



Appendix H

**DRAFT ENVIRONMENTAL MANAGEMENT  
PROGRAMME (EMPr)**





# Draft Environmental Management Programme (EMPr)

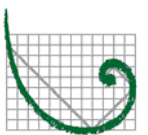
Proposed 140MW Beaufort West Wind Facility near  
Beaufort West, Western Cape Province  
DEA Ref: 12/12/20/1784/1

South Africa Mainstream Renewable Power Developments  
(Pty) Ltd

Revision 5

September 2019

*Delivering sustainable solutions in a more competitive world*



**ERM**



Draft Environmental Management Programme  
(EMPr)

*Proposed 140MW Beaufort West Wind  
Facility near Beaufort West, Western Cape  
Province*

www.erm.com


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## CONTENTS

<b>1</b>	<b>DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)</b>	<b>1</b>
1.1	<i>INTRODUCTION</i>	1
1.2	<i>MAINSTREAM POLICY</i>	3
1.3	<i>ROLES AND RESPONSIBILITIES</i>	5
1.3.1	<i>Mainstream SA</i>	6
1.3.2	<i>Environmental Control Officer</i>	8
1.3.3	<i>Site Personnel and Contractors</i>	8
1.3.4	<i>Environmental Awareness Training for Site Personnel</i>	9
1.4	<i>SUBSIDIARY PLANS AND POLICIES</i>	9
1.5	<i>STAKEHOLDER ENGAGEMENT</i>	10
1.5.1	<i>Grievance Procedure</i>	10
1.6	<i>UNCERTAINTY AND CHANGE MANAGEMENT</i>	11
<b>2</b>	<b>METHODOLGY FOR FINALISING THE SITE LAYOUT</b>	<b>12</b>
2.1	<i>ANALYSIS OF WIND DATA AND REFINING OF LAYOUT</i>	16
2.1.1	<i>Analysis of wind data</i>	16
2.1.2	<i>Pre-construction bird monitoring</i>	16
2.1.3	<i>Pre-construction bat monitoring</i>	18
2.1.4	<i>Draft Final Layout</i>	19
2.2	<i>FIELD VERIFICATION BY SPECIALISTS</i>	19
2.3	<i>FINAL LAYOUT SUBMISSION</i>	19
<b>3</b>	<b>PERMIT REQUIRMENTS</b>	<b>20</b>
3.1	<i>HERITAGE</i>	20
3.2	<i>BORROW PITS</i>	22
3.3	<i>WATER USE</i>	22
3.4	<i>ABNORMAL VEHICLE LOADS</i>	22
3.5	<i>ACCESS FROM THE N12</i>	22
<b>4</b>	<b>MITIGATION AND MONITORING MEASURES</b>	<b>23</b>
4.1	<i>PLANNING PHASE</i>	23
4.2	<i>CONSTRUCTION PHASE</i>	31
4.3	<i>OPERATIONAL PHASE</i>	40
<b>5</b>	<b>DECOMMISSIONING PHASE</b>	<b>45</b>
<b>6</b>	<b>OPERATIONAL MONITORING REQUIREMENTS</b>	<b>46</b>
6.1	<i>BIRD MONITORING</i>	46
6.1.1	<i>Avian densities</i>	46
6.1.2	<i>Bird activity monitoring</i>	46
6.1.3	<i>Avian collisions</i>	47
6.2	<i>BAT MONITORING REQUIREMENTS</i>	48

1.1 *INTRODUCTION*

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter Mainstream SA) was issued with an Environmental Authorisation (EA) for the proposed construction of the 140MW Beaufort West Wind Facility, in the Prince Albert Local Municipality in the Western Cape Province. Authorisation was granted on 13 February 2017, by way of EA Reference No 12/12/20/1784/1.

The Beaufort West Wind Facility originally formed part of development proposals for a Wind and Solar Energy facility which was authorised on 20 March 2012 (DEA Reference 12/12/20/1784). The EIA and associated specialist studies assessed the potential impacts in relation of the proposed PV array and 260 turbine wind farm layouts, on non-adjacent land parcels. Turbine specifications included a hub height of 80m and a rotor diameter up to 101m (i.e. a maximum height of 130.5m at blade tip).

Subsequently, Mainstream SA proposed amendments to the EA which involved dispensing with the northern-most site and splitting the southern component of the development into two (2) separate 140MW wind facilities, namely Beaufort West Wind Facility and Trakas Wind Facility. Site layouts and turbine specifications were also amended to allow for up to 70 turbines on each wind facility, with a hub height and rotor diameter of 150m (i.e. a maximum height of 225m at blade tip). The amendment in respect of the Beaufort West Wind Facility was authorised on 13 February 2017, by way of EA Reference No 12/12/20/1784/1.

The amendment made provision for the construction of a total number of 70 wind turbines, each with a hub height of up to 150m and a rotor diameter of 150m. In light of advancements in wind turbine technology, however, Mainstream SA is proposing amendments to the turbine specifications stipulated in the EA for the Beaufort West Wind Facility to allow for greater project efficiency and viability. The proposed amendments are as follows:

- Increased turbine hub height: from 150m up to 200m; and
- Increased rotor diameter: from 150m to up to 200m.

The increased rotor diameter and tower hub height would result in a maximum tip height of 300m. Although other authorised elements of the project, such as the total output capacity and the associated infrastructure, will remain unchanged, the number and location of turbines will change in accordance with the findings of the specialist studies. The modified turbine specifications may however be construed as a change in the scope of the EA and may result in changes in the associated impacts, thus requiring an amendment application in terms of Part 2 of Chapter 5 of the Environmental Impact Assessment (EIA) Regulations 2014, as amended.

Accordingly, Mainstream SA has appointed SiVEST SA (Pty) Ltd (hereafter SiVEST) to act as the independent Environmental Assessment Practitioner (EAP) to undertake the Part 2 Amendment process for the above-mentioned proposed amendments, as required in terms of Regulation 32 of Government Notice (GN) R. 982.

It should be noted that an Environmental Management Programme (EMPr) was prepared by ERM Southern Africa (Pty) Ltd in 2011, for Mainstream SA, for the proposed construction and operation of the 140MW Beaufort West Wind Facility at the Beaufort West Site. In addition, this EMPr was updated by SiVEST in 2016 as part of the first EA amendments which were proposed (EA Reference No 12/12/20/1784/1). This EMPr addressed potential impacts associated with the installation, operation and decommissioning phases of the project. An EMPr is a set of guidelines and actions aimed at ensuring that construction and/or installation activities, and subsequent management of facilities, are undertaken in a manner that minimises environmental risks and impacts. However, as part of the Part 2 Amendment process currently being undertaken, the above-mentioned EMPr needs to be updated again and re-submitted to the Department of Environmental Affairs (DEA) for final approval prior to the commencement of construction on the project site.

In light of the above, the following EMPr [which was originally prepared by ERM Southern Africa (Pty) Ltd in 2011 and updated by SiVEST in 2016] has once again been updated by SiVEST, as part of the current Part 2 Amendment process being undertaken for the proposed 140MW Beaufort West Wind Facility. This EMPr has been compiled in line with the recommendations of the original EIA for the 140MW Beaufort West Wind Facility, as well as the additional mitigation measures and recommendations contained in the revised specialist reports / comment letters commissioned for the second EA amendment application submitted. Importantly, all additional mitigation measures carried across from the revised specialist reports / comment letters have been included herein and underlined in the various sections for ease of reference.

The EMPr is required in order to:

- assist in ensuring continuing compliance with South African legislation and Mainstream SA policy;
- provide a mechanism for ensuring that measures identified in the EIA to mitigate potentially adverse impacts, are implemented;
- 
- provide a framework for mitigating impacts that may be unforeseen or unidentified until construction is underway;
- 
- provide assurance to regulators and stakeholders that their requirements with respect to environmental and socio-economic performance will be met; and
- provide a framework for compliance auditing and inspection programs.



The EMPr will remain a draft document and will be updated to include the conditions of the EA and second amended EA (if approved), as well as measures dictated by the final layout plan and micro-siting. In addition, the updated EMPr will be re-submitted to the DEA for final approval prior to the commencement of construction on the project site. Additional details will be provided by the contractors and engineers once the detailed design has been completed.

## 1.2 *MAINSTREAM POLICY*

Mainstream activities are governed by their corporate values and these will be adopted by the Beaufort West Wind Facility development team and will include Mainstream's Environmental, Health and Safety Policy (see *Box 1.1* and *Box 1.2*) to manage the environmental impacts of the proposed development in conjunction with this EMPr.



# ENVIRONMENTAL POLICY

**At Mainstream Renewable Power we believe in a sustainable approach to everything we do. Our core business is to develop, build and operate wind energy, solar thermal and ocean current plants by partnering with governments, utility companies, developers and investors worldwide.**

Our core business is designed to have a positive impact on the environment and on the sustainability of human activity. We are committed to ensuring that environmental protection and awareness are at the forefront of all our activities.

Mainstream Renewable Power, through our Environmental Management System, is committed to compliance with environmental legislation and other requirements and to the continual improvement in environmental performance through the setting, implementing and monitoring of environmental and sustainability targets.

In order to deliver and maintain high standards of environmental care Mainstream will:

- Promote environmental awareness amongst our employees partners and contractors.
- Promote environmental sustainability, through the use of Life Cycle Analysis , in all our activities.
- Ensure that the working methods adopted by Mainstream, our partners and our contractors minimise damage to the environment.
- Work towards ISO 14001 certification of our environmental management system.
- Promote and maintain close relationships with enforcing authorities and other environmental organisations and groups as appropriate.
- Report our verified performance to the public.

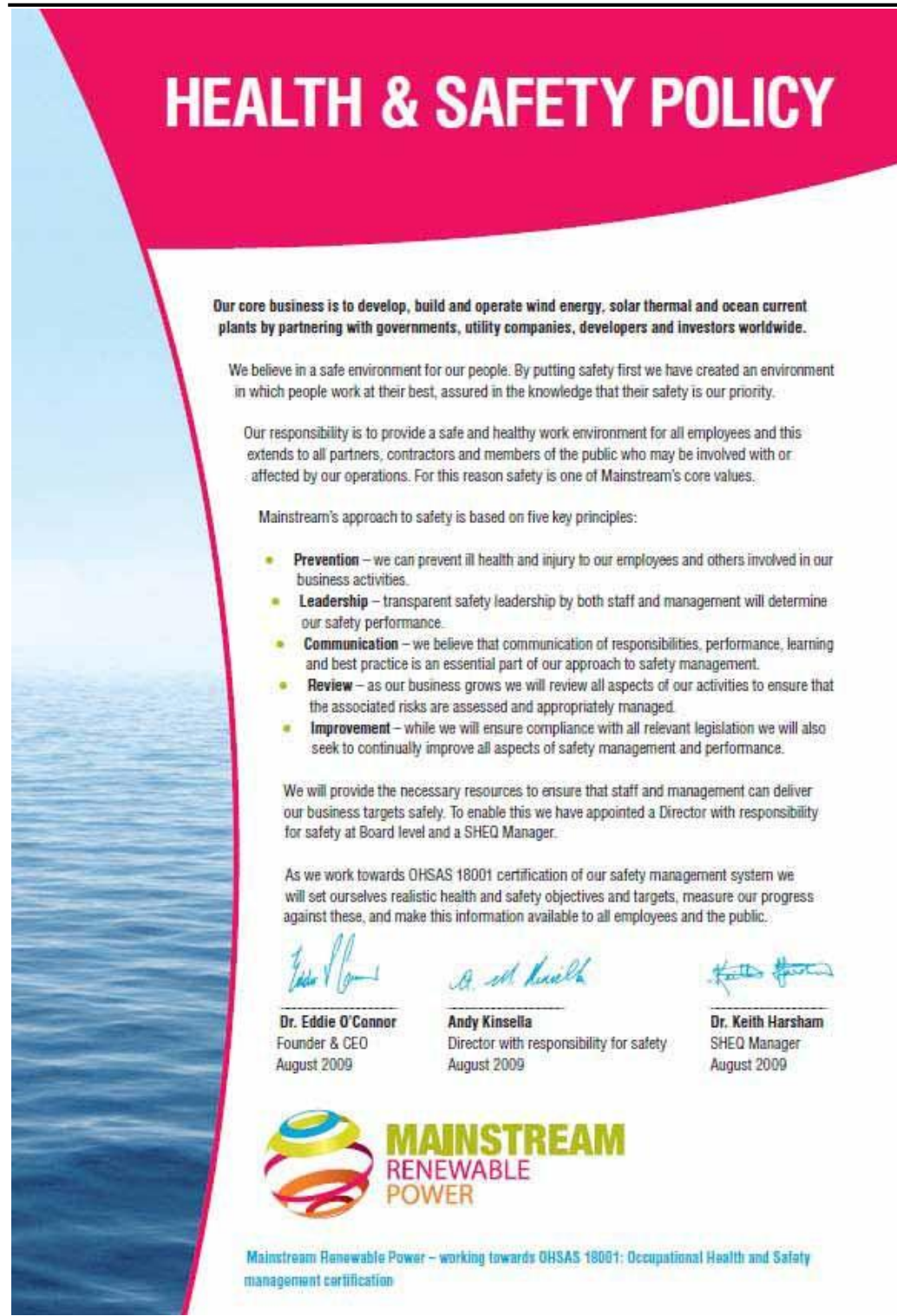
This Policy is brought to the attention of all who work with Mainstream and is available to interested parties on request. Employees and contractors are encouraged to promote environmental awareness and report any opportunities for improvement as soon as possible.

		
<b>Dr. Eddie O'Connor</b> Founder & CEO August 2009	<b>Andy Kinsella</b> Director with responsibility for safety August 2009	<b>Dr. Keith Harsham</b> SHEQ Manager August 2009



**MAINSTREAM  
RENEWABLE  
POWER**

Mainstream Renewable Power – working towards ISO:14001 Environmental management certification



**HEALTH & SAFETY POLICY**

**Our core business is to develop, build and operate wind energy, solar thermal and ocean current plants by partnering with governments, utility companies, developers and investors worldwide.**

We believe in a safe environment for our people. By putting safety first we have created an environment in which people work at their best, assured in the knowledge that their safety is our priority.


Our responsibility is to provide a safe and healthy work environment for all employees and this extends to all partners, contractors and members of the public who may be involved with or affected by our operations. For this reason safety is one of Mainstream's core values.


Mainstream's approach to safety is based on five key principles:


- **Prevention** – we can prevent ill health and injury to our employees and others involved in our business activities.
- **Leadership** – transparent safety leadership by both staff and management will determine our safety performance.
- **Communication** – we believe that communication of responsibilities, performance, learning and best practice is an essential part of our approach to safety management.
- **Review** – as our business grows we will review all aspects of our activities to ensure that the associated risks are assessed and appropriately managed.
- **Improvement** – while we will ensure compliance with all relevant legislation we will also seek to continually improve all aspects of safety management and performance.


We will provide the necessary resources to ensure that staff and management can deliver our business targets safely. To enable this we have appointed a Director with responsibility for safety at Board level and a SHEQ Manager.

As we work towards OHSAS 18001 certification of our safety management system we will set ourselves realistic health and safety objectives and targets, measure our progress against these, and make this information available to all employees and the public.

  
**Dr. Eddie O'Connor**  
Founder & CEO  
August 2009

  
**Andy Kinsella**  
Director with responsibility for safety  
August 2009

  
**Dr. Keith Harsham**  
SHEQ Manager  
August 2009

  
**MAINSTREAM  
RENEWABLE  
POWER**

Mainstream Renewable Power – working towards OHSAS 18001: Occupational Health and Safety management certification

### 1.3 ROLES AND RESPONSIBILITIES

The following section outlines the roles and responsibilities of those involved in the proposed installation, operation and decommissioning of the renewable energy facility.

### 1.3.1

### Mainstream SA

Mainstream SA's Development Manager will have the ultimate responsibility for ensuring the measures outlined in the EMPr are delivered and that the measures are implemented by their contractors and subcontractors. In this respect the Development Manager will review and approve contractor plans for delivery of the actions contained in the EMPr during construction and ensure that during operation performance will be evaluated through monitoring and auditing.

#### Development Manager

The Development Manager's responsibilities will encompass the following:

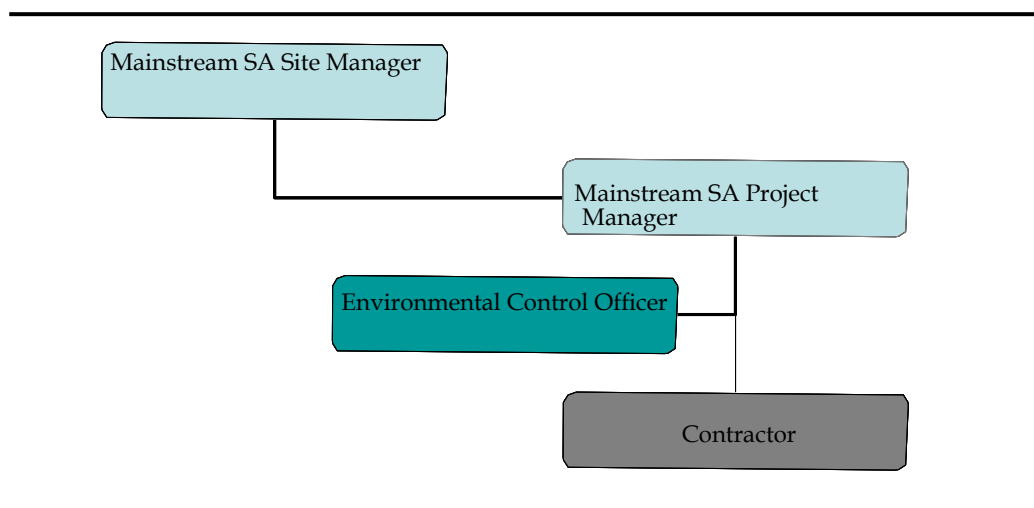
- Liaise with the project engineers to ensure that the Wind Facility is designed to meet all the specified environmental parameters and legal requirements as specified in the EMPr and Environmental Authorisation (EA);
- Authority to stop works in emergency situations;
- Approval of method statements; and
- Liaise with authorities.

The Development Manager, Mr. Eugene Marais, can be contacted on:

Tel: +27 (0)21 657 4045  
Email: [Eugene.marais@mainstreamrp.com](mailto:Eugene.marais@mainstreamrp.com)  
Cell: +27 (0)73 871 5781

The Project Manager, who is responsible for the implementation of the EMPr, will report directly to the Development Manager on environmental, health and safety matters. An organogram showing reporting structures is provided in *Figure 1.1*.

Figure 1.1: Reporting Structures



### *Project Manager*

The Project Manager is the person involved with the development project who is responsible for the implementation of the EMPr. This person is, therefore, responsible for the environmental issues involved with the construction phase of the project.

The Project Manager, Rebecca Thomas, can be contacted on:

Tel: +27 (0)21 657 4040  
Email: Rebecca.Thomas@mainstreamrp.com  
Cell: +27 73 452 0096

The Project Manager's main role is to regularly inspect and manage the construction activities on-site in order to ensure compliance with the EMPr. The Project Manager will liaise with the Environmental Control Officer (ECO) and Contractor and report to the Development Manager.

The Project Manager's responsibilities will encompass the following:

- Training of contractors on environmental matters (see Section 1.3.4);
- Inspect the site at least once every two (2) weeks for the duration of the construction phase;
- Management of the contractors in terms of the EMPr;
- Review of contractor method statements;
- Report on environmental problems to Development Manager;
- Keep records of:
  - Environmental incidents;
  - Contractors non-compliance to the EMPr; and
  - Contractor fines and penalties.
- Recommend the removal of any contractor or his/her employees from site upon failure to comply with the EMPr;
- Recommend the suspension of work activities where such activities contravene the EMPr requirements; and
- The authority to stop works in emergency situations when the Development Manager is not available and construction activities seriously threaten the environment.

The Project Manager will also be responsible for implementing the community engagement plan. The Project Manager will be required to participate in community meetings that will be held in affected communities prior to, during and upon completion of construction.

During the construction phase, an ECO will be responsible for ensuring the overall environmental and socio-economic objectives of the EMPr are met. Specialists such as palaeontologists, bird specialists etc. will be utilised as required. When working on site, the ECO will report to the Project Manager.

### 1.3.2

#### *Environmental Control Officer (ECO)*

Mainstream SA will appoint an independent ECO for the duration of the construction phase of the project. The ECO will be appointed before construction commences and contact details of this person will be provided at this stage.

The primary role of the ECO will be to monitor the construction activities.

The ECO's responsibilities will encompass the following:

- Brief the Contractor on EMPr requirements;
- Visit the site at least once a week:
  - Observe activities on-site.
  - Inspect the site for non-compliance, etc.
  - Scrutinise the logbook and on-site records.
- Liaise with DEA regarding implementation of the EMPr, if and when required;
- Give feedback to the Project Manager after each site visit; and
- Be contactable telephonically in case of emergencies.

### 1.3.3

#### *Site Personnel and Contractors*

During site preparation and construction, the contractor will be responsible for ensuring compliance with all relevant legislation as well as adherence to all environmental and socio-economic mitigation measures specified in the EMPr. The contractor is also responsible under the contract for managing the potential environmental, socio-economic, safety and health impacts of all contract activities whether these are undertaken by themselves or by their subcontractors. There is therefore no intention to differentiate between the responsibilities of contractors and subcontractors, all contractors must meet all requirements.

The contractor will need to demonstrate to Mainstream's satisfaction how compliance with the requirements of the EMPr will be ensured. The contractor will also be expected to demonstrate commitment to the EMPr at all levels in the contractor's management structure. The contractor will be required to identify individuals responsible for overall environment, socio-economic, safety and health management.

The contractor will be required to undertake regular environmental and socio-economic inspections and provide reports to Mainstream SA to monitor and evaluate performance against the measures and objectives established in the EMPr. In this regard, the contractor's performance in complying with the EMPr will be monitored and audited by the ECO, Project Manager and Development Manager.

The contractor will be appointed before construction commences and contact details of this person will be provided at this stage.

### 1.3.4 *Environmental Awareness Training for Site Personnel*

All contractor teams involved in work on the development are to be briefed on their obligations towards the environmental controls and methodologies in terms of this EMPr prior to work commencing. The briefing will usually take the form of an on-site talk and demonstration by the ESA. The education / awareness programme should be aimed at all levels of personnel within the contractor team.

## 1.4 **SUBSIDIARY PLANS AND POLICIES**

Environmental and socio-economic management issues at various stages in the life of the project, from detailed design through decommissioning, are governed or guided by a number of standard, including:

- those contained in South African legislation;
- those established by industry codes of practice;
- those required by Mainstream SA policy or manufactures specifications;
- those within relevant international standards (e.g. World Bank environmental guidelines, IFC Performance Standards, World Health Organisation, International Labour Organisation); and
- commitments made in the EIA.

Primary contractors will be required to compile a management plan to cover the issues identified in this EMPr, for approval by the Project Manager. This plan will be compliant with the legal and Project Standards as described above, as well as the mitigation actions made in the EIA.

As detailed design proceeds and as construction contractors are appointed, the EMPr requires specific plans be developed for the management of issues such as those summarised in *Box 1.3* below.



**Plans and programmes to be developed**

- Bat Monitoring Programme
- Bird Monitoring Programme
- Construction Site Management Plan
- Code of Conduct
- Emergency Response Plan
- Health and Safety Plan
- Traffic Management Plan
- Community Development Trust
- Community Engagement Plan
- Recruitment Policy
- Local Procurement Policy

**1.5*****STAKEHOLDER ENGAGEMENT***

Mainstream SA must continue to engage with stakeholders throughout project construction and operation. Communication with local communities and other local stakeholders will be a key part of this engagement process and is one where Mainstream SA and the contractor will need to work closely together during the construction period. Development of a Community Engagement Plan (CEP) is important to facilitate this communication.

The objectives of communication and liaison with local communities are the following.

- To provide residents in the vicinity of the Beaufort West Wind Facility (e.g. Touwsrivier residents and neighbours) and other interested stakeholders, with regular information on the progress of work and its implications.
- To monitor implementation of mitigation measures and the impact of construction on communities via direct monitoring and feedback from those affected in order to ensure that mitigation measures are implemented and the mitigation objectives achieved.
- To manage any disputes between Mainstream SA, the contractors and local people.

This engagement process can serve to inform the establishment of the Community Development Trust linked to the project.

**1.5.1*****Grievance Procedure***

Mainstream SA must develop a grievance procedure to ensure fair and prompt resolution of problems arising from the project. The grievance procedure must be underpinned by the following principles and commitments:

- Implement a transparent grievance procedure, and disseminate key information to directly impacted stakeholders.



- Seek to resolve all grievances timeously.
- Maintain full written records of each grievance case and the associated process of resolution and outcome for transparent, external reporting.

The responsibility for resolution of grievances will lie with Mainstream SA and its contractors.

## 1.6 *UNCERTAINTY AND CHANGE MANAGEMENT*

Uncertainty in the development of the 140MW Beaufort West Wind Facility derives from a number of factors including:

- evolving layout design;
- uncertainty in certain aspects of the baseline; and
- unforeseen events and the results of monitoring.

A key element of on-going environmental and socio-economic management is to address uncertainty through collecting information, additional assessment and, where necessary, the development of further mitigation and management measures.

The EIA as a process does not stop with submission of the reports to the authorities, or indeed with environmental authorisation. The EMPr will require a mechanism to manage change. These changes may be material ones that could influence the original findings of the EIA, and hence the basis for its approval or may be minor adjustments to the project.

Mainstream SA will therefore implement a Change Management System. This is to ensure that changes to the scope of the Project, or any new information are subjected to a robust assessment process. Any changes will be evaluated by the Project Manager for their degree of significance, and incorporated into the appropriate project documentation as follows:

- Minor changes will be reflected in updates to the EMPr.

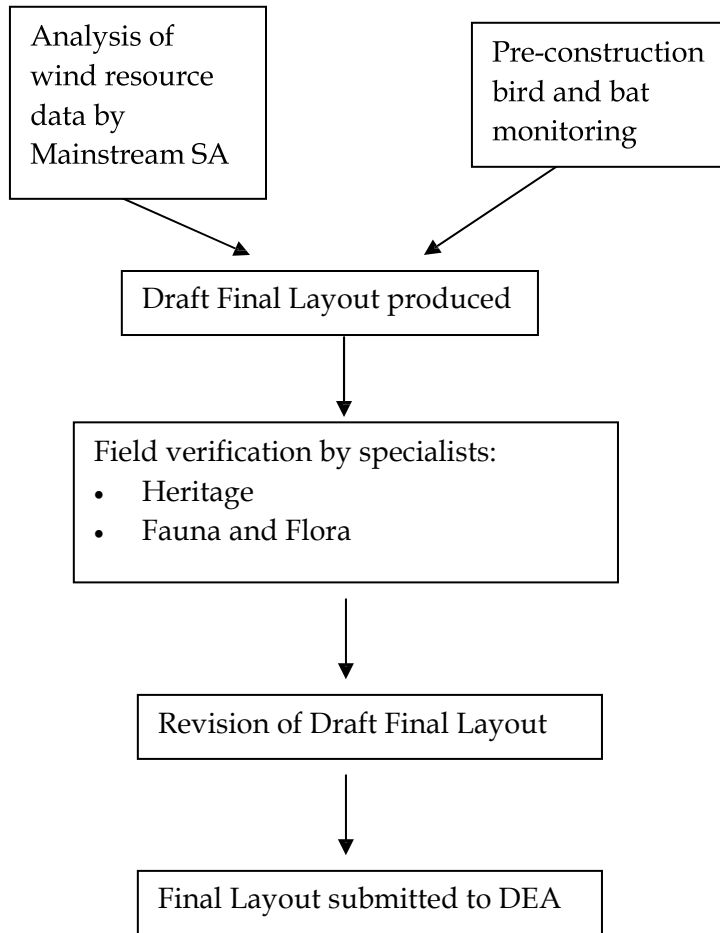
Substantive changes that might potentially alter the EIA findings (i.e. result in changes to the predicted significance of environmental and socio-economic impacts) will be subject to re-assessment, including further stakeholder and authority consultation, supplementary reporting and revision of the EMPr. It will be the responsibility of the Mainstream Project Manager to communicate substantive changes to the DEA.

It should be noted that Mainstream SA has further refined the proposed layout for the Beaufort West Wind Facility as part of the current Part 2 Amendment process. This is as a result of the findings of the Avifaunal and Bat specialists, as well as the mitigation measures recommended by these specialists. This new layout specifically relates to the following specialist concerns / comments:

- **Avifauna:**
  - Given the significant proposed increase in rotor swept area, the Avifauna Specialist concluded that, if the proposed change in turbine dimensions is applied to the current 70 turbine layout, the original pre-mitigation impact significance rating of “medium - high” for potential collision mortality will no longer be valid. A collision risk rating of “high” would thus be more appropriate. However, should the number of turbines be reduced significantly, the collision rating will remain unchanged, or even be reduced, depending on the extent of the reduction in the number of turbines.
  
- **Bats:**
  - A maximum number of 40 turbines, with a hub height of 200 m and a rotor diameter of 200 m, is proposed with a total output of 140 MW. If more than 40 turbines with a hub height of 200m and a rotor diameter of 200m are installed, the curtailment programme as indicated in Table 7 of the EA Amendment report (Schwartz, 2019) is to be applied from the onset of the wind farm operation.

In light of this, the number of turbines in the refined layout has been reduced to 40. The figure below shows the refined 40 turbine layout now proposed for the Beaufort West Wind Facility.

It is recognised that the preferred site layout, **Site Layout Alternative 2** (see *Figure 2.1* below), which has been refined as part of the current Part 2 Amendment process, may undergo further revisions once sufficient wind resource data has been acquired at the site. Any revisions of the site layout design will adhere to the relevant exclusion and buffer zones identified as part of the EIA and amendment processes, as indicated in the refined preferred site layout map (*Figure 2.1*) and the constraints map below (*Figure 2.2*). It is necessary to include a process in the EMPr which will be followed to ensure that the necessary specialist input is obtained and that the final layout adheres to the constraints highlighted by the specialist through the EIA. The final layout must be submitted to the DEA before construction commences. The methodology for finalising the design layout is outlined below:







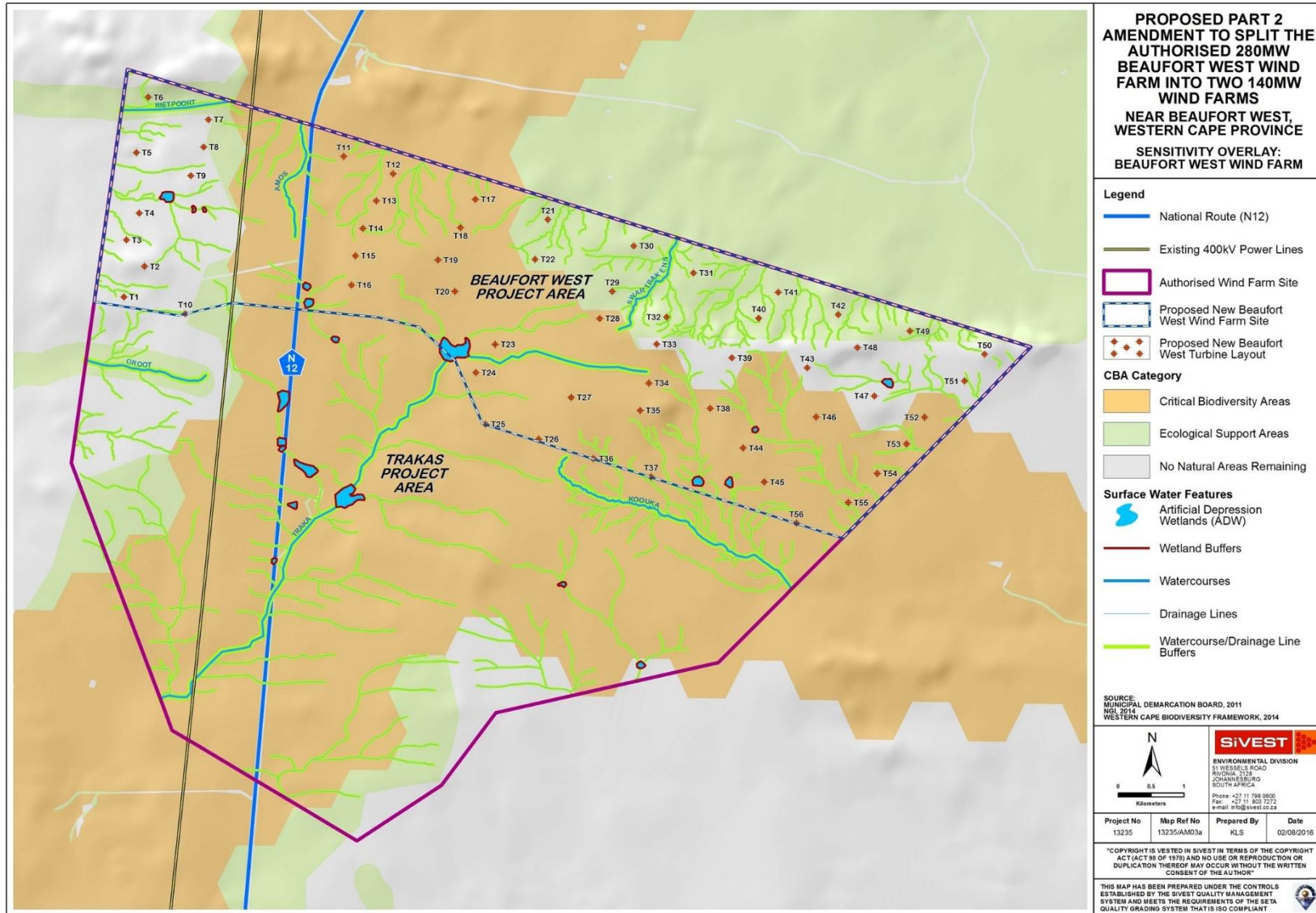


Figure 2.2 Constraints Map (prior to recent EA Amendment)

## 2.1 ANALYSIS OF WIND DATA AND REFINING OF LAYOUT

### 2.1.1 *Analysis of wind data*

Wind resource data gathered from wind measuring masts placed on the site will be analysed by Mainstream SA in order to refine **Site Layout Alternative 2**. Mainstream SA may therefore relocate turbines on the site layout based on the wind data analysis to ensure optimal energy generation. The refined layout will adhere to the relevant exclusion and buffer zones identified for the site as part of the EIA and amendment processes, and as contained in the constraints map.

### 2.1.2 *Pre-construction bird monitoring*

Pre-construction bird monitoring will be undertaken considering avian densities, bird activity monitoring and passage rates of priority species.

#### *Avian densities*

A set of at least 10 walk-transect routes, each of at least 1000 m in length, should be established in areas representative of all the avian habitats present within a 10 km radius of the centre of the Wind Facility development site. Each of these should be walked at least once every two (2) months over the six (6) months preceding construction, and at least once every two (2) months over the same calendar period, at least six (6) months after the Wind Facility is commissioned. The transects should be walked after 06h00 and before 09h00, and the species, number and perpendicular distance from the transect line of all birds seen should be recorded for subsequent analysis and comparison.

In addition, the cliff-lines within the development area should be surveyed for cliff-nesting raptors at least every six (6) months using documented protocols (Malan, 2009), and all sightings of key species on-site should be carefully plotted and documented, and the major waterbodies on and close to the development area should be surveyed for wetland species on each visit to the study area, using the standard protocols set out by the CWAC initiative (Taylor *et al.*, 1999).

#### *Bird activity monitoring*

Monitoring of bird activity in the vicinity of the Wind Facility should be done over a 2-3 day period at least every two (2) months for the six (6) months preceding construction, and at least once per quarter for a full calendar year starting at least six (6) months after the 140MW Beaufort West Wind Facility is commissioned. Each monitoring day should involve:

- (i) Half-day counts of all priority species flying over or past the wind facility impact area (see passage rates below); and
- Opportunistic surveys of cranes (and bustards) and raptors seen when travelling around the wind facility site.

### *Passage rates of priority bird species*

Counts of bird traffic over and around the proposed/operational wind facility should be conducted from suitable vantage points (and a number of these should be selected and used to provide coverage of avian flights in relation to all areas of the wind facility), and extend alternately from dawn to midday, or from midday to dusk, so that the equivalent of four (4) full days of counts is completed each count period. This should provide an adequate (if minimal) sample of bird movements around the facility in relation to a representative cross-section of conditions and times of day, for all seasons of the year. Once in position at the selected count station, the observer should record (preferably on a specially designed data sheet) the date, count number, start-time and conditions at start - extent of cloud cover, temperature, wind velocity and visibility - and proceed with the count. The counts should detail all individuals or flocks of the stipulated priority bird species, all raptors, and any additional species of particular interest or conservation concern, seen flying within 500 m of the envisaged or actual periphery of the Beaufort West Wind Facility. Each record should include the following data: time, updated weather assessment, species, number, mode of flight (flapping, gliding, soaring), flight activity (commuting, hunting other), direction of flight, vertical zoning relative to the envisaged or actual turbine string (low - below or within the rotor arc, medium - within c.100 m of the upper rotor arc, high - >100 m above the upper rotor arc), and horizontal zoning relative to the envisaged or actual turbine string (near - through the turbine string or within the outer rotor arc, middle - within c.100 m of the outer rotor arc, distant - >100 m beyond the outer rotor arc) and, for post construction monitoring, notes on any obvious evasive behaviour or flight path changes observed in response to the 140MW Beaufort West Wind Facility. The time and weather conditions should again be noted at the end of each count.

### *Revised Mitigation Measures*

It should be noted that Chris van Rooyen *et al* of Chris van Rooyen Consulting were requested to revisit the avifaunal impact assessments previously undertaken for the proposed Beaufort West Wind and Solar Energy facility and the subsequent amendment application (Avisense, 2011; Avisense, 2016 and Van Rooyen *et al.*, 2016) in light of the proposed amendments.

The "Best Practice Guidelines for Avian Monitoring and Impact Mitigation at Proposed Wind Energy Development Sites in Southern Africa", (Jenkins *et al.* 2011) revised in 2015, requires that either all, or part of the pre-construction monitoring is repeated if there is a time period of three (3) years or more between the data collection and the construction of the wind facility. This re-assessment is necessary in order to take cognisance of any changes in the environment which may affect the risk to avifauna, and to incorporate the latest available knowledge into the assessment of the risks. In order to give effect to this requirement, nest searches were repeated in June 2019 to ensure current information on the breeding status of priority species at the proposed Beaufort West Wind Facility is recorded.

The assessment however concluded that no additional priority species nests which could be impacted by the proposed Wind Facility, were recorded during the nest searches in June 2019. The original mitigation measures listed in the Bird Specialist Study (Avisense, 2011 and 2016) thus remain valid and do not need to be revised in view of the proposed changes to the turbine dimensions.

### 2.1.3 *Pre-construction bat monitoring*

The pre-construction bat monitoring programme would provide quantitative information on the effects of the 140MW Beaufort West Wind Facility on bats and inform decision-making around reducing potential risks during the construction and operational phases.

- Acoustic monitoring should be conducted at the site once wind measuring masts have been installed across seasons to straddle the times that bats migrate (April/May and August/September) and during mid-summer to inform micro-siting of turbines.
- Monitoring should be done over extended periods within each season e.g. several weeks at 3-4 days per week.
- Bat activity should be assessed with detectors placed at ground level as well as 30 m above ground. The pre-construction wind-measuring masts should be used for this purpose.
- Using systems e.g. the ANABAT SD2 (Titley Electronics PO Box 19 Ballina NSW 2478, Australia [info@titley.com.au](mailto:info@titley.com.au), <http://www.titley.com.au/batdetection.htm>) that enables the remote downloading of echolocation data would allow the collection of data over extended periods.
- Research on seasonal and diurnal activity rhythms is needed for all bat fauna in South Africa.



#### 2.1.4

#### *Draft Final Layout*

The wind data and bird and bat monitoring survey will be used to produce a draft Final Layout, using the refined layout map (see *Figure 2.1*) as a basis and taking the identified environmental sensitivities into consideration (i.e. the constraints map – *Figure 2.2*). A draft Final Layout indicating precise locations (i.e. GPS coordinates) for the turbines, roads and buildings will then be made available to the following specialists to ensure there is no infringement on identified sensitive areas:

- Ecological specialist;
- Bird specialist;
- Bat specialist;
- Botanical specialist;
- Heritage specialist;
- Visual Specialist; and
- Noise specialist.

#### 2.2

#### *FIELD VERIFICATION BY SPECIALISTS*

A walk-through of the site may be conducted in order to determine whether additional micro-siting is required to avoid areas of interest around turbines, roads and buildings. Specialists will visit the site and inspect the location of the turbines, roads and buildings. It is at this stage that permits other than the EA will be obtained (see *Section 3* of the EIA).

The archaeology and cultural heritage specialist will use the site survey and the draft Final Layout with potential ‘micro-siting’ to finalise submission of the Heritage Impact Assessment (HIA) to Heritage Western Cape (HWC).

Comments and suggestions on the draft Final Layout will be fed back to Mainstream SA, who will make adjustments to turbine locations or infrastructure (if required) and produce the Final Site Layout.

Additional mitigation measures recommended by the specialists must be incorporated into the EMP for implementation during the construction and operational phases of the project.

#### 2.3

#### *FINAL LAYOUT SUBMISSION*

The Final Site Layout will be submitted to the DEA and HWC, along with a record of the findings and recommendations of the various specialists consulted.

Activities undertaken during site preparation, construction and operation may require additional permits, over and above the EA. Mainstream SA is responsible for ensuring that the necessary permits are in place in order to comply with national and local regulations. Additional permit requirements are described below.

**3.1****HERITAGE**

The protection and management of South Africa's heritage resources is controlled by the National Heritage Resources Act (NHRA), 1999 (Act No. 25 of 1999). The objective of the NHRA is to introduce an integrated system for the management of national heritage resources.

*Archaeology, Palaeontology and Meteorites*

According to Section 35 (Archaeology, Palaeontology and Meteorites) and Section 38 (Heritage Resources Management) of the NHRA, palaeontological heritage impact assessments (PIAs) and archaeological impact assessments (AIAs) are required by law in the case of developments in areas underlain by potentially fossiliferous (fossil-bearing) rocks, especially where substantial bedrock excavations are envisaged, and where human settlement is known to have occurred during prehistory and the historic period. Depending on the sensitivity of the fossil and archaeological heritage, and the scale of the development concerned, the palaeontological, and archaeological impact assessment required may take the form of (a) a stand-alone desktop study, or (b) a field scoping plus desktop study leading to a consolidated report. In some cases, these studies may recommend further palaeontological and archaeological mitigation, usually at the construction phase. These recommendations would normally be endorsed by the responsible heritage management authority, namely Heritage Western Cape (HWC), to whom the reports are submitted for review. *Table 3.1* outlines when a permit is required depending on the sensitivity of the heritage resources.

**Table 3.1*****Permitting requirements for fossil, built environment and Stone Age archaeology***


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**PERMIT APPLICATION SECTION 35 – FOSSILS, BUILT ENVIRONMENT FEATURES, SHIPWRECKS & STONE AGE ARCHAEOLOGY (Ref: NHRA 1999: 58):**


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- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
  - (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
  - (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite
-

## *Burial Grounds and Graves*

A Section 36 permit application is made to the South African Heritage Resources Agency (SAHRA) which protects burial grounds and graves that are older than 60 years and must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit. SAHRA must also identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with these graves and must maintain such memorials. A permit is required under the conditions listed in *Table 3.2*.

**Table 3.2** *Permitting requirements for burial grounds and graves older than 60 years to Heritage Western Cape (HWC) and historic burials to the South African Heritage Resources Agency (SAHRA)*

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**PERMIT APPLICATION SECTION 36 - BURIAL GROUNDS & GRAVES  
(REF: NHRA 1999: 60)**

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- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves
  - (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
  - (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals
  - (d) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant
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**Table 3.3** *Permitting requirements for heritage resources management*

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**PERMIT APPLICATION SECTION 38 (Ref: NHRA 1999: 62)**

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- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
  - (b) the construction of a bridge or similar structure exceeding 50 m in length;
  - (c) any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup> in extent; or
    - (ii) involving three or more existing erven or subdivisions thereof; or
    - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
  - (d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or
  - (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority
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### 3.2 *BORROW PITS*

A borrow pit refers to an open pit where material (soil, sand or gravel rock) is removed for use at another location. Mainstream SA may want to use borrow pits for certain earthworks operations, such as the construction of roads, embankments, bunds, berms, and other structures.

The establishment of borrow pits is regarded as a mining activity and is legislated in terms of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA). A mining permit must be obtained from the Department of Minerals and Energy prior to the establishment of borrow pits on the site.

### 3.3 *WATER USE*

There are licensing procedures that need to be followed for particular “water uses”. Water uses that may be of relevance to the development of wind farms and associated road construction include the following:

- Taking of water from a water resource, including a water course, surface water, estuary or aquifer (i.e. borehole)
- altering the bed, banks, course or characteristics of a water course; and/or
- impeding or diverting of a flow in a water course.

Under the National Water Act (Act No. 36 of 1998) (NWA), either General Authorisation (GA) or a Water Use License (WUL) must be applied for by Mainstream SA. It is anticipated that Mainstream SA may require registration under the General Authorisation: GN 1199 (18 December 2009), for potential river crossings.

### 3.4 *ABNORMAL VEHICLE LOADS*

Wind turbine components will be delivered to site using road transport and due to the size of the components, the vehicles used to deliver turbine components will be considered abnormal loads in terms of the Road Traffic Act (Act No 29 of 1989). A permit for a vehicle carrying an abnormal load must be obtained from the relevant Provincial Authority. The vehicle must comply with the Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, issued by the Department of Transport, 2009.

### 3.5 *ACCESS FROM THE N12*

Access to the 140MW Beaufort West Wind Facility will be off the N12, which is a National road. The N12 however remains under provincial control. Approval to construct a new access to a provincial road needs to be sought from the Western Cape Department of Transport and Public Works.

## **4** *MITIGATION AND MONITORING MEASURES*

Mitigation and monitoring measures are presented in this section under the following headings:

- Planning Phase;
- Construction Phase;
- Operational Phase; and
- Decommissioning.

### **4.1** *PLANNING PHASE*

In order to ensure compliance with environmental legislation requirements, the following actions are applicable to the planning phase for the 140MW Beaufort West facility.

PLANNING PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
1.	Design and Planning	Notify all registered Interested and Affected Parties of Environmental Authorisation and any amendments thereto.	1.1	Notify all registered I&APs and key stakeholders of the Environmental Authorisation opportunity and appeal procedure.	Notices sent to relevant parties on the stakeholder database. List of those to whom it was sent on file	ERM/SIVEST	Within 5 days from the issuing of the Environmental Authorisation.
		Plan the draft Final Layout of the 140MW Beaufort West unnecessary disturbance of natural vegetation, fauna and heritage resources, and minimise collision risks with avifauna and bats.	1.2	Follow the layout finalisation methodology outlined in Section 2 to plan the draft Final Layout and submit Final Layout to DEA.	Final Layout and relevant documentation on record.	Mainstream SA	Prior to construction.
			1.3	<u>Development must be restricted to a maximum number of 40 turbines, with a hub height of 200 m and a rotor diameter of 200 m with a total output of 140 MW.</u>			
			1.4	<u>The turbine layout must be approved by a bat specialist upon finalisation of turbine specifications.</u>			
		Ensure compliance with legal and other permitting requirements.	1.5	Ensure that all relevant legal requirements have been met.	Permits	Mainstream SA	Prior to construction.
		Ensure submission of final layout design prior to construction	1.6	Submission of Final Layout to DEA and HWC.	Proof of communication.	Mainstream SA	Prior to construction
			1.7	<u>Potential noise impact must be re-evaluated if:</u> <u>- layout changes result in wind turbines being located within 1000 m of a confirmed Noise-sensitive Development (NSD); or</u> <u>- the developer decides to use a different wind turbine that has a sound power emission level higher than the Acciona WTG used in the Noise report (sound power emission level exceeding 113 dBA re 1 pW)</u>			
		Incorporate additional mitigation measures recommended by specialists during the finalisation of the layout into the EMPr	1.8	Update EMPr with mitigation measures	EMPr	Mainstream SA	14-days in advance of commencement of construction.
		Ensure that DEA are notified of commencement date	1.9	Notify DEA prior to commencement of construction.	Proof of communication.	Mainstream SA	

PLANNING PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
2.	Health and Safety	Ensure the health and safety of site personnel during construction.	2.1	A health and safety plan must be developed prior to the commencement of construction to identify and avoid work related accidents.	Health and Safety Documentation	Mainstream SA and appointed contractor	Prior to construction
			2.2	Turbines must be sufficiently spaced from one (1) another so that if one (1) turbine collapses, it does not make contact with the nearest turbine.	Final Layout		
			2.3	Standard buffer zones around roads, houses, and any other structures must be observed, (refer to <i>Figure 2.1</i> and <i>2.2</i> ).			
3.	Traffic Impact	Minimise negative effects associated with the increase in traffic.	3.1	A transport study must be undertaken approximately one (1) year prior to the commencement of construction to determine the most appropriate route from port to site.	Transport Study	Mainstream SA	Prior to commencement of construction.
			3.2	Mainstream SA will develop a Traffic Management Plan including strict controls over driver training, vehicle maintenance, speed restrictions, appropriate road safety signage, and vehicle loading and maintenance measures.	Traffic management plan	Mainstream SA	
			3.3	All necessary transportation permits will be applied for at this stage and obtained from the relevant authorities, including permits for abnormal loads.	Permits	Mainstream SA and appointed contractor	

PLANNING PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
4.	Visual Impacts	Minimise visual impacts	4.1	The facility and related infrastructure must not be located on mountain ridges, spurs and steep slopes.	Final layout and building designs	Mainstream SA	Prior to commencement of construction.
			4.2	The facility and related infrastructure must not be located on landscape features such as rock outcrops, streams and wetlands.			
			4.3	A visual buffer of 250m for the wind turbines from local roads and external farm boundaries must be implemented, unless smaller distances are negotiated with the local authority and neighbours.			
			4.4	The design of the buildings to be compatible in scale and form with buildings of the surrounding area. All yards and storage areas to be enclosed by masonry walls.			
			4.5	<i>Some of the new turbine positions are still located in 'constraint' areas identified in our previous study, mainly in the ephemeral watercourse buffers, and we assume that this will be remedied in the micro-siting of the turbines.</i>			
5.	Damage or Destruction of Cultural Heritage Interests	Avoid damage or destruction of cultural heritage aspects	5.1	Since the preferred layout design may undergo revisions prior to construction, once the final layout design has been fixed (subject to micro-siting), a field survey must be undertaken by a Archaeology, palaeontology and cultural heritage specialist. The survey will be used to finalise the HIA to be submitted to HWC.  <i>A realistic, collaborative mitigation programme and protocol must be drawn up by the palaeontologist in conjunction with the developer and Heritage Western Cape (HWC) so that any important fossil heritage on-site may be conserved cost-effectively.</i>	Final layout design	Mainstream SA and subcontractors	Prior to construction
			5.2	Avoid disturbance or damage to buildings and	Site inspection report		



			structures older than 60 years by maintaining 500m buffers around the on-site dwellings;			
		5.3	Avoid inland water bodies (100m buffer) and rivers (200m buffer); and			
		5.4	Maintain a 200m buffer zone around cemeteries or graves on-site.			

**PLANNING PHASE**

Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
6.	Socio-Economic Impact: Community Development	Enhance benefits associated with the Community Development Trust	6.1	<p>Mainstream SA must continue, as is their stated intention, to explore ways to enhance local community benefits with a focus on broad-based BEE through mechanisms such as community shareholding schemes and trusts. At this preliminary stage, and in accordance with the relevant BEE legislation and guidelines, up to four (4) percent of after tax profit could be used for community development over and above that associated with expenditure injections into the area. As such;</p> <ul style="list-style-type: none"> <li>• Mainstream SA to establish a Community Development Trust for the advancement of local development needs.</li> <li>• Mainstream SA will contribute up to four (4) percent of after tax profit to the fund.</li> <li>• Projects will be identified in collaboration with the local Municipality and community representatives to ensure alignment with the key needs identified through the Integrated Development Planning process.</li> <li>• All projects will be aligned with Mainstream SA's policies.</li> </ul>	Community Development Trust documentation	Mainstream SA	Prior to construction and operation

PLANNING PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
7.	Socio-Economic Impact: Employment and Procurement	Ensure that employment of local people is maximised and procurement of local, regional and national services is maximised	7.1	Mainstream SA will establish a recruitment and procurement policy which sets reasonable targets for the employment of South African and local residents /suppliers (originating from the local municipality) and promote the employment of women as a means of ensuring that gender equality is attained. Criteria will be set for prioritising, where possible, local (local municipal) residents/suppliers over regional or national people/suppliers. All contractors will be required to recruit and procure in terms of Mainstream SA's recruitment and procurement policy.	Recruitment policy	Mainstream SA	Prior to construction
			7.2	Mainstream SA will work closely with relevant local authorities, community representatives and organisations to ensure that the use of local labour and procurement is maximised.	Meeting minutes		
8.	Socio-Economic Impact: Employment and Procurement Continued	Enhance employment and procurement benefits	8.1	Mainstream SA to work closely with the wind turbine suppliers to provide the requisite training to the workers. The training provided will focus on development of local skills.	Training material	Mainstream SA	Prior to construction
			8.2	Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the project. This will help to ensure that they have future opportunities to provide goods and services to the sector.	Records of training		
9	Disruption to and loss of agricultural land	Minimise disruption to agricultural activities and loss of agricultural land	9.1	All workers will agree to the Code of Conduct and be aware that contravention of the Code could lead to dismissal (as outlined in Section 14.2 of the EIA).	Code of conduct	Mainstream SA	Prior to construction
			9.2	All directly affected and neighbouring farmers will be able to lodge grievances with Mainstream SA using the Grievance Procedure.	Grievance procedure		

10.	Waste and effluent	Prevent soil and/or groundwater contamination from waste and effluent.	10.1	A suitable area for the storage of waste must be selected (away from water courses) and included in the site layout plan.	Final layout design	Mainstream SA	Prior to commencement of construction
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PLANNING PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
11.	Loss of Vegetation	Minimise impacts associated with vegetation loss	11.1	Adhere to the restrictions and exclusion zones incorporated into the revised / refined preferred Site Layout Map (see <i>Figure 2.1</i> and <i>2.2</i> ) and follow the layout finalisation methodology outlined in Section 2 of this EMPr.	Final design layout	Mainstream SA	Prior to construction
12.	Faunal Impacts	Minimise impacts to onsite fauna	12.1	Adhere to the restrictions and exclusion zones incorporated into the revised / refined preferred Site Layout Map (see <i>Figure 2.1</i> and <i>2.2</i> ) and follow the layout finalisation methodology outlined in Section 2 of this EMPr.	Final design layout	Mainstream SA	Prior to construction
13.	Disturbance of avifauna habitat and collision	Mitigate the potential impact on avifauna	13.1	Conduct bird monitoring as outlined in Section 2 of this EMPr.	Monitoring data	Mainstream SA and subcontractor	Prior to construction
			13.2	Adhere to the restrictions and exclusion zones incorporated into the revised / refined preferred Site Layout Map (see <i>Figure 2.1</i> and <i>2.2</i> ) and follow the layout finalisation methodology outlined in Section 2 of this EMPr.	Final design layout		
14.	Bat Habitat Loss: Destruction, Disturbance and Displacement	Mitigate impacts on bats	14.1	Conduct bat monitoring as outlined in Section 2 of this EMPr.	Monitoring data	Mainstream SA and subcontractor	Prior to construction
			14.2	Adhere to the restrictions and exclusion zones incorporated into the revised / refined preferred Site Layout Map (see <i>Figure 2.1</i> and <i>2.2</i> ) and follow the layout finalisation methodology outlined in Section 2 of this EMPr.	Final design layout		
16.	Social	To limit, where possible, social ills brought about by the construction and operation of the renewable energy facility	16.1	A Code of Conduct must be developed for all workers (Mainstream SA and contractors, including their workers) directly related to the project.  <i>Mainstream SA to adhere to the design mitigation measures and all measures specified in the EMPr.</i>  <i>Mainstream SA will work with the Local Municipality and local tourism organisations to raise awareness about wind farms.</i>	Code of conduct	Mainstream SA	Prior to commencement of construction and during construction.

## 4.2

**CONSTRUCTION PHASE**

In order to ensure compliance with environmental legislation requirements and National Environmental Management Act (NEMA) best practice, the following actions are applicable to the construction phase of the mast installation.

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment/ Actions Required/ Key Controls			
1.	Compliance with EMP	Confirm Mainstream SA and appointed contractors commitment to adherence to EMPr.	1.1	Ensure that approved EMPr is available at the site during installation.	Copy of signed EMPr with subcontractor	Mainstream SA	Prior to construction
			1.2	Ensure that equipment is in place to meet EMPr requirements.	Checklist of EMPr requirements		
			1.3	Signed commitment from subcontractors to compliance with EMPr is required.	Copy of signed EMPr is with subcontractor during installation		
2.	Concrete Works	Prevent contamination of soil and groundwater.	2.1	Excess or spilled concrete must be confined within the work area and then removed to a licensed landfill site.	Waste documentation and visual inspection of site	Mainstream SA and appointed contractor	During construction
			2.2	Concrete must be mixed on mortar boards, away from drainage channels and water courses.			
			2.3	The visible remains of the mixing of concrete, either solid or from washings, must be physically removed and disposed of as waste at a licensed landfill site.			
			2.4	All excess aggregate must also be removed from site.			
3.	Fire protection	Fire prevention.	3.1	No fires are allowed around the construction area.	Adequate fire-fighting equipment with the subcontractor	Mainstream SA and appointed contractor	During construction
			3.2	Adequate fire-fighting equipment must be available on-site and must be in good working order.			
			3.3	Welding, gas cutting or cutting of metal will only be permitted in an area designated as safe by the subcontractor.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
4.	Refuse and waste (refers to all solid waste, including installation debris, timber, cans etc.)	Limit the potential for site pollution and the accumulation of waste materials on-site.	4.1	Minimise, reduce, reuse and recycle waste material where possible. All waste must be separated into skip bins for recycling, reuse and disposal.	Waste manifest documents Relevant documentation for waste disposal must be prepared and filed (e.g. certificates of safe disposal).  Visual inspection of site.	Mainstream SA and appointed contractor	Throughout construction phase
		4.2	Vegetative material will be kept on-site and mulched after construction to be spread over the disturbed areas in order to rehabilitation of the natural vegetation.				
		4.3	All waste that cannot be reused or recycled will be placed in a skip bin and must be removed off-site and disposed of at a licensed municipal disposal site				
		4.4	The subcontractor must not dispose of any waste and/or construction debris by burning or burying.				
		4.5	The skip bins must be kept in a sheltered place and covered to prevent contents from blowing out.				
		4.6	Effluent and stormwater run-off will be discharged away from water courses (drainage channels, streams or dams). Effluent from construction site offices and staff facilities will be collected in storage tanks, which will be emptied by a sanitary contractor.				
		4.7					
		4.8	Effluent from concrete washings etc. will be contained within a bunded area and will not be allowed to drain into water courses.  Subcontractors are responsible for cleaning-up at the end of the construction phase.				
		4.9	Steel off-cuts will be re-used or recycled, as far as possible.				

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment/ Actions Required/ Key Controls			
5.	Impact on Surface and Groundwater	Minimise impacts on surface and groundwater	5.1	Soil stockpiles will be protected from wind or water erosion through placement, vegetation or appropriate covering.	Site inspection and photographic evidence	Mainstream SA and appointed contractor	Throughout construction phase
			5.2	Proper drainage controls such as culverts and cut-off trenches will be used to ensure proper management of surface water runoff in order to prevent erosion.			
			5.3	Cleared or disturbed areas will be rehabilitated as soon as possible in order to prevent erosion.			
			5.4	Fuel, oil and used oil storage areas will have appropriate secondary containment (i.e. bunds).			
			5.5	Spill containment and clean up kits will be available on-site and clean-up from any spill will be appropriately contained and disposed of to a licensed landfill by a licensed operator.			
			5.6	Construction vehicles and equipment will be serviced regularly and provided with drip trays, if required.			
			5.7	Workshop areas will be lined to prevent subsurface ingress of contaminants and drainage from these areas will not be allowed to drain into water courses.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment/ Actions Required/ Key Controls			
6.	Loss of Topsoil, Soil Compaction and Erosion	Minimise erosion and loss of topsoil	6.1	Restrict removal of vegetation and soil cover to the development footprint.	Site inspection and photographic evidence	Mainstream SA and appointed contractor	Throughout construction phase
			6.2	Implement soil conservation measures such as stockpiling top soil for remediation of disturbed areas. Topsoil storage must be as brief as possible and rehabilitation areas must be fenced off to protect plants until plant communities are adequately developed.			
			6.3	Proper drainage controls such as culverts and cut-off trenches will be used to ensure proper management of surface water runoff to prevent erosion.			
			6.4	Soil stockpiles must be vegetated or appropriately covered to reduce soil loss as a result of wind or water, in order to prevent erosion.			
			6.5	Disturbed areas will be rehabilitated as soon as possible to prevent erosion.			
			6.6	Construction vehicles will remain on designated and prepared roads.			



CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
7.	Dust and emissions	Limit fugitive dust and exhaust emissions.	7.1	Vehicles travelling on gravel roads must not exceed a speed of 40km/h.	Site inspection	Mainstream SA and appointed contractor	During construction
			7.2	Where appropriate, straw must be laid on exposed ground to prevent fugitive dust.			
			7.3	Containers for dusty materials will be enclosed or covered by suitable tarpaulins / nets to prevent escape of dust during loading and transfer from site.			
			7.4	Where necessary, stock piles of soil must be covered by suitable shade cloth or netting to prevent erosion, fugitive dust and to prevent the escape of dust during loading and transfer from site.			
			7.5	Vehicles are too kept in good working order and serviced regularly to minimise emissions.	Service records.		
			7.6	Any complaints received from neighbours or site users must be reported to the Mainstream SA Project Manager and measures must be taken to limit dust.	Grievance procedure documentation/logbook		
8.	Noise pollution	Avoid disturbing surrounding landusers.	8.1	Vehicles and equipment used on-site must be in good condition and serviced regularly.	Service and maintenance records for equipment and vehicles.	Mainstream SA and appointed contractor	During construction
			8.2	Construction activities will be restricted to regular working hours, as far as possible.			
			8.3	Mechanical equipment with lower sound power levels must be selected to ensure that permissible occupation noise-rating limit of 85 dBA is not exceeded.			
			8.4	Construction workers and personnel must wear hearing protection when required.			
			8.5	A grievance procedure will be established whereby complaints are recorded and responded to.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
9.	Vegetation loss	Prevent unnecessary disturbance and damage to natural vegetation and topsoil loss.	9.1	Subcontractors are to use existing roads and tracks as far as possible.	Photographic evidence ECO report	Mainstream SA and appointed contractor	Throughout construction phase
			9.2	Topsoil must be set aside to facilitate re-vegetation.			
			9.3	Construction vehicles must stick to the designated and prepared roads.			
			9.4	No vegetation must be collected for fire wood.			
			9.5	During construction, in areas classified as high sensitivity areas, a botanist or ecologist will be consulted to ensure micro-siting of turbines minimises damage to or loss of sensitive flora.			
			9.6	Clear demarcation during the construction phase of all undisturbed sensitive areas that are not within the direct footprint of the Beaufort West Wind Facility to ensure that there is no uncontrolled access by construction vehicles and labourers.			
			9.7	Temporary construction lay-down or assembly areas will be sited on transformed areas.			
			9.8	Rapid regeneration of plant cover will be encouraged by setting aside topsoil during earthmoving and replacing onto areas where the re-establishment of plant cover is desirable to prevent erosion.			
			9.9	Rehabilitation or ecological restoration during and after the construction phase will be undertaken with indigenous plants with input from a botanist with experience in restoration of arid Karoo areas.			
			9.10	Remove alien vegetation from disturbed areas.			
10.	Bird Habitat Loss Destruction, Disturbance and Displacement	Minimise impacts on birds	10.1	Habitat loss and disturbance can be mitigated during the construction phase by on-site demarcation of 'no-go' areas. These areas must be identified during pre-construction monitoring.	Photographic evidence ECO report	Mainstream SA and appointed contractor	Throughout construction phase

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment/ Actions Required/ Key Controls			
11.	Health and Safety	Ensure the health and safety of subcontractors and site users	11.1	A health and safety plan must be developed prior to the commencement of construction to identify and avoid work related accidents. This plan must be adhered to by the appointed construction contractors and meet Occupational Health and Safety Act (OHSAct), Act 85 of 1993, requirements.	Signed Health and Safety Plan	Mainstream SA and appointed contractor	During construction
			11.2	Potentially hazardous areas must be clearly demarcated (i.e. unattended foundation excavations).			
			11.3	Appropriate Personal Protective Equipment (PPE) must be worn by construction personnel.			
12.	Traffic Impact	Mitigate traffic impacts	12.1	The traffic management plan will be adhered to, including adherence to speed limits and 'rules of the road'.	Traffic Management Plan	Mainstream SA and appointed contractor	During construction
			12.2	All directly affected and neighbouring farmers and local residents will be able to lodge grievances with Mainstream SA using the Grievance Procedure regarding dangerous driving or other traffic violations that could be linked to the project.	Grievance procedure and logbook of complaints and actions taken.		
13.	Socio-cultural issues	Minimize impacts associated with influx of jobseekers.  Minimise damage to agricultural land and stock losses, minimize disruption to current farm regimes.	13.1	Mainstream SA's code of conduct which is developed prior to the construction phase must be adhered to.	Code of conduct must be available on-site.	Mainstream SA and appointed contractor	During construction
			13.2	The HIV Policy developed prior to the commencement of construction must be adhered to.	HIV policy must be available on-site.		
			13.3	The construction workers (from outside the area) must be allowed to return home over the weekends or on a regular basis to visit their families. The contractor must make the necessary arrangement to facilitate these visits.	Employment records		
			13.4	Mainstream SA will implement a grievance procedure that is easily accessible to local communities. Complaints related to contractor or employee behaviour can be lodged and responded to.	Grievance procedure and logbook		
14.	Loss of Agricultural Land	Minimise loss to agricultural land	14.1	Mainstream to minimise the damage caused by construction activities to the farmland by ensuring strict compliance with construction plans and worker 'Code of Conduct'.	Photographic evidence	Mainstream SA and appointed contractor	During construction
			14.2	Any damage to vegetation will be rehabilitated in accordance with mitigation proposed for the rehabilitation of natural vegetation.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment/ Actions Required/ Key Controls			
15.	Faunal Impacts	Mitigate impacts on fauna	15.1	During construction, in areas classified as high sensitivity areas, an ecologist must be consulted to ensure micro-siting of turbines minimises damage to or loss of sensitive habitat;	ECO reports and photographic evidence	Mainstream SA and appointed contractor	During construction
			15.2	Clear demarcation during the construction phase of all undisturbed sensitive areas that are not within the direct footprint of the Wind Facility must be undertaken to ensure that there is no uncontrolled access by construction vehicles and labourers;			
			15.3	All vehicles must stick to designated and prepared roads;			
			15.4	Temporary construction lay-down or assembly areas must be sited on transformed areas;and			
			15.5	Rapid regeneration of plant cover must be encouraged by setting aside topsoil during earthmoving and replacing onto areas where the re-establishment of plant cover is desirable in order to prevent erosion.			
16.	Noise Impacts		16.1	Mechanical equipment with lower sound power levels will be selected to ensure that the permissible occupation noise-rating limit of 85 dBA is not exceeded. Construction workers and personnel will wear hearing protection when required.	ECO reports	Mainstream SA and appointed contractor	During construction
			16.2	Vehicles and machines will be properly serviced and well maintained.			
			16.3	Mainstream SA will require drivers to adhere to speed limits.			
			16.4	A grievance procedure will be established whereby noise complaints by neighbours are recorded and responded to.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment/ Actions Required/ Key Controls			
17.	Damage or Destruction of Cultural Heritage Interests	Minimise damage to cultural heritage interests	17.1	Once the final layout design has been fixed (subject to micro-siting), a field survey must be undertaken by an archaeologist to ensure protection of archaeological remains.	Inspection reports  ECO reports	Mainstream SA and appointed contractor	Throughout construction
			17.2	Buffer zones around built structures must be maintained during the construction phase to prevent damage to structures of cultural heritage interest.			
			17.3	Should any human burials, archaeological or palaeontological materials (fossils, bones, artefacts etc.) be uncovered or exposed during earthworks or excavations, they must immediately be reported to HWC and SAHRA.			
19.	Site Clean Up and Rehabilitation	To restore any degradation caused by the installation activities.	19.1	The Contractor must ensure that all equipment and materials used or created on-site for or during installation activities are removed after installation. The construction site must be cleared and cleaned to the satisfaction of the Mainstream SA Project Manager.	At discretion of Mainstream SA Project Manager and ECO	Mainstream SA and appointed contractor	After installation
			19.2	All excess installation equipment and excess aggregate, gravel, stone, poles, concrete and the like will be removed from the site upon completion of the work.			
			19.3	No discarded materials of any nature must be buried.			
			19.4	Re-vegetation of disturbed areas will be undertaken to prevent erosion.			

4.3

**OPERATIONAL PHASE**

In order to ensure compliance with environmental legislation requirements, the following generic and specific requirements are applicable during the operational phase of the wind farm.

OPERATIONAL PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
1.	Visual impacts	Minimize the visual impacts during the operation phase.	1.1	Signage related to the project must be discrete and confined to entrance gates.	Photographic evidence	Mainstream SA	Throughout operation
2.	Avian collisions	Monitor potential injury to avifauna and fatalities	2.1	Carefully monitoring collision incidence and investigate appropriate mitigation measures, when required.	Monitoring reports	Mainstream SA	Initial 12 to 24 month period at which time whether or not additional monitoring is required.
			2.2	A register of injuries to avifauna, complaints or queries received as well as any action taken must be maintained.			

3.	Bat collisions	Monitor fatalities	<p>3.1 Carefully monitoring collision incidence and investigate appropriate mitigation measures, when required.</p> <p>3.2 <u>To account for the lack of data within the sweep of the amended turbine specifications, the appropriate turbines, as indicated by the post-construction bat specialist, must be installed with bat monitoring equipment at height and bat monitoring must start at the onset of turbine operation.</u></p> <p>3.3 <u>An operational bat monitoring study must already be in place at the start of the wind farm operation and must be implemented immediately after construction of turbines. Mitigation measures outlined by the Bat Specialist during the operational monitoring study must be applied with due diligence.</u></p> <p>3.4 <u>Mitigation conditions need to be carefully re-evaluated during the first few months of the wind farm operation. If deemed necessary, curtailment measures must be adapted to a turbine specific mitigation strategy.</u></p> <p>3.5 A register of injuries to bats, complaints or queries received as well as any action taken must be maintained.</p>	Monitoring reports	Mainstream SA	Initial 12 to 24 month period at which time whether or not additional monitoring is required.
4.	Loss of Topsoil, Soil Compaction and Erosion	Minimise erosion	4.1 Bi-annual monitoring of erosion in the vicinity of the turbines, roads and other hard- standing surfaces will be conducted before and after the rainy season to ensure erosion sites can be identified early and remedied.	Monitoring reports and photographic evidence	Mainstream SA	Biannually

OPERATIONAL PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
5.	Loss of Vegetation	Minimise impacts associated with loss of vegetation	5.1	On-site employees, farm workers and visitors to the site will be educated about the conservation of vegetation. This will include strict guidelines for remaining on existing roads while on-site in order to avoid unnecessary destruction or damage to undisturbed and rehabilitated vegetation.	Signage	Mainstream SA	Throughout operation
			5.2	It is understood that lease agreements are in place but it is recommended that landowners are encouraged to ensure livestock numbers are kept at or below densities recommended by the Department of Agriculture in order to prevent over-grazing.			
			5.3	A fire management policy and guidelines will be developed to ensure that the operation of the facility is compatible with the long-term fire ecology of the site.	Fire management policy		
			5.4	Remove alien vegetation from any disturbed areas.			
6.	Bird Habitat Loss: Destruction, Disturbance and Displacement	Minimise disturbance to birds	6.1	Maintenance activities must be scheduled to avoid disturbances to sensitive areas (identified through operational monitoring) during breeding season.	Maintenance schedules	Mainstream SA	Throughout operation
7.	Waste and Effluent	Prevent soil and groundwater pollution	7.1	Used oil stored on-site must be stored in an impervious container, within a bunded area.	Photographic evidence	Mainstream SA	Throughout operation
			7.2	General waste must be removed from site by a licensed contractor.	Waste manifest documents		



8.	Health and Safety	Maintain health and safety standards	8.1	Regular maintenance of turbines and all other infrastructure must be undertaken to ensure optimal functioning and to reduce the chance of gearbox failure.	Inspection records	Mainstream SA	Throughout operation
8.2	Regular inspections of the turbine foundations, towers, blades, spinners and nacelle must be undertaken in order to check for early signs of structural fatigue.						

OPERATIONAL PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
9.	Tourism	Enhance tourism impacts	9.1	Mainstream SA will establish an information kiosk/notice board on the site boundary or entrance to facilitate educating the public about the need and benefits of project. This is aimed at instilling the concept of sustainability and creating awareness by engaging the community and local schools. Information brochures and posters will be made available at the kiosk that will provide more information about the facility. These must be presented in the appropriate languages to maximise the benefits.	Photographic evidence	Mainstream SA	Throughout operation
10.	Electromagnetic Interference	Prevent Electromagnetic Interference (EMI) effects	10.1	Appropriate mitigation measures will include the replacement of receiving aerial installations, replacement by satellite dishes or the provision of a private transmitter.	Installation reports	Mainstream SA	Throughout operation
11.	Traffic	Minimise traffic impacts	11.1	During operation, if abnormal loads are required for maintenance, the appropriate arrangements will be made to obtain the necessary transportation permits and the route agreed with the relevant authorities to minimise the impact of other road users.	Permits	Mainstream SA	Throughout operation
			11.2	All internal and access roads that will be used by Mainstream SA during the operational phase of the project will be maintained by Mainstream SA throughout the life of the Project.			
12.	Shadow flicker	Assess potential shadow flicker impacts	12.1	A shadow flicker study will be undertaken if the final layout results in turbines being located within a distance of 10 blade diameters of the identified cottages.		Mainstream SA	Throughout operation

A detailed decommissioning and rehabilitation plan must be developed prior to the decommissioning of the wind measuring masts. This plan must include, but must not be limited to, conditions regarding removal of infrastructure, management of waste and/or contaminated soil, dust suppression and re-vegetation.

## 6.1 BIRD MONITORING

The primary aims of a long-term monitoring programme would be to:

- Determine the densities of birds resident within the impact area of the 140MW Beaufort West Wind Facility before construction of the facility, and afterwards, once the facility, or phases of the facility, become operational.
- Document patterns of bird activity and movements in the vicinity of the proposed 140MW Beaufort West Wind Facility before construction, and afterwards, once the facility is operational.
- Monitor patterns of bird activity and movement in relation to weather conditions, time of day and season for at least a full calendar year after the 140MW Beaufort West Wind Facility is commissioned.
- Register and as far as possible document the circumstances surrounding all avian collisions with the 140MW Beaufort West Wind Facility turbines for at least a full calendar year after the facility becomes operational.

It should be noted that the original mitigation measures listed in the Bird Specialist Study (Avisense 2011: 2016) remain valid and do not need to be revised in respect of amended turbine dimensions as proposed in terms of the Amendment Application of 12 August 2019 (DEA Ref **12/12/20/1784/1**).

### 6.1.1 Avian densities

A set of at least ten (10) walk-transect routes, each of at least 1000 m in length, should be established in areas representative of all the avian habitats present within a 10 km radius of the centre of the 140MW Beaufort West Wind Facility development site. Each of these should be walked at least once every two (2) months over the six (6) months preceding construction, and at least once every two (2) months over the same calendar period, at least six (6) months after the 140MW Beaufort West Wind Facility is commissioned. The transects should be walked after 06h00 and before 09h00, and the species, number and perpendicular distance from the transect line of all birds seen should be recorded for subsequent analysis and comparison.

In addition, the cliff-lines within the development area should be surveyed for cliff-nesting raptors at least every six (6) months using documented protocols (Malan, 2009), and all sightings of key species (Table 6.1) on-site should be carefully plotted and documented, and the major waterbodies on and close to the development area should be surveyed for wetland species on each visit to the study area, using the standard protocols set out by the CWAC initiative (Taylor *et al.*, 1999).

### 6.1.2 Bird activity monitoring

Monitoring of bird activity in the vicinity of the 140MW Beaufort West Wind

Facility should be done over a 2-3 day period at least every two (2) months for the six (6) months preceding construction, and at least once per quarter for a full calendar year starting at least six (6) months after the Beaufort West Wind Facility is commissioned.

Each monitoring day should involve:

- (ii) Half-day counts of all priority species flying over or past the impact area; and
- (iii) Opportunistic surveys of cranes (and bustards) and raptors seen when travelling around the site.

### 6.1.3

#### *Avian collisions*

Collision monitoring should have two (2) components, namely: (i) experimental assessment of search efficiency and scavenging rates of bird carcasses on the site, and (ii) regular searches of the vicinity of the wind farm for collision casualties.

##### *Assessing search efficiency and scavenging rates*

The value of surveying the area for collision victims only holds if some measure of the accuracy of the survey method is developed (Morrison, 2002). To do this, a sample of suitable bird carcasses (of similar size and colour to the priority species – e.g. Egyptian Goose *Alopochen aegyptiacus*, domestic waterfowl and pigeons) should be obtained and distributed randomly around the site without the knowledge of the surveyor, sometime before the site is surveyed. This process should be repeated opportunistically (as and when suitable bird carcasses become available) for the first two (2) months of the monitoring period, with the total number of carcasses not less than 20. The proportion of the carcasses located in surveys will indicate the relative efficiency of the survey method.

Simultaneous to this process, the condition and presence of all the carcasses positioned on the site should be monitored throughout the initial two (2)-month period, to determine the rates at which carcasses are scavenged from the area, or decay to the point that they are no longer obvious to the surveyor. This should provide an indication of scavenge rate that should inform subsequent survey work for collision victims, particularly in terms of the frequency of surveys required to maximize survey efficiency and/or the extent to which estimates of collision frequency should be adjusted to account for scavenge rate (Osborn *et al.*, 2000; Morrison, 2002). Scavenger numbers and activity in the area may vary seasonally so, ideally, scavenge and decomposition rates should be measured twice during the monitoring year, once in winter and once in summer.

##### *Collision victim surveys*

The area within a radius of at least 50 m of each of the turbines at the facility

should be checked regularly for bird casualties (Anderson *et al.*, 1999; Morrison, 2002). The frequency of these surveys should be informed by assessments of scavenge and decomposition rates conducted in the initial stages of the monitoring period (see above), but they should be done at least weekly for the first two (2) months of the study. The area around each turbine, or a larger area encompassing the entire wind facility, should be divided into quadrants, and any sign of a bird collision incident (carcasses, dismembered body parts, scattered feathers, injured birds). All suspected collision incidents should be comprehensively documented, detailing the precise location (preferably a GPS reading), date and time at which the evidence was found, and the site of the find should be photographed with all the evidence *in situ*. All physical evidence should then be collected, bagged and carefully labelled, and refrigerated or frozen to await further examination. If any injured birds are recovered, each should be contained in a suitably-sized cardboard box. The local conservation authority should be notified and requested to transport casualties to the nearest reputable veterinary clinic or wild animal/bird rehabilitation centre. In such cases, the immediate area of the recovery should be searched for evidence of impact with the turbine blades, and any such evidence should be fully documented (as above).

In tandem with surveys of the wind farm for collision casualties, the vicinity of the solar installation should be searched for any signs of avian interaction with the hardware – mortalities, nest building, regular perch or roosting sites, nest sites, and these should be documented.

## 6.2 **BAT MONITORING REQUIREMENTS**

The operational wind facility will be regularly monitored for bat activity and bat mortality as follows:

- Acoustic monitoring will be done at one (1) or two (2) randomly chosen towers at each site during the periods of migration and mid-summer.
- The acoustic monitoring will be accompanied by monitoring for bat fatalities at one (1) or two (2) randomly chosen towers at each facility by walking two (2) concentric spiral transects 7m apart with the larger spiral starting at 50 m from the tower.

It should be noted that in order to account for the lack of data within the sweep of the amended turbine specifications, the appropriate turbines, as indicated by the post-construction bat specialist, should be installed with bat monitoring equipment at height and bat monitoring should start at the onset of turbine operation. In addition, mitigation conditions need to be carefully re-evaluated during the first few months of the wind farm operation. If deemed necessary, curtailment measures should be adapted to a turbine specific mitigation strategy.





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