward all (live and fatality) bat monitoring data to the database recommended by SABAA to expand the scientific knowledge base for more informed decision making and mitigation.	

6.2.2 Mitigation measures

The following mitigation measures apply to impacts on bats:

- **Avoid High sensitive areas**. Where necessary, the WEF layout must be adjusted to ensure that turbines, quarries, construction camps, and construction laydown areas avoid all High sensitive areas. Under the amended WEF layout there is no encroachment into High sensitive areas from the onsite substation complex, nor any turbine (with 87.5 m blades plus a 2 m pressure buffer) – except that T**urbine 17 should be shifted by at least 20 m to avoid the 500 m buffer around a rocky outcrop.**
- Minimize the road network to minimize the clearing and disturbance of natural areas. Obtain a water use licence for any watercourse crossing.
- **Minimize artificial lighting** on site. Apart from compulsory civil aviation lighting, minimize artificial lighting - especially high-intensity, steady-burning, sodium vapour, quartz, halogen, and other bright lights at sub-stations, offices, and turbines. All non-aviation lights should be hooded downward and directed to minimise horizontal and skyward illumination. Where possible, solar-powered motion-sensitive lights should be used.
- **Make sure that turbines can be fitted with bat detectors and deterrent devices**. Turbine engineers must consult with bat specialists to incorporate the necessary turbine adaptations for this during the design phase, so there are no unexpected surprises or concerns after the turbines are built.
- **Minimize degradation of terrestrial habitat** by implementing and maintaining effective erosion, stormwater, and potential invasive alien plant control measures. Rehabilitate disturbed areas based on consultation with an appropriate experienced specialist(s).
- **Implement curtailment of all turbines in February and March** (when major peaks in the activity of Egyptian Free-tailed Bats were most common), between sunset and sunrise, below a cut-in wind speed of 6.9 m/s, when atmospheric temperature is ≥8.5 °C. Wind speeds below 7 m/s (measured at 80 m above ground level) were associated with approximately 93% of all bat activity recorded at 10 m above ground level in 2012/2013 (NSS 2013), and the 6.9 m/s cut-in wind speed is a US Fish and Wildlife Service recommended cut-in speed for avoiding fatality impacts on priority species (Maclaurin et al. 2022). This recommendation represents an updated and refined version of the curtailment previously prescribed by NSS (2013), based on consideration of: i) the South African bat fatality threshold guidelines (MacEwan et al. 2018), which were published after the NSS (2013) study was reported; ii) the full 18 months of pre-construction bat monitoring and the comparative impact assessment presented in this report for the amended versus the authorized project; and iii) the comparatively higher levels of bat activity recorded in other South African ecoregions as reported by MacEwan et al. (2020b).
- **Perform operational bat monitoring as soon as the first turbine is operational** - as per the latest South African guideline for this (Aronson et al. 2020 or later). The quality of the operational monitoring and data analysis are to be conducted to a high standard so that there is confidence in the data and the fatality estimate results. If the operational monitoring and data analysis are not conducted properly as per Aronson et al. 2020 (or later), more rigorous turbine curtailment must be implemented.
- **Adaptively manage and mitigate bat fatalities** by consulting the South African bat monitoring guidelines for operational wind farms (Aronson et al. 2020 or later), the South African bat fatality threshold guidelines (MacEwan et al. 2018 or later), and the best available relevant scientific information. The specialist conducting the Year 1 and Year 2 operational monitoring should provide recommendations for adaptive management and mitigation of bat fatalities on a six- and 12-month basis at the very most. Allowance should be made in the financial provision for adaptive management and mitigation of bat fatalities. If one or more fatalities of a conservation priority bat species is recorded, and/or if the overall bat fatality threshold is exceeded (determined as per MacEwan et al. 2018 or later), further adaptive management and mitigation (possibly including greater curtailment) must be implemented without delay.
- **Submit quarterly progress and annual bat fatality monitoring reports to SABAAP** (the South African Bat Assessment Association Panel), EWT (the Endangered Wildlife Trust), and the DEFF (the national Department of Environment, Forestry and Fisheries).
- **Forward all (live and fatality) bat monitoring data to the database recommended by SABAA** to expand the scientific knowledge base for more informed decision making and mitigation.

6.3 Terrestrial biodiversity

6.3.1 Impact assessment

The footprint of the proposed Wind Farm, including turbine foundations, laydown areas were 2500m^2 per turbine and road widening and ancillary infrastructure was expected to occupy approximately 1 percent of the Richtersveld site. Approximately 10 turbines were located in the Very High Sensitivity area and the majority of turbines were located in an area of vegetated, stabilized dunes which are considered High Sensitivity as a result of their vulnerability to wind erosion. The adjacent plains are less vulnerable to disturbance and are considered Medium Sensitivity. The habitat in the area was in relatively good condition as the site was not cultivated, however it is used for grazing. Under Layout Alternative 1, 36 turbines fell within areas classified as High Sensitivity; ten turbines fell within a Very High Sensitivity area and the remaining 14 turbines all occurred within areas classified as Medium Sensitivity. The site falls within the Northern Richtersveld Yellow Duneveld vegetation type and four differing habitats were identified on site, namely, granite outcrops, sand dunes, plains habitat and coastal belt.

Impacts identified for the construction phase include:

- Loss of vegetation associated with site clearance, road construction, lay-down and assembly area etc.
- Disturbance caused by introduction of soil from elsewhere, and seeds on vehicles and equipment, resulting in invasion of alien species.
- Impact on fauna associated with site clearance, blasting, road upgrade and lay-down areas, and increased human activity.

Impacts identified for the operational phase include:

- Damage to natural vegetation through off-road movement of vehicles and maintenance activities.
- Disturbance to fauna associated with the operation of the Wind Farm and movement of vehicles.

Although it is clear that the amended layout would generate a lower overall impact than the original approved layout, a conservative approach to the assessment was taken and as a worst-case scenario, impacts have been assessed as being unchanged from the original assessment. The reduction in footprint and changes to the distribution of the wind farm are favourable in terms of ecological impact, but this is spread across all elements of ecological impacts and when considered in isolation regarding a single impact, the change is not considered sufficient to reduce the post-mitigation impact from the original assessed significance. Since the footprint of the development is contained within the original development area, no new impacts are anticipated and no significant deviations from the original mitigation and avoidance measures are required for the amendment.

6.3.2 Impact assessment tables

Impact identified are summarised in Table 6-3.

Table 6-3: Impact assessment – Terrestrial ecology

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Destruction & Loss of Vegetation	C	N	L	H	M	L	L	H	Moderate	Identical to approved EIR and EMPr	Minor
Impact on Plant SCC	C	N	L	L	L	L	L	H	Moderate-Minor	Identical to approved EIR and EMPr	Minor
Direct faunal impacts due to construction disturbance	C	N	S	H	L	L	L	M	Moderate	Identical to approved EIR and EMPr	Moderate-Minor

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	**Duration** Temporary – T; Short term – S Medium term – M; Long term – L	**Likelihood** Unlikely – U; Low – L, Medium – M; High – H; Definite – D	**Frequency** Low – L; Medium – M; High – H	**Extent of impact** Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	**Scale** Negligible – N; Low – L; Medium – M; High – H	**Receptor sensitivity** Low – L, Medium – M; High – H;			
Direct faunal impacts due to poaching/hunting/poisoning	C	N	S	L	L	L	L	M	Moderate-Minor	Identical to approved EIR and EMPr	Minor
Increased Erosion potential	O	N	L	H	H	L	L	M	Moderate-High	Identical to approved EIR and EMPr	Minor
Alien Plant Invasion	O	N	L	H	M	L	M	L	Minor-Moderate	Identical to approved EIR and EMPr	Minor

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Impacts on fauna and flora due to illegal hunting and collecting	O	N	L	H	L	L	L	H	Moderate	Identical to approved EIR and EMPr	Minor
Loss of Landscape Connectivity for Fauna	O	N	L	M	M	L	L	M	Minor	Identical to approved EIR and EMPr	Minor
Impact on Critical Biodiversity Areas	O	N	L	U	L	L	L	H	Minor	Identical to approved EIR and EMPr	Minor

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Inadequate rehabilitation of the site	D	N	L	U	L	L	L	M	Moderate	Identical to approved EIR and EMPr	Minor

6.3.3 Mitigation measures

Although it is clear that the amended layout would generate lower overall impact than the original layout, a conservative approach to the assessment has been taken and as a worst-case scenario, impacts have been assessed as being unchanged from the original assessment. The reduction in footprint and changes to the distribution of the wind farm are favourable in terms of ecological impact, but this is spread across all elements of ecological impact and when considered in isolation regarding a single impact, the change is not considered sufficient to reduce the post-mitigation impact from the original assessed significance. Since the footprint of the development is contained within the original development area, no new impacts are anticipated and no significant deviations from the original mitigation and avoidance measures are required for the amendment.

The terrestrial ecology specialist supported the amendment application and based on terrestrial ecological considerations stated that it could be authorized under the same EMPr conditions as detailed in the original assessment.

6.4 Visual

6.4.1 Impact assessment

Description of impacts assessed for avifauna

The following impacts have been assessed as part of this impact assessment:

- Construction and decommissioning phases:
    - Visual intrusion of cranes, heavy vehicles and construction activities
- Operational phases:
    - Potential visual intrusion of larger turbines and change in sense of place as a result
    - Potential visual intrusion of substations and other buildings
    - Impact of lighting in the project area

In the previous EIR, these were rated as follows:

Impact	Significance rating pre-mitigation	Significance rating post-mitigation
Construction and decommissioning phases		
Visual intrusion of equipment on site as well as construction activities	Moderate-Major	Moderate-Major
Operational phase		
Visual intrusion as a result of turbines	Moderate-Major	Moderate-Major
Visual intrusion as a result of substations and other buildings	Minor-Moderate	Minor
Impact of project lighting	Moderate	Minor-Moderate

6.4.2 Construction and decommissioning phases

Visual intrusion of equipment and construction activities

The proposed wind turbines would be visible to a small number of scattered farmsteads, however, the area is largely uninhabited, and the site is considered remote.

Although the turbines would be manufactured off site and the construction phase would be relatively short-term in duration (24 months), it would still require large equipment or infrastructure such as the turbines themselves when being erected as well as cranes on site. Additionally, the presence of bare soil and borrow pits would increase the potential

visual impact. The significance of the visual impacts will reduce at increasing distance from the development at 15km away on the R382.

Pre-mitigation, the intensity is expected to be high but for a short duration during the construction phase. The impact will be localised with a medium rated magnitude and medium receptor sensitivity. Scenic resources are not damaged irreparably. Receptors (residents and visitors) would be affected over the short term. The overall significance rating pre-mitigation is moderate. With mitigation measures implemented, it is expected that the intensity would decrease to medium. All other criteria are expected to remain the same. The overall significance rating thus remains moderate.

6.4.3 Operational phase

Visual intrusion as a result of larger turbines

There is a sense of remoteness and spaciousness about the landscape. The proposed wind farm will introduce wind turbines into the area, as well as associated infrastructure such as a substation, Operation and Maintenance (O&M) buildings and an 80 m wind measuring mast which has already been installed. It is anticipated that the wind turbines will have the greatest visual significance in the landscape, due to their large scale. The proposed wind turbines would be located on a high point at Visagiesfonteinkop, and therefore visible from the surroundings for a considerable distance. However, the wilderness landscape has been disturbed in the past by diamond prospecting, and open trenches and open cast mines are visible along the coast. the location of the turbines on the slightly elevated ridges, the Wind Farm will have a fairly extensive viewshed, visible from about 50% of the area within 10 km from the site.

The proposed wind turbines would be visible to a small number of scattered farmsteads, however, the area is largely uninhabited, and the site is considered remote. The Richtersveld Wind Farm would not be visible from Alexander Bay or Port Nolloth. The site will not be visible from Richtersveld National Park, which is located over 40km north east of the site.

Potential visual intrusion of the tall wind turbines on the rural landscape, scenic resources and sensitive receptors. Change in the wilderness/pastoral character and sense of place of the local area. Pre-mitigation, the intensity will be high for a long duration and local extent of the impact. The likelihood is high (i.e. definite) with a high magnitude and high receptor sensitivity. The overall significance score pre-mitigation is rated as Major. Post-mitigation it is expected that all the criteria ratings will remain similar as the turbines will remain visible in the landscape and thus minimal mitigation measures. The post-mitigation significance rating thus remains at Major.

Visual intrusion as a result of substations and other buildings

It is expected that the project infrastructure (buildings and substations) would also result in visual intrusion impacts. Pre-mitigation, the intensity is rated as medium with a long term duration and local extent. It has a high likelihood and a medium magnitude with low receptor sensitivity. The over all significance rating pre-mitigation is Minor. Substations and O&M Buildings should be located in unobtrusive low-lying areas not visible from R382 if possible, as currently proposed. On-site signage shall be discrete, and billboards prohibited. Signage to be fixed as low as possible. Powerlines shall follow valleys and avoid peaks/ridges where possible. Post-mitigation, the intensity will reduce to low while the other ratings will remain the same. The overall significance rating will remain Minor port-mitigation.

Impact of project lighting

It is anticipated that there will be a visual effect on the dark skies of the Richtersveld created by lights on turbines for aircraft navigation. Visual intrusion of area and security lighting around the substation and O&M buildings.

Pre-mitigation, the intensity is rated as medium, the duration long-terms and it would have a local extent. The frequency of the impact will be continuous with a high likelihood and a medium magnitude and receptor sensitivity. The overall significance rating pre-mitigation is Moderate. When lighting recution mitigation measures are implemented, the intensity of the impact will reduce to low while all other rating criteria will remain the same. The post-mitigation impacts will remain at a Moderate rating.

6.4.4 Impact assessment tables

Impact identified are summarised in Table 6-4

Table 6-4: Impact assessment – Visual

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Visual intrusion of cranes, heavy vehicles and construction activities	C	N	S	H	H	L	H	L	Moderate	Disturbed areas to be rehabilitated / revegetated as soon as possible during and after the construction phase. Temporary laydown and areas and batching plants to be located away from the R382 arterial road. Stockpiles to be located within approved construction footprints. Visual mitigations to form part of the EMPr .	Moderate

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Potential visual intrusion of the tall wind turbines on the rural landscape, scenic resources and sensitive receptors. Change in the wilderness/pastoral character and sense of place of the local area.	O	N	L	H	H	L	H	L	Major	Mitigation only achievable by means of avoidance of no-go and high visual sensitivity areas in the siting of turbines, including turbines on prominent peaks. Turbine no. 10 to be micro-sited to avoid hillcrest .	Major

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	**Duration** Temporary – T; Short term – S Medium term – M; Long term – L	**Likelihood** Unlikely – U; Low – L, Medium – M; High – H; Definite – D	**Frequency** Low – L; Medium – M; High – H	**Extent of impact** Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	**Scale** Negligible – N; Low – L; Medium – M; High – H	**Receptor sensitivity** Low – L, Medium – M; High – H;			
Visual effect of industrial-type substations and O&M buildings, powerlines, and internal access roads and hardstands in the local area.	O	N	L	H	H	L	L	L	Minor	Substations and O&M Buildings to be located in unobtrusive low-lying areas not visible from R382 if possible, as currently proposed. On-site signage to be discrete, and billboards prohibited. Signage to be fixed as low as possible. Powerlines to follow valleys and avoid peaks/ridges where possible. Security and other outdoor lighting to be fitted with reflectors to conceal the light source and minimise light spillage.	Minor

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Visual effect on the dark skies of the Richtersveld created by lights on turbines for aircraft navigation. Visual intrusion of area and security lighting around the substation and O&M buildings.	O	N	L	H	H	L	M	L	Moderate	Use of available technology to minimise the visual effect of navigation lights, conforming with CAA requirements. Use of reflectors on general area and security lighting to conceal light sources.	Moderate

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Visual effect of decommissioning activities to remove infrastructure at the end of the life of the project, including wind turbines, substation, buildings, internal overhead powerlines and access roads.	D	N	S	H	L	L	L	L	Moderate	Disturbed areas to be rehabilitated / revegetated as soon as possible after the decommissioning phase. Wind turbines and building structures removed at the end of the life of the project. Hardstands and access roads no longer required to be ripped and regraded. Exposed or disturbed areas to be revegetated and returned to grazing pasture or natural veld to blend with the surroundings.	Moderate

6.4.5 Mitigation measures

The following mitigation measures shall be implemented:

- Turbine 10 to be micro-sited to avoid the no-go visual buffer of the hillcrest.
- Internal access roads to generally follow the contours of the land to minimise cut and fill earthworks.
- Steep or pristine areas to be avoided because of the difficulty of landscape rehabilitation in the arid landscape.
- Substation and O&M buildings to be grouped together as far as possible.
- Signage related to the project to be discrete. No advertising signage, particularly billboards, to be permitted.
- Navigation lights on the wind turbines to be fitted with reflectors so that the lights are not directly visible from below, although these need to conform to CAA requirements.
- Construction Mitigation measures
- The construction camp, material stores and lay-down area to be located as far as possible out of sight of the R382, possibly in the vicinity of the proposed substation and O&M buildings.
- The extent of the construction camp and stores should be limited to the essential required area.
- Disturbed areas rather than pristine or intact landscape areas to preferably be used for the construction camp.
- Measures to control wastes and litter to be included in the EMPr.
- Rehabilitation/ re-vegetation of areas damaged by construction activities to form part of the EMPr.
- Borrow pits for the construction, if required, to be subject to permits from the relevant authorities.
- Operational Mitigation Measures
- The footprint of the operations and maintenance facilities, as well as parking and vehicular circulation, to be clearly defined, to limit the area of disturbance.
- The proliferation of vehicular and pedestrian tracks in the fragile desert landscape to be strictly controlled.

6.4.6 Decommissioning Mitigation Measures

- Disturbed areas to be rehabilitated / revegetated as soon as possible after the decommissioning phase.
- Wind turbines and building structures removed at the end of the life of the project.
- Hardstands and access roads no longer required to be ripped and regraded.
- Exposed or disturbed areas to be revegetated and returned to grazing pasture or natural veld to blend with the surroundings.

6.5 Heritage

6.5.1 Impact assessment

The following impacts have been assessed as part of this impact assessment:

- Construction and decommissioning phases:
  - Disturbance/damage of resources of palaeontological significance
  - Disturbance/damage of resources of archaeological significance
  - Disturbance/damage of cultural heritage resources
- Operational phases:
  - Impacts on heritage resources are largely confined to the construction phase i.e. during earthworks, roads and borrow pits, construction and installation. Provided that the WEF operational phase is restricted to the approved footprint, it is not anticipated that the operational phase will impact on heritage resources.

In the previous EIR, these were rated as follows:

Impact	Significance rating pre-mitigation	Significance rating post-mitigation
Construction and decommissioning phases		
Impact on paleontological heritage	Minor	Minor-Moderate

Impact	Significance rating pre-mitigation	Significance rating post-mitigation
• Impact on pre-colonial archaeology and built environment construction	• Moderate	• Minor (positive)
Impact on graves (cultural heritage resources)	Major	Minor (positive)
Operational phase		
Not applicable		

Construction and decommissioning phases

Disturbance/damage of resources of palaeontological significance

According to the palaeo sensitivity map on the SAHRIS database, the WEF site is located in a Low sensitivity area (Blue), and it is unlikely that the proposed work will impact palaeontological resources.

Disturbance/damage of resources of archaeological significance

The new infrastructure layout as described in Section **Error! Reference source not found.** effectively avoided all the s ignificant archaeological sites identified in 2011 and 2013 and the approved EIR.

Sites of archaeological importance are illustrated as “High Risk” or defined as “No Go” areas from which WEF infrastructure is excluded in the new layout (Figure 6-1).

One significant site recorded by Hart in 2011, known as 003 (28°45'20.37"S 16°39'37.85"E) is within the area of the new layout, but is sufficiently far (~200 meters) from the entrance road and (~400 meters) from Turbine 13 and is therefore unlikely to be impacted. All other sites were considered to be of low significance and no mitigation is required. Most are in any event unlikely to be impacted by the construction.

Archaeological information is mapped in Figure 6-1 and listed in Appendix F.

Disturbance/damage of cultural heritage resources

There are some resources of cultural heritage significance on the property where WEF is situated. The footprint of the WEF however has been positioned in such a manner so as to avoid high and low significance resources. It is thus not likely that the proposed WEF will impact cultural heritage resources.

6.5.2 Impact assessment tables

Impact identified are summarised in Table 6-5.

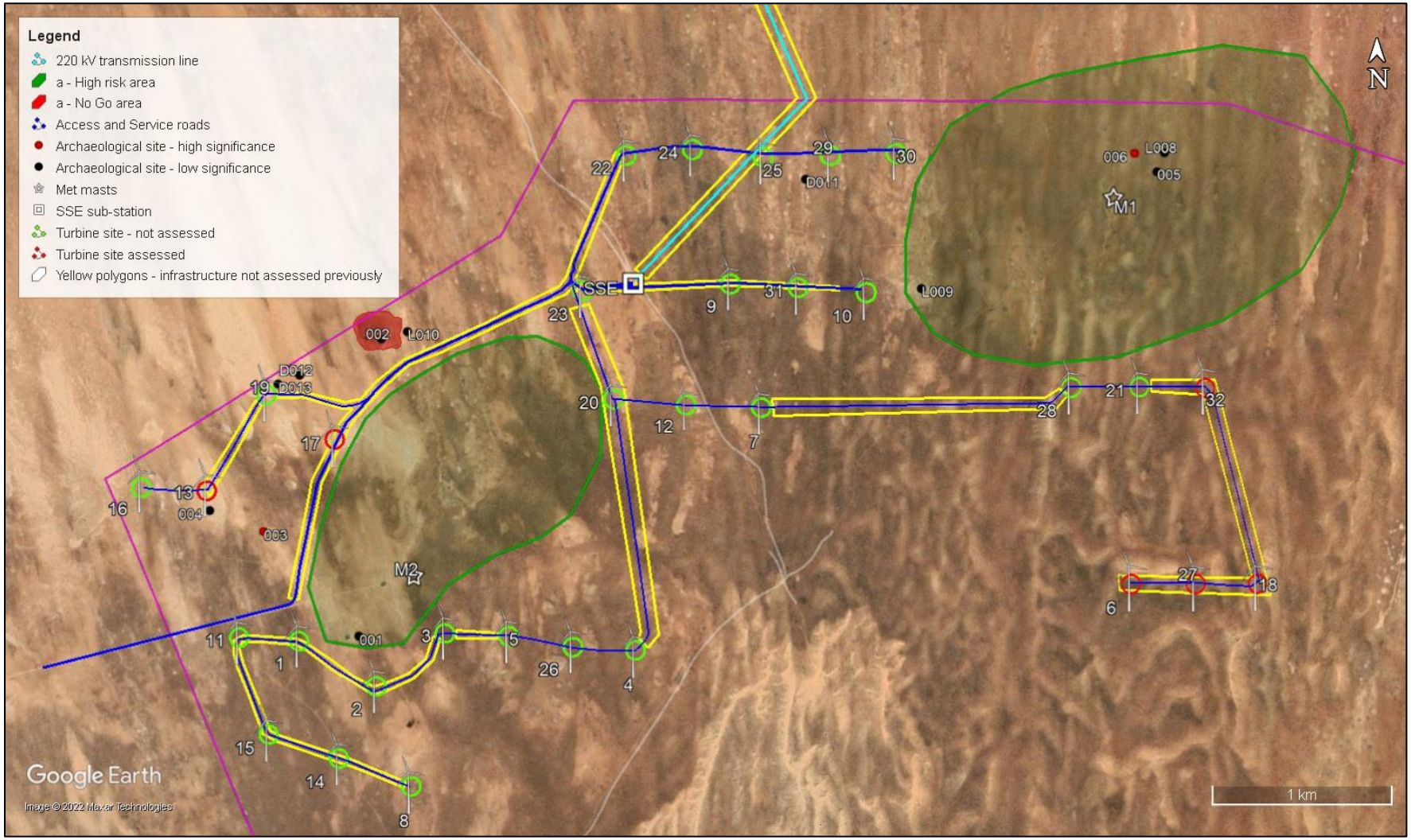

Figure 6-1: Richtersveld Wind Energy Facility – proposed layout with respect to heritage findings

Table 6-5: Impact Assessment - Heritage

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Disturbance/damage of resources of palaeontological significance	C	N	S	L	L	L	M	H	Minor	Implement chance find procedure Should any buried palaeontological material be encountered during excavations, the heritage specialist must be informed to determine way forward.	Negligible

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	Duration Temporary – T; Short term – S Medium term – M; Long term – L	Likelihood Unlikely – U; Low – L, Medium – M; High – H; Definite – D	Frequency Low – L; Medium – M; High – H	Extent of impact Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	Scale Negligible – N; Low – L; Medium – M; High – H	Receptor sensitivity Low – L, Medium – M; High – H;			
Disturbance/damage of resources of archaeological significance	C	N	S	L	L	L	M	H	Minor	Implement chance find procedure. Assess project footprint on foot prior to construction to screen for additional resources. Should any buried palaeontological material be encountered during excavations, the heritage specialist must be informed to determine way forward.	Negligible

IMPACT	Project Phase Construction – C; Operation – O; Decommissioning – D	Incidence				Severity			Environmental and Social Consequence Magnitude before mitigation	Mitigation Measure(s)	Environmental & Social Magnitude Consequence after mitigation
		Direction N = Negative; P = Positive	**Duration** Temporary – T; Short term – S Medium term – M; Long term – L	**Likelihood** Unlikely – U; Low – L, Medium – M; High – H; Definite – D	**Frequency** Low – L; Medium – M; High – H	**Extent of impact** Site/local – L, Regional – R, Beyond Regional – B-R, National N, Trans-boundary - T	**Scale** Negligible – N; Low – L; Medium – M; High – H	**Receptor sensitivity** Low – L, Medium – M; High – H;			
Disturbance/damage of cultural heritage resources of significance	C	N	S	L	L	L	M	H	Minor	Implement chance find procedure. Assess project footprint on foot prior to construction to screen for additional resources. Should any buried palaeontological material be encountered during excavations, the heritage specialist must be informed to determine way forward.	Negligible

6.5.3 Mitigation measures

Palaeontology recommendations

Should any buried palaeontological material be encountered during excavations, work shall stop in line with the requirements of a chance find procedure and the heritage specialist must be informed to determine way forward.

Archaeology recommendations

Areas of the project not previously assessed by fieldwork (including the powerline), should be reassessed on foot prior to construction to allow for micro-siting in the event of any significant heritage sites being located.

Human burials are sometimes found near archaeological sites. A chance find procedure shall be incorporated in the EMPr for the project stating that: "should any human remains be uncovered during excavations, they should not be disturbed and further and work at the specific location must cease. The location must be marked and the remains securely covered and reported to the heritage specialist, who will indicate the way forward. Permission is required from a Heritage Authority to move a burial.

If any significant additional resources are identified which may be impacted by the latest project layout, it is likely that they could be mitigated by micro-siting of infrastructure (avoidance), or sampling.

The proposed mitigation suggested in the 2011-2013 work for these sites should be implemented.

Cultural heritage recommendations

Should any buried material of cultural heritage significance be encountered during excavations, work shall stop in line with the requirements of a chance find procedure, and the heritage specialist must be informed to determine way forward.

6.6 Erosion control

6.6.1 Slope reinforcement and erosion control on steep banks

Earthworks on very steep banks unable to support vegetation may be required to reduce the steep banks to a stable slope to provide areas for vegetation to establish. Following this reshaping, it is recommended that a combination of structural and vegetative measures be implemented to rehabilitate these areas.

6.6.2 Reinforcement of reshaped slopes

A combination of geocells (Figure 6–3) and a biodegradable erosion control blanket such as Geojute netting (Figure 6–4) be used to reinforce the reshaped slopes. The geocells are to be used as a foundation mat that will improve load bearing capacities of the unstable soil and act as an erosion control barrier; while the Geojute netting will protect against raindrop/wind impact and stimulate vegetation growth.

Figure 6–2: Examples of donga / gully rehabilitation measures

Figure 6–3: Example of a geocell installation on a slope

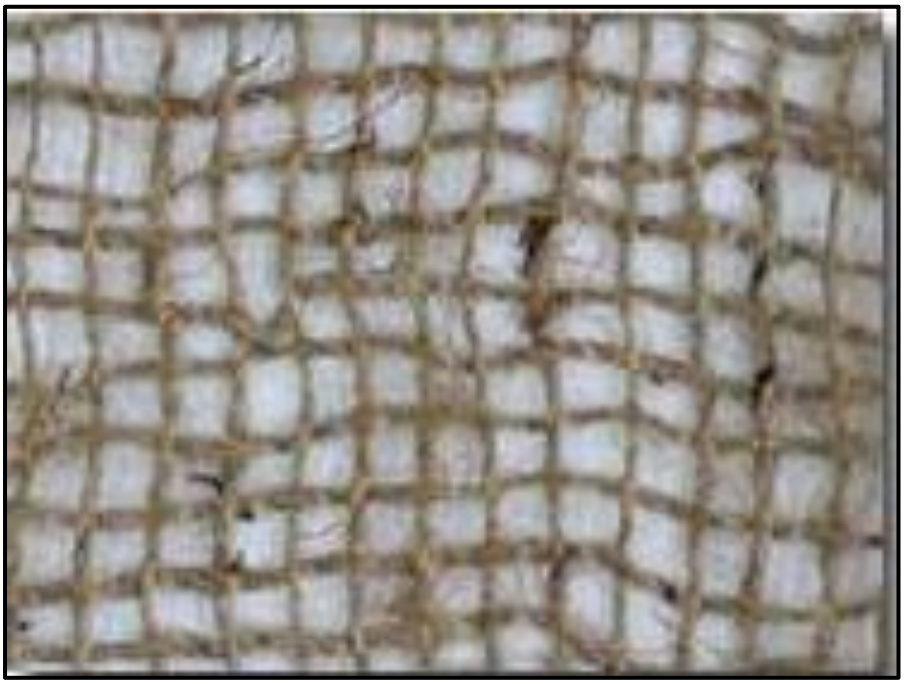

Figure 6–4: Example of Geojute netting

6.6.3 Revegetation of stabilised areas

Following the installation of the geocells or Geojute netting, revegetation of the area must commence immediately in order to prevent soil erosion and the invasion of alien plant species. Wherever possible, planting should not be conducted on very windy days, as this will increase the risk of plants drying out. The purpose of revegetation is to establish a plant cover that links the biotic community into ecosystem structure and function and protects against soil erosion.

6.6.4 Revegetation guidelines

Areas to be revegetation should follow an indigenous landscaping approach. Locally occurring indigenous vegetation can be sourced from surrounding nurseries and preferably not from the natural landscape, provided that plant material sourced falls within a 50km radius of the landholding to ensure genetic compatibility.

Revegetation will aid in the restoration of local biodiversity of the farm, as well as prevent erosion. Seeding, saplings and shrubs can be planted through the open mesh of the Geojute netting, within the individual geocells, with or without prior mulching. Gaps can be created through the Geojute netting and once planting is over, the gaps must be readjusted.

Where ecological restoration is the objective, random outplanting of individual plants will be more representative of natural vegetation patterns. Avoid planting seedlings in rows and aim for a natural look that will mimic nature. Aim to plant a few months before the wet season starts and irrigate OR plant towards the end of the wet season. If planting in the dry season, then irrigation will be essential. All revegetated areas need to be protected from grazing and trampling by livestock. Weeds and exotic grasses also need to be controlled to allow seedlings and young plants to develop.

6.6.4.1 Planting techniques

- Good root-to-soil contact is necessary for plants to become established and be able to readily access water and mineral nutrients. The planting hole needs to be made deep enough so that, when filled, the soil is up to the plant's root collar.
- Square holes are better than rounded holes because the risk of root strangulation of the plant is reduced.
- Holes should be well watered prior to the planting of trees or shrubs.

- Plant holes should be filled with well-mixed soil that contains organic matter.
- The planters need to be instructed to plant at the correct depth and not to pull up on the plant to adjust depth or straightness.
- Plants should not be oriented more than 30 degrees from the vertical plane; this configuration seems obvious on level ground, but the steeper the slope, the more important this orientation becomes.
- Planting holes need to be backfilled with soil without grass, sticks, or rocks.
- It is important to firmly tamp the soil around the root plug to remove air pockets but refrain from stomping around plants to avoid excessive soil compaction or stem injury.
- Plants should be watered immediately after transplanting to ensure that the soil around the plants is wet.

6.7 Monitoring and maintenance of revegetated areas

6.7.1 Revegetated areas

- Regular monitoring and maintenance are required for successful revegetation projects. It is recommended that the minimum level of monitoring consists of photo points and documentation of observations. This should occur monthly (or at the least quarterly) in the first year of establishment and at least annually thereafter.
- General maintenance should involve weed control and replacement of any dead or missing plants. Ongoing effective weed control is critical to the success of revegetation and should be a high priority. Weeding around plants may be necessary to avoid competition and stress. This should be carried out as required.
- Weed control during the first 2 years after planting helps the vegetation to become established and controls the undesired species until they can be outcompeted or shaded out. Weed maintenance after out planting can be accomplished by mechanical means. Care must be taken not to damage the new vegetation. By intensive weed management and by the planting desired species, the site's resistance to further weed invasion will eventually increase by favouring the growth and establishment of the desired species.

6.7.2 Sheet and rill erosion on sloped areas

- Where sheet and rill erosion are evident, these areas should be ripped along the contour line to a depth of approximately 400mm.
- All areas of exposed soil should immediately be protected by placing packed brush on slopes, or creating erosion control barriers using branches, sticks or logs placed horizontally across the slope at 1m intervals (the steeper the slope the closer the barriers should be placed to one another). This will protect bare patches against crusting and will also protect new seedlings. Eventually this plant material will break down and improves the soil status.
- Ripped areas can be planted with indigenous pioneer grass species that are suited to the area. It is recommended that a mixture of different grass species be considered.
- If topsoil has been lost, rehabilitation of indigenous vegetation will be a difficult and expensive process.
- Where possible, fence these areas to exclude livestock to help native grass, shrubs and trees to recover and stabilise the soil.

6.8 Control of alien and invasive species and weeds

Alien and invasive plant species and weeds may be present on all natural areas. Before any clearing of alien vegetation is initiated, it must be understood that when the programme starts, it must be implemented until completion. There is no value in *ad hoc* clearing, with no follow-up programme. Methods proposed to remove, and control alien and invasive plant species and weeds are discussed below:

6.8.1 General recommendations

- Map the extent of invasive alien species.
- Determine the costs and priorities and produce a plan of operations detailing the following:

    - Initial control (drastic reduction of the existing population).
    - Follow-up control (control of seedlings and coppice re-growth).
    - Maintenance (on-going, low-level control) and include targets and timeframes.

- Prioritize the clearing of the most lightly infested areas first.
- On gentle gradients, clearing should start from the outside of a work block and move inwards towards the centre, to assist in containing potentially invasive plant material and seeds within a confined area
- Prioritise the clearing of highly invasive species which may not have become well established to date.
- Prioritise clearing before the burning of a block.
- Prioritise clearing within the first season after a burn.
- Prioritise follow up clearing.
- Seedlings should be controlled when shorter than 0.5m to avoid costly control work at a later stage.
- Restore/rehabilitate areas cleared of alien vegetation immediately after clearance.
- Keep record of clearing operations and areas where alien vegetation was cleared.
- High priority areas that should be controlled first include the following:

    - The area immediately around buildings if there is a risk of fire.
    - Low-density infestations, to curb the spread of invasive plants into surrounding habitats.
    - The crests of slopes, watercourses, and steep, long bare slopes, to inhibit the spread of seeds downhill or downstream, where they will infest new areas.
    - Areas where initial control work has been completed and regrowth is present, to prevent densification and further infestation.
    - Disturbed sites, to prevent new infestations from mass germination of alien seeds in the soil.

6.8.2 Control methods

Control methods for the removal of Invasive and alien plant species are provided below:

6.8.2.1 Chemical control – the use of herbicides

- Chemical control should only be used as a last resort since it is hazardous for natural vegetation. It should not be necessary if regular monitoring is undertaken, which should be effective for controlling invasive alien plants and weeds.
- Chemical control involves the use of registered herbicides to kill the target weed. Managers and herbicide operators must understand how herbicides function. The use of inappropriate herbicides is wasteful and expensive and often do more harm than good, especially when working close to aquatic habitat. Some herbicides can quickly contaminate fresh water and/or be transported downstream where they may remain active in the ecosystem.
- Herbicides are either classified as selective or non-selective. Selective herbicides are usually specific to a group of plants, e.g. those specified for use on broad leaf plants, but should not kill narrow-leaf plants such as grasses. Non-selective herbicides can kill any plant that they come into contact with and are therefore not suitable for use in areas where indigenous vegetation is present.
- Chemical application techniques include foliar (leaf) application, stem applications (basal stem, total frill, stem injections) and stump applications (cut stump, total stump, scrape and paint).

6.8.2.2 Herbicide use tips and precautions

- Only use herbicides that are registered for use on the specific species to be treated.
- Spray plants during the active growing period. When leaf colour starts to turn for winter, it is too late to apply herbicides.
- Spray plants before the seeds are produced, namely, between flowering and fruit set. Avoid using herbicides on drought-stressed or diseased plants or in extremely hot or cold conditions.
- Do not spray plants that are over 1 m in height.
- Herbicide should not be applied during wet conditions, before or after rain. If it rains after application, it is important to monitor the effect as one may need to re-apply.
- Herbicide should always be applied immediately after the selected mechanical control method (e.g. after frilling, ringbarking, cut stumping or strip- barking). Once the stem has dried it will not absorb the herbicide. However, if for some reason this is not done, and one needs to apply the herbicide a few days or a week or two later, it is imperative to remove any callous tissue that has formed. Once the living cells are exposed, the herbicide should be applied.

- Chemical control of alien plants is not recommended in aquatic systems due to the risk of pollution but may be used on the floodplain in conjunction with cutting or slashing of plants.
- Remember to keep herbicide in the shade while at the work site to keep it cool.
- To avoid spills, keep herbicide containers on a waterproof tarpaulin, or inside a big plastic bucket. When mixing herbicides, ensure that you use a funnel to avoid spilling. Should you spill the herbicide, it can be poured back into the container from the plastic bucket.
- Containers containing mixed herbicide should be clearly marked (e.g. 'glyphosate mix'). Likewise, containers filled with water to be used for mixing herbicide should also be clearly marked to ensure that people do not drink from them.
- Always use a measuring jug to measure the correct quantity required.
- To mix herbicides, half fill the appropriate size container with water, and then add the herbicide using the measuring jug. Secondly, close the container and shake, and then fill the rest of the container with water.
- Remember to keep the herbicide away from food.
- Carefully read and understand the instructions on the label prior to initiating chemical control. Most selective herbicides will lose selectivity at a high enough dose, highlighting the importance of adhering to instructions on the label.
- Always store herbicides in the original container and in secure storage areas out of reach of children and animals.
- All persons must wear the required personal protective equipment when working with herbicides. These include overalls, rubber gloves and a face mask.
- Avoid skin contact with herbicides and avoid breathing in the vapour.

6.8.3 Manual methods

- Always start at the highest point and work downwards, i.e. downhill or downstream when using manual control methods.
- Start towards the edge of the infestation and work towards the centre.

6.8.3.1 Hand pulling

- Hand pulling is most effective with small (30cm), immature or shallow rooted plants.
- Shake the excess sandy material from the plant, this makes the plant easier to stockpile and lighter to transport.

6.8.3.2 Chopping / cutting / slashing

- These methods entail damaging or removing the plant by physical action. This method is most effective for plants in the immature stage, or for plants that have relatively woody stems/trunks. This control option is feasible in sparse infestations or on small scale, and for controlling species that do not coppice after cutting.

For species that coppice after cutting, chemical treatment of the cut stumps will be required.

- Cut/slash the stem of the plant as near as possible to ground level.
- Paint resprouting plants (i.e. black wattle, lantana) with an appropriate herbicide immediately after they have been cut.
- Stockpile removed material into piles as prescribed.

6.8.3.3 Basal bark

For plants with thin bark or stems up to 25 cm in diameter.

- Application of suitable herbicide in water can be carried out to the bottom 250mm of the stem. Applications should be by means of a low pressure, coarse droplet spray from a narrow angle solid cone nozzle or by using a paintbrush.
- If plant is multi stemmed, then individual stems need to be treated.

6.8.3.4 Ring barking

This method is not used for stands but rather for large individual trees.

- Remove the bark and cambium around the trunk of the tree in a continuous band around the tree at least 25cm wide, starting as low as possible.
- Where clean de-barking is not possible due to crevices in the stem or where roots are exposed, a combination of bark removal and basal stem treatments should be carried out.
- For aggressively coppicing species pull off the bark below the cut to ground level (bark stripping), to avoid the use of herbicide.

6.8.3.5 Bark stripping

- All the bark should be stripped from the trunk between the ground level and 1m above ground level.
- Application of suitable herbicide can also be used with this method.
- Herbicide applications should be by means of a low pressure, coarse droplet spray from a narrow angle solid cone nozzle or by using a paintbrush.

6.8.3.6 Frilling

- Using an axe or bush knife, make a series of overlapping cuts around the trunk of the tree, through the bark into the softwood (approximately 500mm from ground level). The thickness of the blade should force the bark open slightly, ensuring access to the cambium layer.
- Ensure to affect the cuts around the entire stem.
- Apply a suitable herbicide immediately to the cuts by spraying into the frill. The frill needs to be deep enough to retain the herbicide.

6.9 Rehabilitation and monitoring of cleared areas

- All areas of exposed soil should immediately be protected by placing packed brush on the slope, or creating erosion control barriers using branches, sticks or logs placed horizontally across the slope at 1m intervals (the steeper the slope the closer the barriers should be placed to each other). If topsoil has been lost, rehabilitation of indigenous vegetation will be a difficult and expensive process.
- If the soil remains relatively undisturbed and the area has some indigenous vegetation left intact, the natural regeneration processes of the indigenous vegetation on the site should be managed.
- If natural regeneration is unlikely, indigenous vegetation can be planted on the cleared areas. Plants used for rehabilitation purposes must be sourced from within 50km of the rehabilitation site to ensure that the genetic composition of the introduced plants is not significantly different from that of naturally occurring indigenous plants in/around the rehabilitation area. Refer to the proposed mitigation measures for flora and vegetation for a list of plant species recommended for revegetation.
- Monitor cleared and revegetated areas on a regular basis (monthly) for emergent seedlings of invasive alien species. Only methods such as hand pulling and cut, and stump treatment should be used during the recovering period to prevent damage to recovering indigenous species.
- Special care should be taken to identify aggressive secondary invader species. These species will need to be controlled before seed-set.
- Regular follow-ups are required to remove emergent Invasive and alien plant species, protecting the area from other forms of disturbance (uncontrolled fire, heavy grazing/ browsing pressure, vehicles accessing the area etc.) while the vegetation re-establishes naturally.
- Photographic records must be kept of areas to be cleared prior to work starting and at regular intervals during the initial clearing activities. Similarly, photographic records should be kept of the area from immediately before follow-up clearing activities, and after. Rehabilitation processes/efforts must also be recorded.
- Simple records must be kept of daily operations, e.g. area/location cleared, number of labour units and amount of herbicide used. This will assist with planning as each site will require work, once or twice a year, for several years and of evaluating the costs against the benefits of the work.

6.10 Disposal of removed plant material

- Plant material should be used beneficially wherever possible, as opposed to disposing it at a landfill site where it takes up valuable airspace.

- Woody and dry material, provided no seeds are present, can be chipped and used as mulch or made available to the local community for firewood.
- Wet material should be combined with other organic matter and composted.
- Material which cannot be used beneficially must be disposed of at a registered and approved disposal site.
- When removing material, take care to remove all debris, including shoots and seeds.
- Disposal of the cut invasive and alien plant species material needs to be carefully considered, for example, the burning of some species of Invasive and alien plant species stimulates seed release or rapid seed germination.

6.11 Improving wildlife habitat

Encouraging biodiversity in and around the development areas will maintain certain ecosystem functionality aspects. Proactive management of relatively small areas of land can significantly enhance biodiversity. The biodiversity of these areas can be improved by providing habitat in the form of clean water, trees, vegetated riparian areas and indigenous grasses.

7 Roles and responsibilities

7.1 Holder of the EA

The holder of the EA / property owner is the overseeing entity responsible for ensuring that all activities undertaken on the property comply with the Environmental Authorisation (EA) and associated Environmental Management Programme (EMPr) & any other approval / licence / permit, as well as the management and maintenance of the ecological sensitive areas. The responsibilities of the holder of the EA / property owner include, but are not limited to the following:

- Ensure that all construction contracts / documentation include reference to, and the need for compliance with, the EA and EMPr as well as any other legally binding documentation, which include and are not limited to: - the Municipal Approval/s (, service agreements & building plans etc.).
- Be conversant with, and ensure that all Contractors, Sub-contractors, Engineers (and future senior site managers / personnel) are made aware of, and understand the conditions and recommendations, contained in the abovementioned documentation.
- Ensure that all Contractors, Sub-contractors, Engineers (during construction activities), as well as all future visitors and service providers (during operation) are made aware of their 'Duty of Care to the Environment' and that any damage or degradation of the natural environmental within the bounds of the property will not be tolerated and must be dealt with / remedied at the cost of the perpetrator.
- Take remedial and/or disciplinary action in circumstances where persons are found to be in contravention of the abovementioned legally binding documentation.

7.2 Engineers / Contractors / employees

The Engineers, Contractors and employees are often the parties responsible for physically carrying out the activities for which majority of the recommendations in this EMPr are intended. Also see roles of the Developer's Project Manager in section 7.3. The responsibilities indicated here are also relevant to Sub-Contractors. The responsibilities of these parties include but are not limited to the following:

- Be conversant and compliant with the EA, the EMPr, and any relevant License, Permit or any legally binding documentation relevant to their operations.
- Have a responsibility to adhering to any conditions and recommendations laid out in above mentioned documentation.
- Prevent actions that may cause harm to the environment.
- Be responsible for any remedial activities in response to an environmental incident within their scope of influence.
- Liaise with the holder of the EA in complying with the EMPr, and in the event that any industry regulated standards are in contradiction with the EMPr or any other authorisations.
- Review and amend to any construction activities to align with the EMPr and Best Practice Principles.
- Ensure compliance of all site personnel and / or visitors to the EMPr and any other authorisations.

In addition:
The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion of substation infrastructure for the transmission and distribution of electricity activities.

The responsibilities of the Contractor will be:

- Project delivery and quality control for the development services as per appointment;
- Employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period;
- Ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely;
- Attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; and
- Ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.

7.3 contractor Environmental Officer (cEO)

Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public.

Responsibilities are as follows:

- Be on site throughout the duration of the project and be dedicated to the project;
- Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site;
- Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements;
- Attend the Environmental Site Meeting;
- Undertaking corrective actions where non-compliances are registered within the stipulated timeframes;
- Report back formally on the completion of corrective actions;
- Assist the ECO in maintaining all the site documentation;
- Prepare the site inspection reports and corrective action reports for submission to the ECO;
- Assist the ECO with the preparing of the monthly report; and
- Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

7.4 Developer's Project Manager

The Project Developer is accountable for making sure that the EMPr and any conditions of approval from the competent authority (CA), are complied with. Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent.
The responsibilities are as follows:

- Be fully conversant with the conditions of the EA;

- Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s);
- Issuing of site instructions to the Contractor for corrective actions required;
- Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and
- Ensure that periodic environmental performance audits are undertaken on the project implementation.

7.5 Developer Site Supervisor (DSS)

The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr.

The responsibilities of the DSS are:

- Make sure that all contractors identify a contractor's Environmental Officer (cEO);
- Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO;
- Must make sure that all landowners have the relevant contact details of the site staff, ECO and cEO;
- Issuing of site instructions to the Contractor for corrective actions required;
- Will issue all non-compliances to contractors; and
- Ratify the Monthly Environmental Report.

7.6 Environmental Control Officer (ECO)

The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr.

The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required.

The responsibilities of the ECO include but are not limited to the following:

- Be aware of the findings and conclusions of all EA related to the development;
- Be familiar with the recommendations and mitigation measures of this EMPr;
- Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them;
- Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required;
- Educate the construction team about the management measures contained in the EMPr and environmental licenses;
- Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective;
- Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements;

- In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses;
- Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns;
- Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr;
- Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO);
- Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken;
- Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken;
- Assisting in the resolution of conflicts;
- Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor;
- In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance;
- Maintenance, update and review of the EMPr;
- Communication of all modifications to the EMPr to the relevant stakeholders.

7.7 developer Environmental Officer (dEO)

The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities.

The responsibilities of the dEO are:

- Be fully conversant with the EMPr;
- Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;
- Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s);
- Confine the development site to the demarcated area;
- Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO);
- Assist the contractors in addressing environmental challenges on site;
- Assist in incident management:
  - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared;
  - Assist the contractor in investigating environmental incidents and compile investigation reports;
- Follow-up on pre-warnings, defects, non-conformance reports;
- Measure and communicate environmental performance to the Contractor;
- Conduct environmental awareness training on site together with ECO and cEO;
- Ensure that the necessary legal permits and / or licenses are in place and up to date; and
- Acting as Developer's Environmental Representative on site and work together with the ECO and contractor.

7.8 Environmental induction and training

The holder of the EA in consultation with the Contractor shall ensure that adequate environmental awareness training of senior site personnel takes place and that all construction workers receive an induction presentation on the importance and implications of the EA and EMPr. The presentation shall be conducted, as far as is possible, in the employees' language of choice. The Contractor must provide a translator from their staff for the purpose of translating, if this is deemed necessary. As a minimum, training must include:

- Explanation of the importance of complying with the EA and EMPr and the employees accountability.
- Discussion of the potential environmental impacts of construction activities.
- The benefits of improved personal performance.
- Employees' roles and responsibilities, including emergency preparedness.
- Explanation of the mitigation measures that must be implemented when carrying out their activities.

- Explanation of the specifics of this EMPr and its specification (no-go areas, etc.).
- Explanation of the management structure of individuals responsible for matters pertaining to the EMPr.
- Where staff turnover is high and with additional appointment of Sub-contractors, it may be necessary to undertake additional induction training sessions. The Contractor must keep records of all environmental training sessions, including names, dates and the information presented.

8 BESS IMPACT MANAGEMENT

8.1 Design phase

The environmental management and mitigation measures that must be implemented during the Design Phase, as well as responsibilities and timelines for the implementation of these measures and monitoring thereof, are laid out in Table 8-1.

Table 8-1: Environmental management and mitigation measures that must be implemented during the Design Phase

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance Indicators
Authorisations	Environmental compliance	Ensure that all required licences and permits have been obtained before the start of construction.	Eskom	Before construction commences	Keep record of all permits, licences and authorisations	Required licences/permits on file
		Appoint a suitably qualified Environmental Control Officer (ECO) to oversee construction activities.	Eskom	Before construction commences	Review appointment documentation	ECO appointment documents
		Include the EMPr in all tender documents to ensure that sufficient resources are allocated to environmental management by the Contractor.	Eskom and Engineering consultants	Prior to call for tenders	Eskom to check tender documents and contract	Incorporated in tender documents
Water supply	Impact on local water supply	Obtain approval from local municipality / water use association for supply of water required during construction.	Eskom or Contractor	Prior to construction	Request for Approval from local municipality /water use association	Approval for water use
Employment	Socio-economic impacts	Set targets for the use of local labour based on the needs of the proponent and the availability of existing skills and people that are willing to undergo training.	Eskom	Call for tenders	•Eskom to check tender documents and contract •Keep record of how targets were determined •Keep record of staff by origin •Keep record of training provided	•Incorporated in tender documents •Percentage of local staff •Percentage of Previously Disadvantaged Individual (PDI) staff •Number of incidents •Time activities stopped •Number of recurring incidents
		Ensure that Contractors from outside the local area that tender for work meet the required targets for how many locals are given employment.				
		Consider implementing labour-intensive rather than capital-intensive work methods wherever possible				
		Consider purchasing resources from local sources wherever possible				
Battery storage	Safety	Be mindful of supplier recommendations when deciding on placement (especially in relation to existing high voltage infrastructure at the substation) and stacking of battery storage containers.	Eskom and Engineering consultants	During design phase	Review design documentation	Placement of battery storage
Waste management	Litter/ incorrect disposal	Develop a waste management plan, laying out: •Expected type and amount of waste; •Measures to reduce waste; •Type and expected volume of recyclable waste; •Recycling facilities that will collect / receive waste; •Type of storage for different waste types; •Waste contractors that will collect waste	Eskom Consultant team	During design phase	Review of design documents	Adequate provision for waste disposal
Stormwater management	Contamination of water resources	Ensure designs comply with the recommendations of the Stormwater Management Plan (SWMP), including: Ensure that storm water originating from upgradient (stormwater that could flow across the site from external areas) is diverted around the site.	Engineering consultants	During design phase	Review detailed layout plans	Approval of final design Recommendations of SWMP included in final design

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance Indicators
Floral management	Illegal removal/ destruction of flora	Appoint a suitably qualified specialist to oversee search and rescue of floral species. Obtain necessary approval from DFFE. Rescue and relocate all identified Species of Conservation Concern to areas adjacent to construction footprint areas, preferably when the bulbs are dormant (March to May).	Eskom Consultant team	Prior to the start of vegetation clearance	Appointment of vegetation specialist Search and Rescue Report	Permit on file Floral species relocated
Dust management	Visual and safety impacts	Compile a Dust Management Plan	Eskom Contractor	Prior to the start of vegetation clearance	Dust Management Plan	Dust Management Plan available
BESS container	Visual impacts	Paint the battery storage containers (and where possible, associated infrastructure such as fencing) dark grey or brown. Avoid the use of light colours (e.g. white). Do not increase the height of existing buildings, unless specifically required for operations. Be sensitive towards the use of glass or material with a high reflectivity which may cause glare and increase visual impacts.	Engineering consultants	During design phase	Review detailed layout plans	Compliance with measures
Traffic	Traffic congestion	Engage the road authorities to determine the optimal route to the site for construction vehicles and battery delivery vehicles.	Eskom Contractor	Prior to construction	Correspondence with road authorities	•Proof of correspondence with road authorities •Permission to transport battery storage containers

8.2 Construction phase

The impacts and associated management objectives are described below for the construction phase. With the exception of the amount of space required for the footprint of the development, construction impacts are common to all of the technology alternatives and are discussed and rated independently from the technology alternatives.

The environmental management and mitigation measures that must be implemented during the Construction Phase, as well as responsibilities and timelines for the implementation of these measures and monitoring thereof, are laid out in Table 8-2 below

The key role players during the Construction Phase of the project are anticipated to be as follows:

- The proponent;
- Resident Engineer (RE), who will oversee the activities of the contractors on site;
- Contractor(s) responsible for the construction of the battery storage project;
- Any sub-contractors hired by Contractors; and
- ECO.

The anticipated Construction Phase organogram is presented in Figure 5-1 below and shows the proposed lines of communication during this phase. All instructions relating to the EMPr will be given to the Contractor via the ECO or RE. The Contractor will report issues of concern to the RE and ECO, who in turn will engage the proponent. The ECO will report to the RE and Eskom.

Eskom will retain responsibility for ensuring that the Contractor fully implements the provisions of the EMPr.

Table 8-2: Potential environmental aspects and impacts for the construction phase as well as the associated mitigation and management measures

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
Site camp establishment	Incorrectly positioned camp/lack of demarcation can result in pollution and vegetation loss	Submit a method statement for Site Camp establishment for acceptance by the ECO at least two weeks prior to the start of construction activities.	All Contractors	Start of construction	Visual inspections Method statement	Accepted method statement Site boundaries demarcated Signage in place
		Establish a suitably fenced Site Camp at the start of the contract, which will allow for site offices, vehicle, equipment, material and waste storage areas to be consolidated as much as possible. Locate the Site Camp at a position accepted by the ECO. Provide water and / or washing facilities at the Site Camp for personnel.				
		Demarcate construction site boundaries upon establishment. Control security and access to the site. Fence off site boundaries to the satisfaction of the ECO and ensure that plant, labour and materials remain within site boundaries.				
		Designate the area beyond the boundary of the site as "No go" areas for all personnel on site. No vehicles, machinery, materials or people shall be permitted in the "No go" area at any time without the express permission of the RE in Consultation with the ECO.				
Labour force/ local communities	Socio economic impacts	Set targets for the use of local labour based on the availability of existing skills and people that are willing to undergo training.	Eskom Contractors	Throughout construction	Keep record of how targets were determined. Keep record of staff by origin Keep record of training provided	Percentage of local staff Percentage of PDI staff
		Maximise opportunities for the training of unskilled and skilled workers from local communities and use local Sub-Contractors where possible.				
		Meet empowerment targets relevant to the construction sector.				
		Consider implementing labour-intensive rather than capital-intensive work methods wherever possible.				
		Consider purchasing resources from local sources wherever possible.				
	Training	Provide environmental awareness training to all personnel on site at the start of their employment. Training should include discussion of: Potential impact of construction waste and activities on the environment; Suitable disposal of construction waste and litter; Key measures in the EMPr relevant to worker's activities; How incidents and suggestionsfor improvement can be reported; and Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names.	All Contractors	Before workers start working on-site Before new activities are undertaken	Check training attendance register Observe whether activities are executed in line with EMPr requirements	Proportion of workers that completed environmental training Compliance of workers with EMPr
	Complaints Register / Grievances	Maintain and disclose complaints register. The register must record: Complainant name and contact details; Date complaint was lodged; Person who recorded the complaint;	Eskom Contractor	Duration of construction activities	Keep record of all complaints	Register on site Complaints followed up and closed out

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
		Nature of the complaint; Actions taken to investigate the complaint and outcome of the investigation; Action taken to remedy the situation; and Date on which feedback was provided to complainant.				
Hazardous materials	Contamination of wetlands/ watercourses	The construction site camp and laydown areas for stockpiles etc. should be located on higher ground and not within the 50 m sensitivity buffers recommended for Wetlands.	All contractors	Throughout construction	Visual inspection of hazardous materials handling and storage areas	Number of incidents of non-compliance with safety procedures concerning hazardous materials, including waste materials; Number of spills of hazardous materials, including waste materials; Cost of cleaning up spills; Evidence of contamination and leaks.
		Design and construct hazardous material storage facilities, especially fuel storage, with suitable impermeable materials and a minimum bund containment capacity equal to 110% of the largest container within a weatherproof structure				
		Ensure that contaminants (including cement) are not placed directly on the ground (e.g. mix cement on plastic sheeting)				
		Ensure spill kits are available				
		Develop (or adapt and implement) procedures. for the safe transport, handling and storage of potential pollutants.				
		Avoid unnecessary use and transport of hazardous substances				
		Keep Material Safety Data Sheets for all hazardous materials on site and ensure that they are available for reference by staff responsible for handling and storage of materials				
		Storage and Maintenance of machinery and construction-related equipment should be done in the construction site camp and preferably on an impermeable surface				
		No wash water from washing of mechanical plant or equipment may be discharged into the surrounding environment. All wastewater must be collected in a container and allowed to evaporate. The resultant material must be disposed of as hazardous waste				
		Appropriate solid waste disposal facilities must be provided on-site during construction and adequate signage be provided				
		Spillages should be cleaned up immediately and contaminants properly contained and disposed of using appropriate waste facilities (not to be disposed of within the natural environment). Any contaminated soil from the construction site must be removed and disposed of appropriately				
		Cement batching activities should occur in the construction camp, as far as possible, and conducted on an impermeable surface. Cement products/ wash may not be disposed of into the natural environment				

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
		Drip-trays must be provided beneath standing vehicles and machinery, and routine checks should be done to ensure that these are in a good condition				
		Portable toilets must be provided where construction is occurring. Workers need to be encouraged to use these facilities and not the natural environment. Disposal slips should be kept for auditing purposes				
		All construction plant equipment, general waste, surplus rock, and other foreign materials must be completely removed from site once construction has been completed				
	Risk of fire / injury	Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing construction. Submit these emergency procedures to the ECO for approval	All Contractors	Throughout construction	Visual inspection and approval by CR, RE and ECO	Number of safety/emergency incidents.
		Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site				
		Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances, deep excavations etc.).				
		Advise the ECO of any emergencies on site, together with a record of action taken.				
		Secure the Site Camp, particularly to restrict unauthorised access to fuels and any other hazardous substances.				
		Store all construction material and equipment in locked containers within the Site Camp.				
Vegetation clearing	Erosion/ Sedimentation of wetlands	Limit the footprint area of the construction activity to what is absolutely essential	All contractors	Throughout construction	Visual inspection Appointment of vegetation specialist Search and Rescue Report	Size of area cleared relative to development footprint Size of area disturbed outside of construction site boundary Number of SCC relocated Permit on file. Growth of invasive vegetation
		Designate areas outside the development footprint as No go areas.				
		Ensure that no vegetation is removed or disturbed outside the delineated construction site boundary				
		Immediately stabilize slopes that are disturbed / cleared for construction with geofabric or another appropriate erosion stabilisation technique to prevent erosion				
		Excavated or spoil material (including any foreign materials) as well as topsoil stockpiles should not be placed within the recommended 50 m buffers (preferably further away) of the wetlands or drainage line in order to reduce the possibility of material being washed downstream				
		Disturbed areas should be rehabilitated immediately after construction in the relevant area (with indigenous vegetation or using topsoil)				

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
		Rehabilitated areas should be monitored well and measures must be implemented to ensure that topsoil does not wash away, e.g. using swales				
		Any erosion gullies/ channels created during construction should be filled immediately to ensure silt does not drain into aquatic systems and the area revegetated				
	Loss of SSC/Destruction of habitat	Safely remove and relocate any fauna that may be physically harmed by construction activities	All contractors	Throughout construction	Visual inspection Appointment of vegetation specialist Search and Rescue Report	Size of area cleared relative to development footprint. Size of area disturbed outside of construction site boundary. Number of SCC relocated. Permit on file. Growth of invasive vegetation
		Harvesting and collection of any flora, other than that performed under a permit from the Department of Economic Development, Environmental Affairs & Tourism, must be strictly prohibited				
		Replant rescued SSCs in adjacent similar habitat on site preferably within a nearby reserves such as Lombardini Game Farm or African Whisper Private Game Reserve				
		A construction width of 15 m adjacent to the BESS area must be maintained in order to restrict the width of disturbance (site camp, laydown areas and access tracks outside of the proposed battery storage facility area) that may infringe upon the populations of SSC				
		Demarcate a no-go area around the rocky outcrop. No construction related activities should be allowed to take place within the demarcated no-go areas.				
		During the construction phase, the construction area (including site camp, laydown areas and access tracks) must be clearly demarcated and all other areas deemed as no-go areas for the duration of construction				
		The position of the construction site camp should be on an already disturbed area and should be identified in consultation with the Environmental Control Officer (ECO)				
		A fire officer shall be appointed and shall be responsible for co- ordinating rapid, appropriate responses in the event of a fire				
		No burning of vegetation, whether to clear the vegetation, or of cleared vegetation, shall be permitted; No open fires should be allowed on site				
		A designated smoking area, outside of any areas where the risk of fire is prevalent, must be designated. Smoking shall not be permitted outside of designated smoking area;				
		Sufficient fire-fighting equipment shall be maintained and be accessible on sites at all times. In particular, such firefighting equipment shall be readily on hand in areas where hot work may be required				
		The objective of rehabilitation of natural areas must be to re- establish indigenous vegetation (coverage of at least 80% should be attained);				

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
		Rehabilitation of disturbed areas must commence immediately after construction has been completed in that area. Loosen compacted soils within construction footprint which do not form part of the BESS footprint (e.g. access roads, site camp area, stockpile and laydown areas, etc.); Spread stored topsoil over disturbed areas and water regularly until vegetation has sufficiently established				
		All area undergoing rehabilitation must be demarcated as no-go areas				
		During construction, erosion control measures must be implemented in areas sensitive to erosion such as exposed soil, areas with dispersive soils, etc. These measures include but are not limited to the use of sand bags, hessian sheets, silt fences and/ or Replacement of vegetation.				
	Spread of Invasive vegetation	Remove any new alien invasive plant species in the construction footprint as soon as they are detected, preferably by physical removal or by spraying herbicides should physical removal not be feasible (to be conducted in conjunction with the ECO);	All contractors	Throughout construction	Visual Inspection	Growth of invasive vegetation
		Monitoring and removing of alien invasive plants should be conducted from the start of the construction phase, during clearing, until rehabilitation has been complete at the end of the liability period				
		An item should be included in the Bill of Quantities for the contractor for control of alien species. In addition, allowance should be made for multiple site visits by the ECO for the duration of the construction contract, including the defects liability period, to assess and assist in all invasive alien plant eradication and control activities				
		All invasive alien species cleared for the construction of the battery storage facility must be collected and disposed of as waste. Care must be taken not to disperse seeds or seed pods in the surrounding environment during the removal thereof				
Excavation activities	Removal of topsoil	Designate and demarcate areas to be used for topsoil stockpiling	All contractors	Before construction commences	Visual inspection	Incidence of Erosion and Incidence of incorrect storage and harvesting of topsoil
		Remove topsoil (up to a maximum of 30 cm depth)		During vegetation clearing		
		Stockpile topsoil prior to the commencement of construction activities (stockpile no higher than 2m) and conserve topsoil for landscaping and rehabilitation.				
		Locate topsoil stockpiles in an area protected from the wind and agreed to with the ECO.				
		Ensure suitable control of run-off during the construction phase to prevent erosion of topsoil on adjacent land and undeveloped portions of the site		During construction		

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
		Replace harvested topsoil in areas that are to be rehabilitated as soon as sections of the works are completed (i.e. not only following the completion of all works)				
Concrete/ Cement Work	Contamination of soil/wetlands	Use Ready-Mix concrete rather than batching where possible Ensure that cement truck delivery chutes are cleaned in a designated area where wastewater can be disposed of in the correct manner. A suitable washing facility is to be developed on site in consultation with the ECO Batch cement in a bunded area within the boundaries of the development footprint only (where unavoidable). Ensure that cement is mixed on mortar boards and not directly on the ground (where unavoidable). Physically remove any remains of concrete, either solid, or liquid, immediately and dispose of as waste. Place cement bags in bins and dispose of bags as waste to a licensed waste disposal facility. Sweep / rake / stack excess aggregate / stone chip / gravel / pavers into piles and dispose at a licensed waste disposal facility.	All contractors	Throughout construction	Visual inspection and approval by RE and ECO.	Number of incidents of batching outside works footprint Contamination of water and soil Visible litter /waste on site
Waste Management	Dumping/litter	Submit a method statement for waste management (including hazardous waste). Train all staff in the effects of debris and litter in the environment and appropriate disposal procedures Aim to minimise waste through reducing and re-using (packaging) material. Collect recyclables separately and deliver these to suitable facilities or arrange for collection. Collect all waste in bins and/or skips at the construction site Prevent littering by construction staff at work sites by providing bins or waste bags in sufficient locations Provide separate bins for hazardous / polluting materials and mark these clearly. Store hazardous / polluting materials on impermeable ground until it is disposed of / collected. Dispose of waste appropriately to prevent pollution of soil and groundwater. Do not allow any burning or burying of waste on site.	Eskom All contractors	Before star of activities on site Throughout construction	Availability of plan Visual inspection of waste collection and disposal areas Visual inspection of construction areas (litter) Check waste disposal slips	Monitor procedures to ensure the waste management plan is implemented. Presence of litter Availability of rubbish bins and skips Degree to which rubbish bins and skips are filled Total volume of general and hazardous waste storage capacity Total volume of general and hazardous waste stored on site

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
						Degree to which different waste is separated Frequency of waste collection
Stormwater management	Contamination of soil/water, erosion, sedimentation	Collect stormwater from bunded areas in a suitable container and remove from the site for appropriate disposal	Contractors	Throughout construction	Visual inspection	Incidence of stormwater contamination Visible leaks/ water wastage Visible surface erosion Compliance with SWMP
		Use berms and stormwater drainage systems to prevent surface run-off from entering site excavations				
		Implement measures to maximise the infiltration of stormwater on site				
		Implement measures stipulated in the SWMP, including: Protect construction material stockpiles using berms (or another mechanism) to ensure that material cannot be mobilised by runoff and/or potentially block the stormwater system.				
		Ensure that all roads and tracks used for construction have the appropriate water diversion / erosion control structures	Contractors	Throughout construction	Visual inspection	Visible surface erosion.
Excavation and vehicles on site	Dust management	Implement a Dust Management Plan	Contractors	Throughout construction	Visual assessment of dust plumes Visual assessment of dust control measures	Visibility of dust coming off construction site Dust mitigation measures in place Number of days that dust plumes are visible Number of registered complaints Size of disturbed areas
		Avoid clearing of vegetation until absolutely necessary (i.e. just before excavations).				
		Regularly evaluate the effectiveness of all dust management measures. Amend how or which measures are used if necessary.				
		Stabilise exposed surfaces as soon as is practically possible.				
		Avoid excavation and handling and transport of materials which may generate dust under high wind conditions or when a visible dust plume is present.				
		Minimise dust generated off stockpiles: Locate piles in sheltered areas where possible; Place the stockpile lengthwise into the wind; Minimise the slope of the stockpile (maximum slope of 2:1); Limit stockpile sizes; Install barriers on three sides of the stockpile (maximum 50% material porosity) if required; Limit activity to the downwind side of the pile; Use the last in – first out system of stockpile management; and Cover stockpiles when not in active use for some time and / or use an environmentally friendly chemical spray to bind soil.				
		Limit vehicle speeds to 20 km/h on Unconsolidated and non-vegetated areas				

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
		Cover trucks transporting loose material to or from site with tarpaulins, plastic or canvas				
		Ensure that any material spilled from trucks during transport to or from the site is cleaned-up immediately				
		Use bedliners to minimise seepage and spillage of material from bottom-dumping trucks.				
		Check weather reports daily and closely observe weather patterns to enable action to be taken immediately if conditions change.				
		Limit the number of vehicles allowed on- site and restrict the movement of these vehicles over unsurfaced or unvegetated areas once they are on site to reduce dust problems				
		Sweep roads leading from the site if wheel washing facilities do not effectively prevent mud being deposited on access roads				
		Reduce airborne dust at construction sites through: Dampening dust- generating areas with non-potable water if available (and necessary); Use of cloth or brush- barrier fences; and Covering dumps or stockpiles of lose material with plastic sheeting or netting, especially during windy conditions.				
		Sweep roads at site Entrance and exit points regularly, to prevent the spread of mud / dust by construction vehicles				
Labourers on site	Fires	Ensure that no fires are permitted on or adjacent to site	Contractors	Throughout construction	Inspect attendance register for training sessions; and Inspect fire extinguishers and certificates	Number of fire incidents Certified extinguishers in appropriate locations.
		Ensure that no smoking is permitted on the site				
		Ensure that sufficient fire-fighting equipment is available on site				
		Equip all fuel stores and waste storage areas with fire extinguishers.				
		Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated				
		Suitably maintain firefighting equipment				
		Keep spill containment and clean-up equipment at all work sites and for all polluting materials used at the site.				
Transportation and refuelling	Contamination of soil/water with hydrocarbons	Undertake regular maintenance of vehicles and machinery to identify and repair minor leaks and prevent equipment failures	All contractors	Throughout construction	Visual inspection of vehicles, barges, machinery and refuelling/maintenance areas	Number of incidents of non-compliance Number of leaks and spills Cost of cleaning up spills
		Undertake any on-site refuelling and Maintenance of vehicles/machinery in designated areas. Line these areas with an impermeable surface and install oil traps				
		Use appropriately sized drip trays for all refuelling and/or repairs done on machinery – ensure these are strategically placed to capture any spillage of fuel, oil, etc.				

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
		Clean up any spills immediately, through containment and removal of free product and appropriate disposal of contaminated soils.				
		Keep spill containment and clean-up equipment at all work sites and for all polluting materials used at the site.				
Construction equipment/ people	Injury/ death of animals	Flush out fauna before establishing site camp and site boundaries	Contractor	Before construction commences	Visual inspection	Number of animals flushed out of area
		Do not harm, catch or kill birds or animals by any means, including poisoning, trapping, shooting or setting of snares.	Contractor	Duration of construction activities	Visual inspection	Number of animals harmed Time period trenches are left open Number of incidents of animals found in trenches.
		Backfill trenches as soon as possible to ensure that the time the trench is exposed is kept to a minimum.				
		Open trenches must be inspected on a daily basis for animals which may have fallen or become trapped.				
		Safely remove and relocate any fauna that may be physically harmed by construction activities.				
		Do not harm, catch or kill birds or animals by any means, including poisoning, trapping, shooting or setting of snares.				
Excavation	Damage/ destruction of archaeological and paleontological resources	Inform employees and contractors that Archaeological or paleontological artefacts, including human skeletal remains, might be exposed during construction activities.	Contractors	Before construction commences	Visual inspection	Time to rehabilitation Size of disturbed areas.
		Empower staff to stop works on (chance) discovery of artefacts at the site.		During earthworks		
		Report the presence of graves or human remains, fragments of fossil bone, ostrich egg and stone fragments to Heritage Eastern Cape				
		Stop works and obtain a permit for the removal of artefacts from the site if any are discovered during construction				
Construction plant	Traffic congestion	Manage construction sites and activities so as to minimise impacts on road traffic as far as possible, e.g.: Attempt to arrange delivery of materials when it will least disrupt traffic; Stagger deliveries if possible rather than concentrating them during “rush” hours; and Keep construction materials and machinery at the construction site throughout the construction period, where possible.	All contractors operating vehicles	Throughout construction	Keep record of vehicles entering the site and time they enter; Keep record of incidents and complaints; and Visually inspect vehicles for any obvious Faults or overloading	Number of incidents and complaints Number of vehicles travelling to site each day Conditionof vehicles.
		Notify local authorities, road authorities and affected stakeholders prior to construction activities and transport of battery storage containers				
		Use appropriate road signage, in accordance with the South African Traffic Safety Manual, providing flagmen, barriers etc. at the various access points when necessary				
		Ensure that large construction vehicles are suitably marked to be visible to other road users and pedestrians				

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
		Ensure that vehicles transporting battery storage containers are suitably marked noting the hazardous nature of their load				
		Ensure that relevant safety measures and signage are in place when containers are delivered to site				
		Ensure that all safety measures are observed and that drivers comply with the rules of the road.				
		Ensure that vehicle axle loads do not exceed the technical design capacity of roads utilised by the project.				
		Investigate and respond to complaints about traffic.				
Road users/ local community	Visual impacts	Paint the battery storage containers (and where possible, associated infrastructure such as fencing) dark grey or brown. Avoid the use of light colours (e.g. white).	Contractors	Throughout construction	Visual inspection	Colour of infrastructure Number of complaints
		Limit outdoor security lighting and ensure that it is as unobtrusive as possible				
		Attach signs to structures to avoid free standing signs in the landscape during the construction period as much as possible				
		Control litter and keep construction site as clean and neat as possible.				
Construction workers	Effluent contamination	Provide ablution facilities (i.e. chemical toilets) for all site staff at a ratio of 1 toilet per 15 workers (absolute minimum 1:25).	Contractors	Throughout construction	Visual inspections Records of waste disposal	Number of incidents of staff not using facilities Number of pollution incidents
		Secure all temporary / portable toilets to the ground to the satisfaction of the ECO to prevent them toppling due to wind or any other cause				
		Maintain toilets in a hygienic state (i.e. toilet dispensers to be provided, toilets to be cleaned and serviced regularly (at least "twice- monthly" by an appropriate waste contractor), and toilets to be emptied before long weekends and builders' holidays).				
		Remove / appoint an appropriate Sub- Contractor to remove accumulation of chemicals and treated sewage from the site and dispose of at an approved waste disposal site or wastewater treatment works.				
		Ensure that no spillages occur when the toilets are cleaned or emptied. Repeated incidents of spillage of chemicals and or waste (i.e. more than one incident), will require toilets to be placed on a solid base with a sump.				
Machinery/ Equipment on site	Spills from construction activities could contaminate soil	Develop a spill response procedure for approval by the ECO. In the event of environmental pollution, e.g. through spillages, immediately stop the activity causing the problem	Contractors	Throughout construction	Maintain register of pollution events and response Following resumption of activities, frequently	Number of incidents Time activities stopped
		Only resume activity once the problem has been stopped or (in the case of spillages) the pollutant can be captured without reaching the environment				

Aspect	Impact	Mitigation measure/ Procedure	Responsible	Implementation Timeframe	Monitoring Methods3	Performance Indicators
		Repair faulty equipment as soon as possible			inspect repaired equipment to ensure proper functioning	Number of recurring incidents Availability and completeness of register
		Install additional bunding / containment structures around the equipment that was the source of the leak / spillage to prevent pollution from reaching the environment in future.				
		Treat hydrocarbon spills, e.g. during refuelling, with adequate absorbent material, which then needs to be disposed of at a suitable landfill.				
Site rehabilitation and closure	Erosion, Incorrect disposal of waste/dumping, Contamination of soil/water	Plan and make adequate financial provision for Rehabilitation and restoration activities and clearly allocate timing and responsibility for environmental rehabilitation.	Contractor	Prior to construction	Record of financial provisioning for rehabilitation	Financial provisioning for Rehabilitation in place
		Ensure that slopes are immediately stabilized to prevent erosion, using geofabric or other appropriate erosion stabilisation techniques.		Once construction is complete; or Throughout construction if it takes place in phases / different areas sequentially	Visual inspection of site Keep record of rehabilitation measures	Rehabilitation forms an integral part of operations from start-up Construction sites fully rehabilitated within five years
		Remove all construction equipment, vehicles, equipment, waste and surplus materials, including site offices, temporary fencing and diesel, from the site.				
		Clean up and remove any spills and contaminated soil in the appropriate manner				
		Ensure that no discarded materials are buried on site or on any other land not designated for this purpose.				
		Use harvested topsoil for rehabilitation				
		Rehabilitate project areas with locally indigenous species or using anti-erosion measures such as bio-barrier or soil saver as soon as possible after activities have ceased at each area				
		Rehabilitate any disturbed areas as soon as construction in the area is complete				
		Replace harvested topsoil in areas that are to be rehabilitated as soon as sections of the works are completed (i.e. not only following the completion of all works).				
		Rehabilitate all project areas as soon as possible after completion of activities in each area, including removing and/or Remediating any contaminated soils.				

8.3 Waste Management PLan: Repurposing, Decommissioning and Disposal

Energy storage is experiencing a period of rapid deployment growth, and even in the midst of an economic downturn, global analysts' projections indicate this trend is poised to continue due to increasingly attractive economics and the value storage provides from multiple grid services. The attractiveness of this technology is still to be fully understood in the context of the management of these facilities at the end of a system's life.

It is acknowledged that the upsurge in the use of Li-ion applications creates stress along the entire value chain–from mining raw material inputs, such as lithium and rarer elements, to manufacturing and disposition of the batteries once they reach the end of their useful lives. This linear depiction of material and energy use in the economy – from extraction of natural resources to production, use, and disposal – may present significant environmental consequences as the volume of battery production increases.

The debates around how to best manage and handle a proliferation of the Li-ion battery life cycle is best described in an alternative model that attempts to mimic nature in the way inputs are used in production of goods, which upon reaching the end of their useful lives are then reused and/or recycled as inputs again e.g. a "circular economy".

The focus of this management plan is on the end-of-life management of Li-ion batteries, proposing alternative methods and options from the circular economy perspective. Due to this relatively new concept towards future management of end-of -life management of these systems, we have consulted and applied concepts contained in the End-of-Life Management of Lithium-ion Energy Storage Systems document prepared by the Energy Storage Association.[1]

8.3.1 Environmental Management Principles

Eskom Holdings SOC Limited will practice the five environmental management principles in line with NEMA (107 of 1998):

- **Duty of care** - Waste must be avoided, minimised, reused or recycled or otherwise disposed of in a responsible manner. The generator of a waste is responsible for the fate of the generated waste in all circumstances. The generator remains legally liable for any harm to humans, to damage to property or deterioration of the environment. Cradle to grave- responsibility for the waste and the considerations of the waste exist throughout its life cycle.
- **Polluter pays principle** – any organisation causing pollution is liable for the costs of cleaning it up.
- **Precautionary principle** – Prevention of harm is the best method of environmental protection and when knowledge is limited, apply the precautionary approach. Always assume that waste is hazardous until shown to be safe: Take action to avoid the possibility of irreversible environmental harm.
- **Preventative principle** – reduce risk by collection, treatment and disposal to take place as near as possible to the point of generation as is technically and environmentally feasible.
- **Proximity principle** - Waste should be managed and disposed of as close to the point of generation as possible. The objective is to minimise transport distances and cost, exposure and risk associated with waste.

8.3.2 Circular economy and Li-ion batteries

The primary objective of the circular economy framework is to promote a sustainable economic system by minimizing material and energy used to provide economic goods and services. Some of these principles are expressed in shorthand slogans, such as "reduce, reuse, recycle," and frequently are congruent with greenhouse gas (GHG) reductions objectives.

This circular system links with the concept of sustainable development as it appears in Chapter 2 of the National Environmental Management Act (NEMA) (Act 107 of 1998), as amended and is also referred to in section 1.1 above. The conundrum with a circular economy concept is that not all waste can be brought into a circular economy as some goods

[1] Chupka, Marc (2020) *End-of-Life Management of Lithium-ion Energy Storage Systems* Energy Storage Association.

require more energy in the collecting and recycling cycle, than what would be used in the production of virgin materials to produce the relevant products, or the costs of reuse or recycling are prohibitive compared with relatively benign disposal options.

This Waste Management Plan (WMP) aims to define the general criteria and procedures for the management of waste generated during the activities of the Project. This includes handling, transportation, storage and final disposal of all waste and related waste streams. Eskom's Waste Management Standard (2015) should be implemented in conjunction with this WMP at the Melkhout BESS facility.

8.3.3 Hierarchy of end-of-life options for Li-ion batteries

The proposed circular economy reasoning generally superimposes a loose hierarchy on end-of-life options, with reuse taking precedence over recycling, and recycling all, or at least some, of the material inputs preferred over disposal.

Green and blue arcs representing environmentally sustainable flows. This hierarchy is a reasonable way to frame end-of-life management options for Li-ion batteries - though, again, the desirability of any specific end-of-life management pathway on costs, emissions, or other measures depends on technologies, systems and markets. Circular economy principles even apply at the start, in designing products for more economic refurbishment or recycling, or for a longer service life that reduces the need for energy and material inputs for manufacture of new products.

Figure 8-1: End-of-life hierarchy for Li-ion Batteries (Source: Energy Storage Association)

8.3.4 BESS End-of-Life planning

The main objective of the end-of-life management for BESS facilities lies in the fact that this is not an unexpected event that must be mitigated for, but rather proper future planning towards management of these systems at their end-of-life stage.

The lifespan of Li-ion battery-based BESS systems can be extended by the application of enhanced and maintenance and replacement activities. The proposed Melkhout BESS is a modular system composed of individual battery cells assembled into modules (packs, trays or assemblies), arrayed in racks, connected into various control systems and enclosed in containers.

Extending the effective lifetime of a durable asset is consistent with circular economy benefits as it reduces both virgin material input requirements as well as potential waste, although at some point performance, safety and economic considerations will dictate decommissioning.

8.3.5 Decommissioning of BESS

The decommissioning process of a BESS facility involves dismantling of the modular BESS structure and removal from site in line with relevant South African legislation that deals with the transport and disposal of used equipment or waste. The question arises as to who bears the ultimate legal responsibility for the safe disposal of various BESS components. We again refer to section 1.1 which provides clear legal aspects pertaining to who bears the responsibility.

The actual scope of decommissioning depends on project-specific conditions, the type of system, and the disposal pathway chosen, such as whether some or all of the BESS will be reused or recycled. In some cases, the battery modules are removed, while the balance of the system (controls, enclosures, etc.) remain and are re-used with new battery modules. In other cases, the full systems are replaced as integrated packages. If the site itself is being entirely decommissioned (no future energy storage or similar infrastructure will occupy it), contractual agreements govern the final state of the site (e.g., resulting in remediated land, residual foundations, gravel, etc.).

Normally these plants consist of a significant quantity of materials, including concrete pads, steel enclosures, cabling, and an array of electronics that are part of the entire energy storage system package. Concrete and steel are readily recyclable, and many enclosures can be reused, particularly if a site is being repowered with new batteries at the end of old equipment's lifespan. Inverters, control systems, and other electronic equipment share many of the challenges of e-waste more broadly, but useful materials can often be recovered.

8.3.6 Transportation of batteries

After the BESS facility is dismantled and the batteries removed from site, they are transported to other facilities for refurbishment, recycling or disposal (cradle to grave). The risks associated with the transportation of Li-ion batteries include *inter alia* the following:

- Fire hazard due to short circuiting or accidental activation
- Accidental release of hazardous materials from these batteries
- Accidental leakage or combustion

Shippers and transporters of battery waste must adhere to all the relevant requirements under South African legislation that deals with the transportation of hazardous waste.

8.3.7 Refurbishment and Reuse

It is trite that reusing battery systems and their concomitant components is more environmentally friendly than recycling these constituent materials. Batteries degrade over time and may be less useful for large commercial grid systems but can be re-used in conjunction with renewables to power remote irrigation systems that does not require the same performance as for commercial grid purposes. It is generally accepted that once a battery degrades to approximately 70-80% of their original rated capacity they are retired. The process for refurbishment or reconditioning of batteries includes the following processes:

- Testing of batteries to determine conditions of these batteries
- Re-assembling of batteries that may include changes to original control hardware and software which may have its own safety risks
- Cost comparisons between recycled and new batteries

8.3.8 Recycling processes

The recycling process for Li-ion batteries is complex and consist of the following aspects:

- Same chemistry batteries must be fed into the recycling system

- Separation of different types of lithium-based chemistries, such as lithium iron phosphate (LFP) versus lithium nickel manganese cobalt (NMC)
- Dismantling of electrically discharged batteries (this is largely done manually) - removing the battery casings, separating the connectors, disassembling modules from packs, separating cells from modules, and removing the electrolyte.

The Energy Storage Association indicates that there are two primary commercial pathways for recycling of Li-ion batteries consisting of the following:

- **Pyrometallurgical processes (smelting)** is based on 100-year-old technology; the primary advantage of pyrometallurgy is that the smelters can easily handle battery cells of mixed chemistries.
- **Hydrometallurgical recycling processes** reduce cells to elemental products using leaching techniques, which dissolve the metallic fraction and recycled metal solutions for separation and recovery. Leaching agents include organic and inorganic acids, and ammonia-ammonium salt systems. The main advantage for hydrometallurgy is the ability to recover transition metals and lithium from the cathode.
- **Direct recycling** - battery materials recovered and can be reintroduced into the supply chain with little additional processing. Electrolyte removed. Cells crushed and parts separated using e.g. density. Has been demonstrated at bench scale.

8.3.9 Disposal of Li-ion batteries

There is currently no registered facility for the disposal of Li-ion batteries in South Africa, however, the company ACE Green Recycling is proposing to construct two (2) environmentally sustainable battery recycling facilities in South Africa. Furthermore, legislation and associated regulations are likely to play a key role in the future of lithium-ion battery recycling, which is vital to the industry as it reduces resource scarcity and improves sustainability in South Africa.

Proper collection, identifying battery chemistries, and fully de-energizing batteries are as important to a disposal site as to the recycling processes discussed above. Once rendered inert from fire risk (mechanically or chemically), non-hazardous materials not recovered for reuse or recycling can be disposed of through municipal waste streams. While some lithium chemistries are considered non-hazardous, many batteries have toxic constituents that require treatment as hazardous materials. The potential toxicity of Li-ion battery materials varies widely by chemistry; for example, where nickel, cobalt, or lead are present in battery chemistries in significant quantities, precautions must be taken at disposal or incineration sites in line with the hazards of those individual materials.

8.3.10 Decommissioning of BESS facility

A decommissioning plan is intended to ensure that the BESS facilities are properly removed after their useful life. The plan includes provisions for removal of all structures, foundations, underground cables, unused transformers, and foundations, restoration of soil and vegetation. The objective of decommissioning and restoration is to remove the Project installed materials and equipment and return the land to substantially similar condition as existed prior to construction. The procedures described for decommissioning and restoration will ensure public health and safety, environmental protection, and compliance with applicable regulations. The main steps for decommissioning are listed below and includes *inter alia* the following aspects:

- Conducting pre-closure activities, such as final closure and restoration planning, that addresses the original site conditions at the start of the BESS project;
- Establishing and documenting health, risk and safety procedures;
- Using industry standard demolition methods will allow personnel to efficiently undertake;
- Disposing of materials in appropriate facilities for repurpose, treatment, disposal, or recycling.
- Decommissioning includes removing of the complete BESS system, including the BESS containers, battery modules, racks, PCS, EMS, inverters, transformers, overhead and underground cables and lines, equipment pads

and foundations, equipment cabinets, and ancillary equipment. Standard decommissioning practices will be utilised, including dismantling and repurposing, salvaging/recycling, or disposing of the solar energy improvements; and

- After all equipment is removed, any holes or voids created by poles, concrete pads, and other equipment will be filled with native soils to the surrounding grade and the site will be restored to pre-construction conditions, to the extent practicable.

8.3.10.1 Timeframe for decommissioning activities

- It is estimated that decommissioning will take approximately 12 months to complete, and the decommissioning crew(s) will ensure that all equipment and materials are recycled or disposed of properly, as applicable;
- The actual time to decommission the facility depend on the number of teams and equipment that will be used by the appointed contractor.

8.3.10.2 Decommission of site-specific components

- **LIB (Lithium-ion Batteries) Modules**: Modules will be inspected for physical damage, tested for functionality, discharged and disconnected and removed from racking. Functioning modules will be packed, palletized, and shipped to an offsite facility for reuse or resale, or recycling or disposal. Non-functioning LIB will be shipped to t a third party for recycling or disposal.
- **Racking**: Racking and racking components will be disassembled and removed from the containers, processed to an appropriate size, and sent to a metal recycling facility.
- **Containers**: Containers will be removed and send for rep-purposing as these structures are durable and can easily be re-purposed.
- **Overhead and Underground Cables and Lines**: All underground cables and conduits will be removed to a depth required. Topsoil will be segregated and stockpiled for later use prior to any excavation, and the subsurface soils will be staged next to the excavation. The subgrade will be compacted to a density similar to the surrounding soils. Topsoil will be redistributed across the disturbed area. Overhead electric lines, if any, will be removed from the project and taken to a recycling facility.
- **PCS, Transformers, and Ancillary Equipment**: All electrical equipment will be disconnected and disassembled. All parts will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at the Tenderer's sole discretion, consistent with applicable regulations and industry standards.

8.3.10.3 Legislative requirements for LIB

Although the proposed development components will only be decommissioned in future (20 years from now), it is submitted that the company should adhere to the relevant rules and regulations at that time. LIB cells are typically constructed with non-hazardous materials. However, the Tenderer will follow local legislation as well as international guidelines for responsible disposal and recycling of lithium-ion batteries that have reached end of life. These guidelines will ensure that, among other requirements, the LIB cells will not be disposed of in a municipal landfill.

The company must engage a licensed battery recycling location to arrange for disposal of the batteries in accordance with applicable laws and regulations.

8.3.10.4 Training for LIB decommissioning activities

The company will provide Hazmat training to all the personnel that are involved with the handling of lithium-ion batteries during the process, subject to their job function and then applicable regulation. Only qualified electricians will be utilized for the disconnection and removal of battery modules from individual battery racks. Due to the hazardous substances of LIB cells, the company must adhere to the requirements relating to the packaging, labelling and transportation contained in applicable legislation and regulations.

8.3.10.5 State of charge at decommissioning

Before removal and safe transportation, the BESS facility will be fully discharged to the minimum state of charge required as per battery manufacturer specifications. The remote telemetry from the facility battery management system (BMS) will validate such state of charge. Then, the DC disconnect switch for each battery container will be opened and locked out for the remainder of the decommissioning process to ensure no additional charging occurs. If the batteries will be reused, the decommissioning process will follow the manufacturer's instructions regarding depth of discharge to prevent cell damage.

8.3.10.6 The removal of individual batteries

The following aspects must be considered during the process of removal of the individual batteries including inter alia the following:

- To ensure safe transportation and removal, the battery modules will be repackaged on-site and shipped in-tact to a recycling hub. No disassembly will be required at the facility, and the battery terminals will be taped off and protected to avoid any potential shorts during shipping. The transportation of lithium cells or batteries for recycling will comply with applicable regulations and packaging requirements, including proper hazard communication. The tenderer or their subcontractor will ensure compliance with these regulations. If the batteries are to be reused, the decommissioning process will follow the manufacturer's instructions regarding depth of discharge to prevent cell damage. The BESS facility will be fully discharged to the minimum state of charge required as per battery manufacturer specifications, and the state of charge will be validated using remote telemetry from the battery management system (BMS). The DC disconnect switch for each battery container will be opened and locked out for the remainder of the decommissioning process to prevent additional charging.
- If any of the battery modules get damaged or broken, they will be carefully packaged in non-metallic containers that completely enclose the cells. The packaging used will be surrounded by cushioning material that is non-combustible, electrically non-conductive, and absorbent for maximum safety. These containers will be placed in outer packaging that meets all applicable regulations, and the package will be marked to indicate that it contains damaged or defective LIBs. Safety is our top priority, and we take all necessary precautions to ensure that our products are shipped safely and securely.

8.3.10.7 BESS HVAC, fire suppression system, power conversion system, and transformer removal process

- **BESS HVAC and fire suppression system equipment**: In accordance with industry standards, the refrigerant/coolant from HVAC units will be collected and stored in separate containers on site. After processing, the coolant can be reused. The HVAC units, along with other recycling material, will be sent to metal recyclers. Additionally, fire suppression units will undergo careful removal of suppression fluids before being sent to suppliers for reuse, in adherence with industry standard practice. We prioritize safety and sustainability in all practices.
- **Inverters, Transformers, and Ancillary Equipment**: As per the industry norms, all electrical equipment will be disconnected and disassembled. Every part will be taken away from the site and refurbished for reuse, sold as scrap, recycled or disposed of in a responsible manner, as per the Tenderer's discretion and in line with relevant regulations and industry standards. Our focus remains on safety and sustainability at all times.
- **Underground cables**: In accordance with the standard practices, the removal of underground cables and duct banks will be carried out. The disturbed area will be covered with topsoil and the soil will be de-compacted. The Tenderer will be responsible for the reuse, sale as scrap, recycling, or disposal of every part of the equipment, and it will be done responsibly, following relevant regulations and industry standards. Our top priority is to ensure safety and sustainability. The site will be restored to its pre-construction condition and re-vegetated.
- **Fencing**: The company will ensure that all fence parts and foundations are removed from the site and undergo the necessary reconditioning to be reused. If the owner decides not to reuse them, we will either sell them as

scrap, recycle them, or dispose of them in compliance with all relevant regulations and industry standards. Your safety is our top priority, and we always strive to act in the most environmentally responsible way.

- **Access Roads**: Facility access roads, including entrances will be used for decommissioning purposes, after which removal of roads will be discussed with the Employer.
- **Post-decommissioning environmental assessment**: The proposed decommissioning of the site will comply with all the relevant permits/authorisations and environmental management plan and applicable legislation. Relevant closure and decommissioning certificate to be obtained from the Competent Authority (CA).

8.3.11 Disposal of BESS components

Table 8-3 includes a list of the relevant components of the storage facility, including the proposed mode of disposal of individual components:

Table 8-3: Recyclable BESS components

BESS Component	Disposal method
Racking	Re-use or recycle/salvage.
Battery Management System	Recycle/salvage or dispose.
Steel racks and mounts	Salvage for reuse or recycle for scrap
Cabling	Assumed salvage value for recycle
Inverter step-up transformers, inverters and circuit breakers	Salvage for reuse, recycle for scrap, or dispose
Oils/lubricants	Oil drained from components and recycled or disposed
Hazardous materials, if applicable	Dispose through licensed hauler at appropriate facility
Base Container	Container has assumed salvage value for reuse, recycle, or dispose
PCS and Coolant	Salvage for reuse or recycle for scrap. Coolant needs to be drained and recycled
HVAC and Coolant	Salvage for reuse or recycle for scrap
Fire Suppression System, and Tanks	Salvage for reuse or recycle for scrap. Coolant needs to be drained and recycled
Container Reinforcement, lighting and Insulation	Salvage for reuse or recycle for scrap
Energy storage batteries	Re-use, repurpose or recycle
Battery Module Container	Salvage for reuse or recycle for scrap
Inverters	Salvage for reuse or recycle for scrap
Transformers	Salvage for reuse or recycle for scrap

When it comes to decommissioning the BESS Plant, there are a variety of options for handling the materials involved. Galvanized-steel racks, for example, can be sold for scrap, reused, or recycled, while electrical equipment like inverter electronics can be salvaged for reuse or recycled. Components within transformers and cables may also have a high salvage value due to their copper, steel, and aluminium content.

However, concrete from footings may have no assumed salvage value and can be crushed and disposed of off-site. Any spent oils can be recovered for recycling through existing oil reprocessing companies. Overall, residual waste for disposal would be relatively limited, with small amounts of registerable waste materials being managed in accordance with applicable regulations. Residual non-hazardous waste, if any, would be disposed of at a licensed landfill in operation at the time of decommissioning.

8.3.12 Objectives of general waste management in line with circular economy approaches

This plan aims to ensure that THE PRINCIPAL CONTRACTOR establishes a framework under which waste will be effectively managed following current regulations, company policy and standards, and internationally accepted standards. Thus, the principles to be adopted by THE PRINCIPAL CONTRACTOR are as follows:

- All site activities that produce waste or that develop activities related to waste management, must elaborate on their WMP, before starting their activities;
- This plan will be submitted to the DFFE for approval and will be implemented at the facility prior to the commencement of activities that may produce waste - construction phase.
- The implementation of the procedures contained in this WMP will, in general, allow THE PRINCIPAL CONTRACTOR to:

  - Achieve compliance with national legislation regarding the waste produced by the proposed BESS activity;
  - Develop a practical methodology for the handling, storage, transportation, and disposal of waste generated during the operational phase of the BESS; and
  - Outline procedures to minimize and manage the materials generated by waste streams according to the principle of a waste management control hierarchy to "Prevent, Reduce, Reuse and Recover".

This integrated approach is best illustrated by the integrated waste management approach in Figure 8-2:

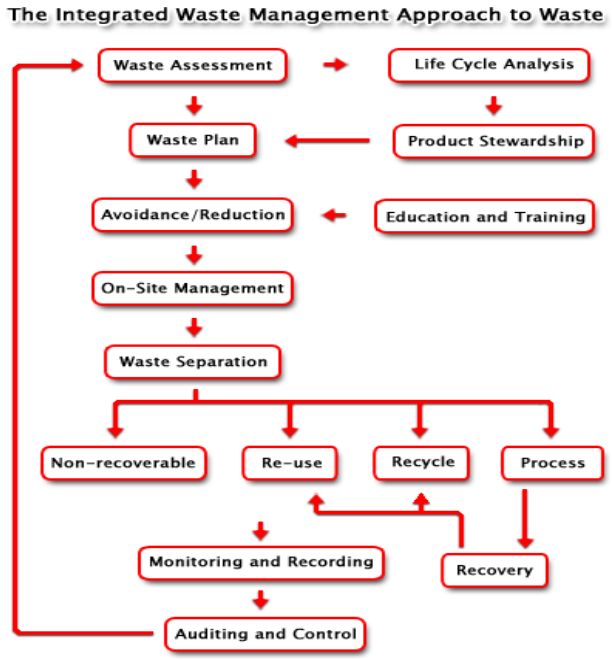

Figure 8-2: Integrated Waste Management Flow Diagram (Source: Enviroserv)

8.3.13 Legal and institutional framework for waste management

8.3.13.1 Normative references

The latest versions of the following documents find application in the implementation of this WMP, and includes the following:

- ISO 9001 Quality Management Systems
- Environmental Indicator Reporting Standard,32-249
- Safety, Health, Environment and Quality (SHEQ) Policy, 32-727
- SANS 0290: 2008: Mineral oils – management and handling of PCB
- Polychlorinated Biphenyl Phase out standard, 32-1135
- Requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles, 32-303.
- Minimum Requirements for the handling, classification and disposal of Hazardous Waste (DWAF), version 2 of 1998.
- National Environmental Management: Waste Act, 2008 (Act 59 of 2008)
- SANS codes for transportation of hazardous waste -10228 to 10234, 10206, 10265 at minimum.
- Environmental, Occupational Health and Safety Incident Management Procedure, 32-95.
- National Waste Information Regulations, August 2012
- Waste classification and management regulations: GN R 634, 23 August 2013
- List of waste management activities that have, or are likely to have, a detrimental effect on the environment: GN 921, 29 November 2013
- National norms and standards for the storage of waste: GN 926, 29 November 2013
- National Environmental Management: Waste Amendment Act 2014, (Act 26 of 2014).

8.3.13.2 Informative references

The following documents find application in the implementation of this WMP, and includes the following:

- Basel Convention on the trans-boundary movement of hazardous waste
- Environment Conservation Act (ECA),1989, (Act 73 of 1989)
- SANS ISO 14001 Environmental Management System: Requirements with guidance for use
- Kyoto Protocol on the removal of greenhouse gases
- Montreal Protocol on the removal of ozone depleting substances
- National Environmental Management Act (NEMA),1998 (Act 107 of 1998)
- National Waste Management Strategy (NWMS) of 2011
- Stockholm Convention on the identification and removal of persistent organic pollutants
- Rotterdam convention on the banning of hazardous substances
- Montreal Convention, the phase-out of ozone depleting substance
- Eskom's Procurement and Supply Chain Management Procedure, 32-1034.

9 ENVIRONMENTAL MONITORING

Per APPENDIX 4 of GN R 326, an environmental management programme must include: (g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f); (h) The frequency of monitoring the implementation of the impact management actions contemplated in (f).

9.1 General environmental monitoring

Please refer to the EIA document, as well as section 6 above that contains detailed monitoring during and after construction of the proposed activities.

10 COMPLIANCE WITH THE EMPR

Per APPENDIX 4 of GN R 326, an environmental management programme must include: (j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented; (k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).

Note that in terms of the National Environmental Management Act No 107 of 1998 (Section 28) those responsible for environmental damage must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and/or environmental damage (The 'polluter pays' principle).

10.1 Non-compliance

The Applicant, contractors or employees, shall act immediately when notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received pertaining to this project, and the environment shall be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints.

Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner in which the environment is managed. Failure to redress the cause shall be reported to the relevant authority for them to deal with the transgression, as it deems fit.

Any contractor is deemed not to have complied with the EMPr if, *inter alia*:

- there is evidence of contravention of the EMPr specifications within the boundaries of the site, site extensions and roads;
- there is contravention of the EMPr specifications which relate to activities outside the boundaries of the site.
- environmental damage is caused due to negligence; and/or
- the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time period.

10.2 Emergency preparedness

The Contractor shall compile and maintain Environmental Emergency Procedures (EEPs) to make sure that there will be an appropriate response to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the construction period. Such activities may include, inter alia:

- Accidental discharges to water and land;

- Accidental exposure of employees to hazardous substances;
- Accidental fires;
- Accidental spillage of hazardous substances; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans shall include:

- Emergency organisation (manpower) and responsibilities, accountability and liability;
- A list of key personnel and contact details;
- Details of emergency services available (e.g. the fire department, spill clean-up services, etc.);
- Internal and external communication plans, including prescribed reporting procedures where required by legislation;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures required to be implemented;
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release and
- Training plans, testing exercises and schedules for effectiveness.

The Applicant and all employees and Contractors shall comply with the emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), the NEMA, 1998 (Act No 107 of 1998), the National Water Act, 1998 (Act No 36 of 1998) and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) as amended and/or any other relevant legislation.

10.3 Incident reporting and remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services must be immediately notified of the incident. The following information must be provided:

- the location;
- the nature of the load;
- the extent of the impact; and
- the status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

10.4 Penalties

Where environmental damage is caused or a pollution incident, and/or failure to comply with any of the environmental specifications contained in the EMPr, as a result of activities of a Contractor, the said Contractor shall be liable.

11 REPORTING

Per APPENDIX 4 of GN R 326, an environmental management programme must include: (l) A program for reporting on compliance, taking into account the requirement as prescribed by the regulations.

11.1 Revisions of the EMPr

An EMPr is a "living document" and needs to be revised throughout the lifetime of this project. It is good practice to review an EMPr on an annual basis as a minimum. The findings and recommendations by internal / external auditors or specialists will be used to update the EMPr.

11.2 Performance management

Periodic audits and inspections will be undertaken using the EMPr as the main reference document. The frequency of audits will be geared to each working section of the operation; it is commonplace for internal inspections to be undertaken by section heads / managers with the ECO providing guidance and support for training and corrective action planning. Annual audits by independent auditors enable overall performance to be documented.

The EMPr audit report typically comprise at least the following:

- Audit scope and assessment period applicable;
- Summary of the assessment procedure followed;
- Evaluation criteria used during the assessment;
- The results of the assessment including monitoring results and trends revealed by the monitoring activities; and
- Recommendations to improve performance, how and by when non-compliances or environmental and social management deficiencies shall be resolved.

The Applicant shall review the EMPr to maintain continual improvement, suitability and effectiveness of the EMPr and to review its performance. The Applicant shall formally document the management review and retain proof thereof (e.g. meeting minutes and decision signed by the responsible / authorised person).

The GG 42323 further requires as follows:

11.3 Document control/Filing system

The holder of the EA is solely responsible for the upkeep and management of the EMPr file. As a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be filed, while an electronic copy may be kept where relevant. A duplicate file will be maintained in the office of the DSS (where applicable). This duplicate file must remain current and up-to-date. The filing system must be updated and relevant documents added as required. The EMPr file must be made available at all times on request by the CA or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations.

11.4 Documentation availability

At the outset of the project the follow in g preliminary list of documents shall be placed in the filing system and be accessible at all times:

- Full copy of the signed EA from the CA in terms of NEMA, granting approval for the development or expansion;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All method statements;
- Completed environmental checklists;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;
- A copy of all instructions or directives issued;
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record;
- Complaints register.

11.5 Weekly Environmental Checklist

The ECOs are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.
The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA Regulations.

11.6 Environmental site meetings

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the Monthly Report that is distributed to attendees. Each set of minutes must clearly record "Matters for Attention" that will be reviewed at the next meeting.

11.7 Required Method Statements

The method statement will be done in such detail that the ECOs are enabled to assess whether the contractor's proposal is in accordance with the EMPr.

The method statement must cover applicable details with regard to:

- Development procedures;
- Materials and equipment to be used;
- Getting the equipment to and from site;
- How the equipment/ material will be moved while on site;
- How and where material will be stored;
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- Timing and location of activities;
- Compliance/ non-compliance with the EMPr; and
- Any other information deemed necessary by the ECOs.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager no less than 14 days prior to the commencement date of the activity:

- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Handling, transport and storage of Hazardous Chemical Substance's;
- Vegetation management – Protected, clearing, aliens, felling;
- Access management – Roads, gates, crossings etc.;
- Fire plan;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Social interaction – complaints management, compensation claims, access to properties etc.;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation;
- Emergency preparedness – Spills, training, other environmental emergencies;
- Dust and noise management methodologies;
- Fauna interaction and risk management – only if the risk was identified – wildlife interaction especially on game farms; and
- Heritage and palaeontology management.

The ECOs shall monitor and ensure that the contractors perform in accordance with these method statements. Completed and agreed method statements between the holder of the EA and the contractor shall be captured in Appendix 1.

11.8 Environmental Incident Log (Diary)

The ECOs are required to maintain an up-to-date and current Environmental Incident Log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents and/or all non-compliance notice would not be issued. An environmental incident is defined as:

- Any deviation from the listed impact management actions (listed in this EMPr) that may be addressed immediately by the ECOs. (For example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the environmental stipulations and guidelines listed in the EMPr which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect (for example no toilet paper available in the ablutions for an afternoon); and
- General environmental information such as road kills or injured wildlife.

The ECOs are to record all environmental incidents in the Environmental Incident Log. All incidents regardless of severity must be reported to the Developer. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the Contractor responsible;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Incident Log will be captured in the EAR.

11.9 Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECOs via the DSS or Project Manager. The non-compliance notice will be issued in writing; a copy filed in the EMPr file and will at a minimum include the following:

- Time and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended / required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the development site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia, There is a deviation from the environmental conditions, impact management outcomes and impact management actions activities, as approved in generic and site specific EMPr as relevant as set out in the EMPr, which deviation has, or may cause, an environmental impact.

11.10 Corrective action records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the DSS, the contractor's cEO will ensure that the corrective actions required take place within the stipulated timeframe. On completion of the corrective action the cEO is to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECOs are to sign-off on the Corrective Action Report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report has signed off by the ECOs.

11.11 Photographic record

A digital photographic record will be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project as well used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

1. Allow the ECOs access to take photographs of all areas, activities and actions.

The ECOs shall keep an electronic database of photographic records which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Condition of all farm fences;
5. Topsoil storage areas;
6. All areas to be cordoned off during construction;
7. Waste management sites;
8. Ablution facilities (inside and out);
9. Any non-conformances deemed to be "significant";
10. All completed corrective actions for non-compliances;
11. All required signage;
12. Photographic recordings of incidents;
13. All areas before, during and post rehabilitation; and
14. Include relevant photographs in the Final Environmental Audit Report.

11.12 Complaints register

The ECOs shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant;
2. Record the time and date of the complaint;
3. Contain a detailed description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECOs to take relevant photographs); and
5. Contain a copy of the ECOs written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contractor, ECO and affected party. Where a damage claim is issued by the complainant, the ECOs shall respond as described in (section 4.11) below.

11.13 Claims for damages

In the event that a Claim for Damages is submitted by a community, landowner or individual, the ECOs shall:

1. Record the full detail of the complaint as described in (section 4.10) above;
2. The DPM will evaluate the claim and associated damage and submit the evaluation to the Senior Site Representative for approval;
3. Following consideration by the DPM, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the Developer's negotiator and legal department; and
4. A formal record of the response by the ECOs to the claimant as well as the rectification of the method of making payments not amount will be recorded in the EMPr file.

11.14 Interactions with affected parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The ECOs shall:

1. Ensure that all queries, complaints and claims are dealt within an agreed timeframe;
2. Ensure that any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
3. Ensure that a complaints telephone numbers are made available to all landowners and affected parties; and
4. Ensure that contact with affected parties is courteous at all times;

11.15 Environmental audits

Internal environmental audits of the activity and implementation of the EMPr must be undertaken. The findings and outcomes included in the EMPr file and submitted to the CA at intervals as indicated in the EA.

The ECOs must prepare a monthly EAR. The report will be tabled as the key point on the agenda of the Environmental Site Meeting. The Report is submitted for acceptance at the meeting and the final report will be circulated to the Project Manager and filed in the EMPr file. At a frequency determined by the EA, the ECOs shall submit the monthly reports to the CA. At a minimum the monthly report is to cover the following:

- Weekly Environmental Checklists;
- Deviations and non-compliances with the checklists;
- Non-compliances issued;
- Completed and reported corrective actions;
- Environmental Monitoring;
- General environmental findings and actions; and
- Minutes of the Bi-monthly Environmental Site Meetings.

11.16 Final environmental audits

On final completion of the rehabilitation and/or requirements of the EA a final EAR is to be prepared and submitted to the CA. The EAR must comply with Appendix 7 of the EIA Regulations.

11.17 Part B: Section 1 Pre-approved generic EMPr templates

The Part B: Section 1 pre-approved generic EMPr templates are available in Appendix K.

12 ENVIRONMENTAL AWARENES

Per APPENDIX 4 of GN R 326, an environmental management programme must include: (m) An environmental awareness plan describing the manner in which – (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.

Environment and health awareness training programmes should be targeted at three distinct levels of employment, i.e. the executive, middle management and labour.

The ECO shall ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr.

The Contractor shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness and the content of the EMPr. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training shall, as a minimum, include the following:

- The importance of conformance with all environmental policies and legislation;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Agency's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- Details regarding floral/faunal species of special concern and protected species, and the procedures to be followed should these be encountered during the construction activities;
- The importance of not littering;
- The importance of using supplied toilet facilities;
- The need to use water sparingly;
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible; and
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered.

12.1 Environmental awareness plan details

12.1.1 Environmental awareness plan

The Applicant will use this Environmental Awareness Plan for this project and will use it as a tool to compile a database, which is referred to in this EMPr, containing all medium to high significant environmental aspects and issues. The environmental awareness plan is detailed in the sections below.

12.1.2 Induction

All fulltime staff and contractors must attend an induction session conducted by the appointed Environmental Control Officer (ECO) or Site Manager. Employees must undergo induction after appointment and when they return from leave. Any contractor on site must undergo the induction training.

12.1.3 The basic content of the induction programme for full time employees is as follows:

- Welcome and Registration;
- Induction Documents Issued;
- Disciplinary Code; Personal Protective Clothing (PPE) and safety; and
- Security.

12.1.4 Environmental issues

- Procedure to emphasise care for the environment;
- Procedure for the identification and protection of threatened or protected plant and animal species;
- Procedure for dam safety and related maintenance requirements;
- Procedure for the identification and eradication of alien invasive plants; and
- Procedure for the maintenance of Ecological Water Requirements.

12.1.5 Environmental reports

Independent external environmental audits must be conducted at least bi-annually or as is decided by the DFFE.

12.1.6 Environmental communications strategy

The authorisation holder shall establish and maintain procedures for the internal communication between the various levels and functions of the project, and receiving, documenting and responding to relevant communication from external interested and affected parties. The Applicant shall have processes for external communication on its significant environmental aspects and record its decision, when required.

Communication is a management responsibility. All contractors are responsible for effective communication within their own teams. Environmental communication can be divided into two categories, namely internal communication and external communication.

12.1.7 External communication

Should external communication be required, the following communication channels and media shall be used to communicate environmental issues to individuals who are not employed by the Applicant:

- **Audit team:** An Environmental Control Officer must keep interested and affected parties informed of significant environmental aspects. This should also be the forum where interested and affected parties get the opportunity to raise environmental concerns. Records must be kept of all decisions and concerns. The Environmental auditor shall chair the meeting, or another appropriately appointed competent individual.
- **Mail:** Correspondence received/sent by mail must be filed.
- **Storage of Correspondence:** All original correspondence must be retained by the Applicant for a minimum period of two years.
- **Environmental Reports:** Copies of relevant specialist study reports and Environmental Impact Assessments will be made available on site by the Applicant should these be requested by an external party.
- **Queries from Interested and Affected Parties:** Response to queries about environmental impacts and aspects will be addressed by the ECO, and also will submit a copy to the DFFE.

12.1.8 Incident reporting structure

Environmental incident reporting should be a vital part of communication by the Applicant. Employees are required to report any and all environmentally related problems, incidents and pollution, so that the appropriate mitigatory action

can be implemented timeously. In the event of an Environmental Incident the reporting procedure is to contact the ECO who will assess the situation and report to the DFFE.

The Site Manager and in collaboration with the ECO shall, where the incident occurred, investigate the incident and record the following:

- How the incident happened;
- The reasons the incident happened;
- How rehabilitation or clean up needs to take place;
- The nature of the impact that occurred;
- The type of work, process or equipment involved;
- Make recommendations to avoid future such incidents and/or occurrences;
- Shall inform the ECO of all incidents that were reported;
- Shall consult with the ECO for recommendations on actions to be taken or implemented where appropriate (e.g. clean-ups); and
- Shall assist the ECO with applicable data in order to accurately capture the incident into the reporting database.

12.1.9 Environmental incident reporting structure

The Site Manager must:

- Forward a copy of the incident form to the ECO;
- Forward a copy of the incident form to the Applicant;
- Inform the ECO of any incident by e-mail or by submitting a copy of the incident report;
- Once a High Risk Incident (*any incident which results from a significant aspect and has the potential to cause a significant impact on the environment*) occurred, it must be reported to the ECO to make sure that immediate response / action is taken; and
- Forward a copy of the completed Incident Reporting Form, and where applicable, a copy of the incident investigation to the ECO.

12.1.10 Environmental Control Officer must:

- Complete an incident assessment form to assess what level of incident occurred;
- Make recommendations for clean-up and / or appropriate alternate actions;
- Enter into the database, actions necessary to remediate environmental impacts in conjunction with the responsible site manager;
- Enter the incident onto the database in order to monitor the root causes of incidents;
- Include the reported incidents in the appropriate monthly audit report; and
- Highlight all incidents for discussion at audit and site meetings.

13 CLOSURE PLANNING

Although closure of this project is not currently planned, it is prudent that the EMPr makes provision for this future scenario.

Final site cleaning - the contractor shall clear and clean the site and ensure that all equipment and residual materials not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.

Rehabilitation - the contractor (landscape architect/horticulturist) shall be responsible for rehabilitating and re-vegetation of all areas disturbed/areas earmarked for conservation during construction to the satisfaction of the engineer and ECO.

13.1 Post-construction environmental audit

A post-construction environmental audit must be carried out and submitted to the CA at the expense of the Applicant. Objectives should be to audit compliances with the key components of the EMPr, to identify main areas requiring attention and recommend priority actions. The audit should be undertaken annually and should cover a cross section of issues, including implementation of environmental controls, environmental management and environmental monitoring.

Results of the audits should inform changes required to the specifications of the EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

13.2 General review of EMPr

The EMPr will be reviewed by the ECO on an on-going basis. Based on observations during site inspections and issues raised at site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site.

Any such changes or updates will be registered in the ECO's record, as well as being included as an annexure to this document. Annexure of this nature must be distributed to all relevant parties.

14 CONDITIONS OF THE ENVIRONMENTAL AUTHORISATION THAT REQUIRES AMENDMENTS

It should be noted from the outset that the proposed development will adhere to the conditions imposed by the Record of Decision (RoD), and that it is the EAPs opinion that the exiting authorisation and an the amended EMPr covers aspects pertaining to this project sufficiently.

Section 4.4.3 and Table 4.2 contains a summary of the project technical changes that must be included in the amended Environmental Authorisation (EA).

It should also be noted that the following conditions as they appear in the RoD must first be met and authorised by the DFFE before commencement can take place:

- a plant rescue and protection plan which allows for the maximum transplant of important conservation species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site in consultation with the ECO and be implemented before the commencement of the construction phase;
- a re-vegetation and habitat rehabilitation plan is to be implemented during the construction and operation of this facility, including timeframes for restoration which must indicate rehabilitation within the shortest possible time after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats;
- an alien invasive management plan to be implemented during the construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken;
- an erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion; and
- a transportation plan for transporting turbine components, main assembly cranes and other large equipment.

Furthermore, a copy of the final layout plan will be submitted to the Competent Authority (CA) for approval prior to commencement of the project.

15 CONCLUSION

Although all foreseeable actions and potential mitigation measures or management actions are contained in this document, the EMPr the Richtersveld Wind Farm Project should be seen as a day-to-day management document. The EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the construction activities.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the Engineer and Contractor are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr.

APPENDIX A

Certified copies of EA

APPENDIX B

TERRESTRIAL REVISED SENSITIVITY REPORT

APPENDIX C

AVIAN AMENDMENT REPORT

APPENDIX D

BAT MONITORING COMPARATIVE ASSESSMENT

APPENDIX E

VISUAL IMPACT ASSESSMENT REPORT

APPENDIX F

HERITAGE IMPACT ASSESSMENT STATEMENT

APPENDIX G

COMMENTS AND RESPONSE REPORT (CRR)

APPENDIX H

EAP CV

APPENDIX I

SPECIALIST DECLARATION OF INTEREST

APPENDIX J

TERMS OF REFERENCE

APPENDIX K

SECTION 1: PRE-APPROVED GENERIC EMPr TEMPLATES

5.1 Environmental awareness training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required; – All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering. – Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities; b) Mitigation measures to be implemented when carrying out specific activities;						

c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention. – A record of all environmental awareness training courses undertaken as part of the EMPr must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available. – Course material must be available and presented in appropriate languages that all staff can understand.						

5.2 Site establishment development

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas; – The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and – The use of existing accommodation for contractor staff, where possible, is encouraged.						

5.3 Access restricted areas

Impact management outcome: Access to restricted areas prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and – Unauthorised access and development related activity inside access restricted areas is prohibited.						

5.4 Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities;						

– All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition – All contractors must be made aware of all these access routes. – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; – Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; – Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands – Access roads must only be developed on a pre-planned and approved roads.							

5.5 Fencing and gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with **section *4.9: photographic record***; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of overhead transmission and distribution electricity infrastructure development activities;						

– Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where appropriate and would not cause harm to the sensitive flora; – Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. – All fencing must be developed of high quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

5.6 Water supply management

Impact management outcome: Undertake responsible water usage.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; – The Contractor must ensure the following:						
a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. – Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.						

5.7 Storm and waste water management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility;						
– Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.						

5.8 Solid and hazardous waste management

Impact management outcome: Waste is appropriately stored, handled and safely disposed of at a recognised waste facility**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal;						
– Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site; – Certificates of safe disposal for general, hazardous and recycled waste must be maintained.						

5.9 Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill, prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland – No return flow into the estuaries must be allowed and no disturbance of the Estuarine Functional Zone should occur; – Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available;						

– There must not be any impact on the long term morphological dynamics of watercourses or estuaries; – Existing crossing points must be favored over the creation of new crossings (including temporary access) – When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction; No altering of the bed, banks, course or characteristics of a watercourse b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.						

5.10 Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General: – Indigenous vegetation which does not interfere with the development must be left undisturbed; – Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species;						

– Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; – Permits for removal must be obtained from the relevant CA prior to the cutting or clearing of the affected species, and they must be filed; – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; – Trees felled due to construction must be documented and form part of the Environmental Audit Report; – Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris; – Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; – A daily register must be kept of all relevant details of herbicide usage; – No herbicides must be used in estuaries; – All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***. Alien invasive vegetation must be removed and disposed of at a licensed waste management facility.						

5.11 Protection of fauna

Impact management outcome: Disturbance to fauna is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present; – The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed; – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.						

5.12 Protection of heritage resources

Impact management outcome: Impact to heritage resources is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No- Go procedure in ***Section 5.3: Access restricted areas***; – Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; – All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.						

5.13 Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; – All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.						

5.14 Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances;						
– Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; – A copy of the waste disposal certificates must be maintained.						

5.15 Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Undertake environmentally-friendly pest control in the camp area; – Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS;						
– The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area; – Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.						

5.16 Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see ***Hazardous Substances section 5.17***).						

5.17 Hazardous substances

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; – All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements; – All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner; – An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); – All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available;						

– The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers; – The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowsers (110% statutory requirement plus an allowance for rainfall); – The floor of the bund must be sloped, draining to an oil separator; – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas; – Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used; – An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations;						

– An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 5.7*** for procedures concerning ***storm and waste water management*** and **5.*8*** for ***solid and hazardous waste management.***						

5.18 Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; – During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; – Leaking equipment must be repaired immediately or be removed from site to facilitate repair; – Workshop areas must be monitored for oil and fuel spills; – Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; - Water drainage from the workshop must be contained and managed in accordance Section 5.7: Storm and waste water management.						

5.19 Batching plants

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Concrete mixing must be carried out on an impermeable surface; – Batching plants areas must be fitted with a containment facility for the collection of cement laden water. – Dirty water from the batching plant must be contained to prevent soil and groundwater contamination – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to ***Section 5.20: Dust emissions***) – Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility; – Temporary fencing must be erected around batching plants in accordance with Section ***5.5: Fencing and gate installation***.						

5.20 Dust emissions

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re- vegetated or stabilised as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust- damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; – Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; – Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

5.21 Blasting

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Any blasting activity must be conducted by a suitably licensed blasting contractor; and – Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.						

5.22 Noise

Impact Management outcome: Prevent unnecessary noise to the environment by ensuring that noise from development activity is mitigated.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only; – All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.						

5.23 Fire prevention

Impact management outcome: Prevention of uncontrollable fires.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Designate smoking areas where the fire hazard could be regarded as insignificant; – Firefighting equipment must be available on all vehicles located on site; – The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two way swop of contact details between ECO and FPA.						

5.24 Stockpiling and stockpile areas

Impact management outcome: Reduce erosion and sedimentation as a result of stockpiling.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.						

5.25 Civil works

Impact management outcome: Impact to the environment minimised during civil works to create the substation terrace.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where terracing is required, topsoil must be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone; – Areas to be rehabilitated include terrace embankments and areas outside the high voltage yards; – Where required, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – These areas can be stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Rehabilitation of the disturbed areas must be managed in accordance with ***Section 5.35: Landscaping and rehabilitation***; – All excess spoil generated during terracing activities must be disposed of in an appropriate manner and at a recognised landfill site; and – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes.						

5.26 Excavation of foundation, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs as a result of excavation of foundation, cable trenching and drainage systems.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a licensed landfill site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with ***Section 5.18: Workshop, equipment maintenance and storage***; and – Hazardous substances spills from equipment must be managed in accordance with ***Section 5.17: Hazardous substances***.						

5.27 Installation of foundations, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs during the installation of foundation, cable trenching and drainage system.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Batching of cement to be undertaken in accordance with **Section *5.19: Batching plants***; and – Residual solid waste must be disposed of in accordance with **Section *5.8: Solid waste and hazardous management***.						

5.28 Installation of equipment (circuit breakers, current Transformers, Isolators, Insulators, surge arresters, voltage transformers, earth switches)

Impact management outcome: No environmental degradation occurs as a result of installation of equipment.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Management of dust must be conducted in accordance with Section ***5. 20: Dust emissions***; – Management of equipment used for installation must be conducted in accordance with Section **5*.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills must be conducted in accordance with Section ***5.17: Hazardous substances***; and – Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.						

5.29 Steelwork assembly and erection

Impact management outcome: No environmental degradation occurs as a result of steelwork assembly and erection.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– During assembly, care must be taken to ensure that no wasted/unused materials are left on site e.g. bolts and nuts – Emergency repairs due to breakages of equipment must be managed in accordance with ***Section 5. 18: Workshop, equipment maintenance and storage*** and ***Section 5.16: Emergency procedures***.						

5.30 Cabling and stringing

Impact management outcome: No environmental degradation occurs as a result of stringing.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste (off cuts etc.) shall be recycled or disposed of in accordance with **Section *6.8: Solid waste and hazardous Management***; – Management of equipment used for installation shall be conducted in accordance with **Section 5*.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills shall be conducted in accordance with ***Section 5.17: Hazardous substances***.						

5.31 Testing and commissioning (all equipment testing, earthing systems, system integration)

Impact management outcome: No environmental degradation occurs as a result of Testing and Commissioning.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.						

5.32 Socio-economic

Impact management outcome: enhanced socio-economic development.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Develop and implement communication strategies to facilitate public participation; – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; – Sustain continuous communication and liaison with neighboring owners and residents – Create work and training opportunities for local stakeholders; and – Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.						

5.33 Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in ***sections 5.17: Hazardous substances and 5.18: Workshop, equipment maintenance and storage***; Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; – Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.						

5.34 Dismantling of old equipment

Impact management outcome: Impact to the environment to be minimised during the dismantling, storage and disposal of old equipment commissioning.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
▯ All old equipment removed during the project must be stored in such a way as to prevent pollution of the environment; – Oil containing equipment must be stored to prevent leaking or be stored on drip trays; – All scrap steel must be stacked neatly and any disused and broken insulators must be stored in containers; – Once material has been scrapped and the contract has been placed for removal, the disposal Contractor must ensure that any equipment containing pollution causing substances is dismantled and transported in such a way as to prevent spillage and pollution of the environment; – The Contractor must also be equipped to contain and clean up any pollution causing spills; and – Disposal of unusable material must be at a licensed waste disposal site.						

5.35 Landscaping and rehabilitation

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed of to a registered waste site; – All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; – Stockpiled topsoil must be used for rehabilitation (refer to ***Section 5.24: Stockpiling and stockpiled areas***); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed;						

– The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment; – Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Spoil can be used for backfilling or landscaping as long as it is – covered by a minimum of 150 mm of topsoil. – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: • Annual and perennial plants are chosen; • Pioneer species are included; • Species chosen must be indigenous to the area with the seeds used coming from the area; • Root systems must have a binding effect on the soil; – The final product must not cause an ecological imbalance in the area						