

Spoonbill PV Facility and Associated Infrastructure Environmental Management Programme

Report Prepared for

**South Africa Mainstream Renewable Power
Developments (Pty) Ltd**



SRK Project Reference Number 581877/Project 1

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Report Prepared by



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Spoonbill PV Facility Associated Infrastructure Environmental Management Programme

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Profile and Expertise of EAPs

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by South Africa Mainstream Renewable Power Developments (Pty) Ltd as the independent consultants to undertake the Environmental Impact Assessment (EIA) process required in terms of the National Environmental Management Act 107 of 1998 (NEMA).

SRK Consulting was established in 1974 and comprises over 1 600 professional staff worldwide, offering wide-ranging expertise in the natural resources and environmental sectors. SRK's Cape Town environmental department has a proven track record for managing large, complex environmental and engineering projects in the Western Cape, Africa and internationally. SRK has rigorous quality assurance standards and is ISO 9001 accredited.

As required by NEMA, the qualifications and experience of the key individual practitioners responsible for this project are detailed below.

Quality Control and Review Chris Dalgliesh, BBusSci (Hons); M Phil (EnviroMan)

Registered EAP (no. 425/2020)

Chris Dalgliesh is an SRK Director and Principal Environmental Consultant with over 35 years' experience, primarily in Southern Africa, West Africa, South America, the Middle East and Asia. Chris has worked on a wide range of projects, notably in the natural resources, Oil & Gas, waste, infrastructure and industrial sectors. He has directed and managed numerous Environmental and Social Impact Assessments (ESIAs), in accordance with international standards (e.g. IFC). He regularly provides high level review of ESIs, frequently directs Environmental and Social Due Diligence studies and monitors projects on behalf of financial institutions. He also has experience in Strategic Environmental Assessment (SEA) and Economics.

Project Manager Lauren Elston, BSc (Env); BSc (Hons) (EnvMgmt)

Registered EAP (no. 2020/981)

Lauren Elston is a Senior Environmental Consultant with 15 years' experience in the environmental consulting sector in South Africa. Lauren specialises in Environmental Impact Assessment, Air Quality Management, Water Use Management and Environmental Auditing. Her core expertise includes environmental impact assessment and management of projects in the renewable energy, waste, agricultural, infrastructure, industrial, mining, and mixed development sectors in South Africa. Lauren has experience in Water Use Licences, Atmospheric Emission Licences, Waste Management Licences, Mine Closure, and the development of Environmental Management Plans.

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Neither SRK nor any of the authors of this EMPr have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no prior association with South Africa Mainstream Renewable Power Developments (Pty) Ltd in regard to the development that is the subject of this Report. SRK has no beneficial interest in the outcome of the assessment which is capable of affecting its independence.

Disclaimer

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Acronyms and Abbreviations

BA	Basic Assessment
BAR	Basic Assessment Report
B-BBEE	Broad-Based Black Economic Empowerment
BESS	Battery Energy Storage System
CR	Contractors Representative
DFFE	(National) Department of Forestry, Fisheries and Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ED	Enterprise Development
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
IPP	Independent Power Producer
LILo	Line In/ Line Out
MTS	Main Transmission Station
NEMA	National Environmental Management Act 107 of 1998 as amended
PM	Project Manager
PV	Photovoltaic
RE	Resident Engineer
REDZ	Renewable Energy Development Zone
REIPPPP	Renewable Independent Power Producer Procurement Programme
SCC	Species of Conservation Concern
SED	Socio-economic Development
SMME	Small, Medium and Micro Enterprise
SRK	SRK Consulting (South Africa) (Pty) Ltd
WUA	Water Use Authorisation

Glossary

Activity	An activity or operation carried out as part of the construction or operation of the power plant
Aspect	An action, event, product or service, occurring as a component or result of an activity, which interacts with the existing environment (or which results in impacts to it)
Community	Those people who may be impacted upon by the construction and operation of the project. This includes neighbouring landowners, local communities and other occasional users of the area.
Contractor	Any company appointed by the Proponent to undertake construction or related activities on site, and will include the main Contractor, as well as any Sub-Contractors.
Construction Phase	The stage of project development comprising site preparation as well as all construction activities associated with the development.
Contaminated water	Water contaminated by activities on site, e.g. concrete water and run-off from plant / personnel wash areas.
Design Phase	The stage during which detailed layout and development plans are prepared, including the drafting of contract documents for construction.
Environment	The external circumstances, conditions and influences that surround and affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Environmental Authorisation	The authorisation by a competent authority of a listed activity or specified activity in terms of NEMA.
Environmental Impact Assessment	A process of evaluating the environmental and socio-economic consequences of a proposed course of action or project
Environmental Management Actions	Requirements or specifications for environmental management to achieve impact management outcomes, as presented in the EMPr, some of which are based on the mitigation measures identified in the EIA Report (in this case the BAR).
Hazardous substance	A substance (including materials and waste) that can have a deleterious (harmful) effect on the environment and those substances declared hazardous substances in terms of the Hazardous Substances Act 15 of 1973.
Housekeeping	Maintaining the working environment in a tidy manner.
Impact	A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.
Impact Management Outcome	The intended objective or end goal of impact management, effected through the implementation of mitigation measures / environmental management actions
Method Statement	A mandatory written submission by the Contractor to the Resident Engineer or Environmental Control Officer setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity.

Mitigation Measures	Actions identified in the BAR to manage (avoid, minimise or optimise) potential environmental impacts which may result from the development.
Operational Phase	The stage of the works (including maintenance) following the Construction Phase, during which the development will function or be used as anticipated in the Environmental Authorisation.
Performance indicator	A measurable indicator of the outcome of environmental management, used to assess the success with which mitigation measures have been implemented. Often captures the results of several different monitoring activities.
Previously Disadvantaged Individual	A person who belongs to the previously disenfranchised population groups in South Africa, i.e. blacks, coloureds, and Indians.
Phase	A defined period during the life of the power plant project, e.g. the construction and operations phases.
Proponent	The person or organisation implementing the project.
Resources	The personnel, financial, equipment and technical requirements necessary for the successful completion of mitigation measures and for monitoring activities.
Schedule	The schedule or deadline for completion of each mitigation measure, which are recorded to ensure that mitigation measures are implemented in good time and in the correct sequence.
Solid waste	All solid waste including construction debris, chemical waste, broken / redundant equipment, oil filters, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
Sub-Contractors	A Sub-Contractor is any individual or Contractor appointed by the main Contractor, to undertake a specific task on site.

1 Introduction

1.1 Background

South Africa Mainstream Renewable Power Developments (Pty) Ltd (Mainstream) intends to construct up to the nine Photovoltaic (PV) facilities and associated infrastructure, referred to as the Stilfontein PV Cluster and comprising (see Figure 1-1):

- 9 x PV facilities, including 11-33 kV transmission lines, each including Battery Energy Storage Systems (BESS), and 9 x Independent Power Producer (IPP)-side on-site substations;
- 9 x Eskom-side on-site substations and 132 kV transmission lines to the Main Transmission Station (MTS); and
- 1 x MTS and 400 kV lines to existing Hermes Pluto transmission lines.

The Stilfontein Cluster is located ~20 km south-west of Potchefstroom and ~6 km north-east of Stilfontein, in the Dr Kenneth Kaunda District Municipality in North West Province and within the Klerksdorp Renewable Energy Development Zone (REDZ) (see Figure 1-1)

A Basic Assessment (BA) process in terms of the National Environmental Management Act 107 of 1998, as amended (NEMA) and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, is required to support an application for Environmental Authorisation (EA) for the project. SRK Consulting (South Africa) (Pty) Ltd (SRK) was appointed by Mainstream to undertake the BA processes for each project in the Stilfontein PV Cluster. A BA Report (BAR) was compiled for each project that contains a detailed description of the project and its impacts.

NEMA requires that an Environmental Management Programme (EMPr) be submitted along with the BAR to demonstrate how environmental management and mitigation measures will be implemented. The content of an EMPr must either contain the information set out in Appendix 4 of the EIA Regulations, 2014, as amended, or the EMPr must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a Government Notice.

This EMPr relates to the Spoonbill PV facility (see Figure 1-2), including BESS, 11 - 33kV transmission lines¹, IPP-side of the Spoonbill on-site substation and associated internal infrastructure and facilities *inter alia* access roads, fencing, lighting, water supply infrastructure, laydown areas and offices.

Generic EMPrs for the *Development or Expansion of Substation Infrastructure for the Transmission and Distribution of Electricity* and for the *Development and Expansion of Overhead Electricity Transmission and Distribution Infrastructure* were gazetted in GN 435 of 2019 and must be used for projects triggering Listing Notice 1 Activity 11 where the greater part of the facility is located within a REDZ (as stipulated in GN 145 of 2021). Therefore, **the Generic EMPrs have been used (and updated to include site specific mitigation measures, if required) for the grid infrastructure associated with the 9 X PV facilities. The Generic EMPr for the Spoonbill PV facility is relevant to be implemented for the construction and operation of the Spoonbill on-site substation**

¹ These are included in this EMPr because the gazetted Generic EMPr for the *Development or Expansion of Overhead Electricity Transmission and Distribution Infrastructure* applies to activities that require EA (referred to as "listed activities"); however, the construction of a 33 kV (or less) transmission line is not a listed activity.

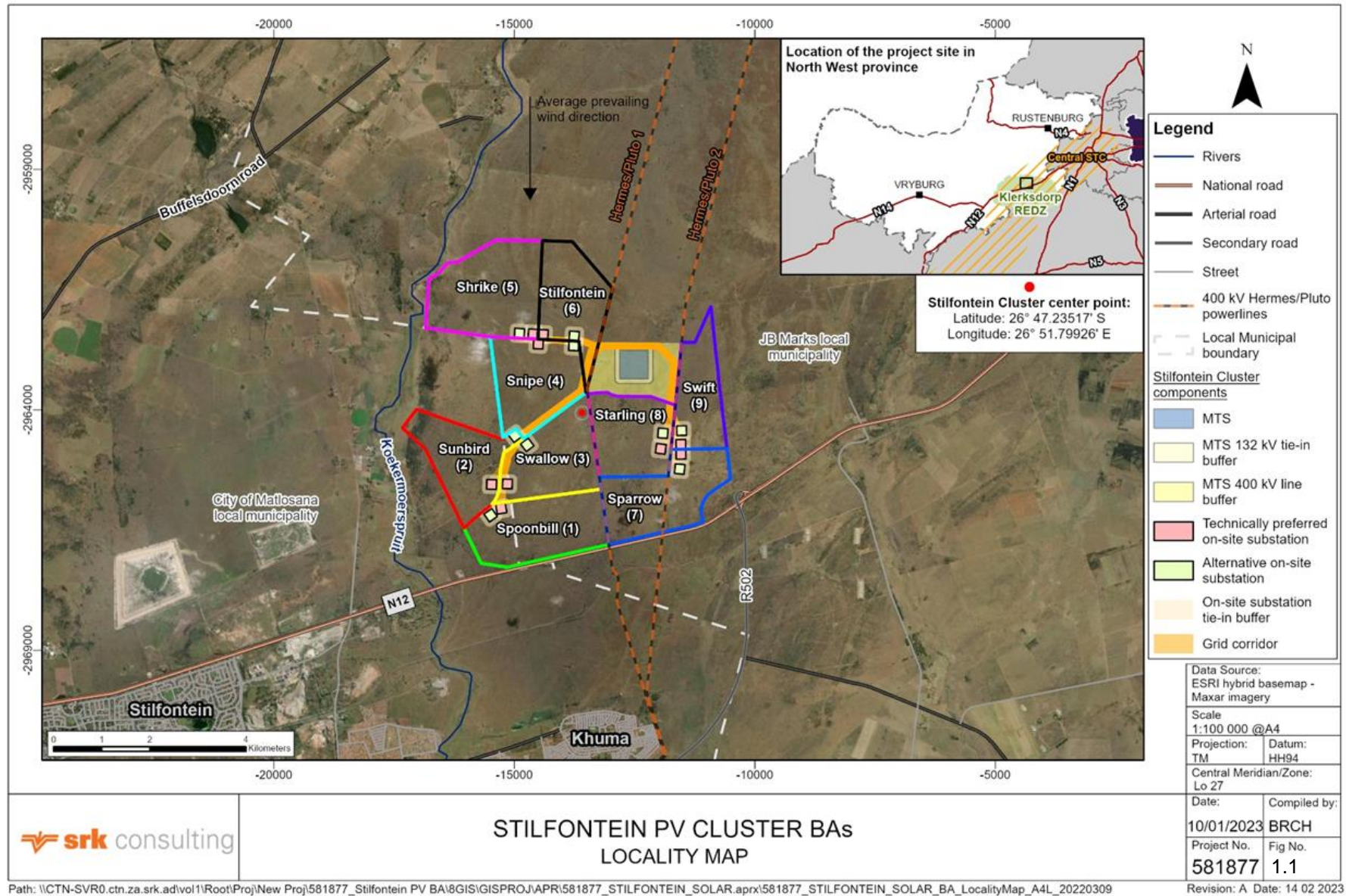


Figure 1-1: Location of the Stilfontein Cluster

The mitigation measures, which were identified during the BA process, apply to the following phases of the development process:

- **The Design Phase:** These measures relate to the detailed layout, planning and design of the Spoonbill PV facility and associated infrastructure, and will largely be implemented by the planning and development team, prior to the commencement of any physical on-site activities. These mitigation measures are presented in Section 2.
- **The Construction Phase:** These mitigation measures are applicable during site preparation and construction of the Spoonbill PV facility and associated infrastructure and must be implemented by the relevant contractors and sub-contractors. These mitigation measures are presented in Section 3.
- **The Operational Phase:** These mitigation measures are applicable during the long-term operation and maintenance of the Spoonbill PV facility and associated infrastructure and must be implemented by the plant management. These mitigation measures are presented in Section 4.
- **The Decommissioning Phase:** These mitigation measures are during the decommissioning phase of the Spoonbill PV facility and must be implemented by the plant management. These mitigation measures are presented in Section 5.

Note: The EMPr will be submitted to DFFE for approval along with the BAR. Once EA has been issued by DFFE, this document may need to be updated to ensure that all relevant conditions of authorisation are adequately captured.

1.2 Content of the EMPr

The EIA Regulations 2014 (as amended) prescribe the required content in an EMPr. These requirements and the sections of this EMPr in which they are addressed, are summarised in Table 1-1.

Table 1-1: Content of the EMPr as prescribed by the EIA Regulations, 2014 (as amended)

GN 982 Annexure 4 (1) Ref.:	Item	Section Ref.:
(a)	Details of:	
(a) (i)	The Environmental Assessment Practitioner (EAP) who prepared the EMPr	Page i
(a) (ii)	The expertise of that EAP to prepare an EMPr, including a curriculum vitae	Page i
(b)	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 1.1 and Section 1.3
(c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating areas that should be avoided, including buffers;	Figure 1-4
(d)	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Table 1-4
(d)(i)	Planning and design;	
(d)(ii)	Pre-construction activities;	
(d)(iii)	Construction activities	
(d)(iv)	Rehabilitation of the environment after construction and where applicable post closure; and	
(d)(v)	Where relevant, operation activities;	

GN 982 Annexure 4 (1) Ref.:	Item	Section Ref.:
(f)	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to-	Table 2-1, Table 3-2, Table 4-1 and Table 5-1
(f)(i)	Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
f(ii)	Comply with any prescribed environmental management standards or practices;	
f(iii)	Comply with any applicable provisions of the Act regarding closure, where applicable; and	
f(iv)	Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	
(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Table 2-1, Table 3-2, Table 4-1 and Table 5-1
(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Table 2-1, Table 3-2, Table 4-1 and Table 5-1
(i)	An indication of the persons who will be responsible for the implementation of the impact management actions;	Table 2-1, Table 3-2, Table 4-1 and Table 5-1
(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Table 2-1, Table 3-2, Table 4-1 and Table 5-1
(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f)	Table 2-1, Table 3-2, Table 4-1 and Table 5-1
(l)	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 3.2 and Section 4.2
(m)	An environmental awareness plan describing the manner in which-	ID No 31 in Table 2-1 Table 1-1
(m)(i)	The applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
(m)(ii)	Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n)	Any specific information that may be required by the competent authority.	TBC

1.3 Site and Project Description

Mainstream proposes to construct and operate the Spoonbill PV facility with maximum nameplate capacity of 150 MW, Lithium-Ion BESS and associated infrastructure in the North West Province on the properties indicated in Table 1-2 and Figure 1-2).

Table 1-2: Property details of Spoonbill PV facility

Property name, number and portion	SG Code	Development footprint
Spoonbill PV		
Stilfontein RE26/408	TOIP00000000040800026	345 ha
Witstinkhoutbaken 1/409	TOIP00000000040900001	
Doornplaat RE4/410	TOIP00000000041000004	

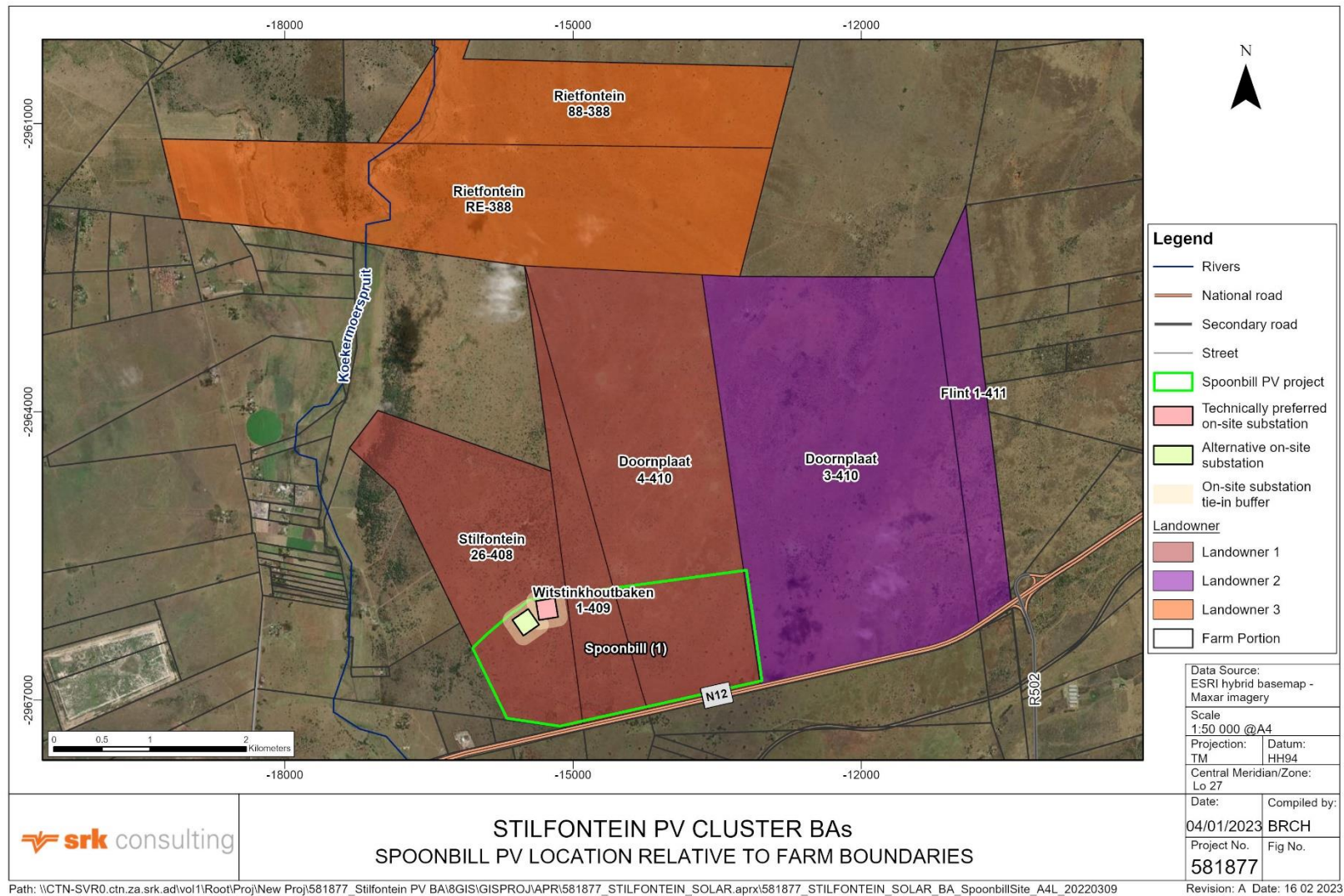


Figure 1-2: Location of the Spoonbill project

The Spoonbill facility is located in the City of Matlosana and JB Marks Local Municipality within the Dr Kenneth Kaunda District Municipality in North West Province, South Africa. The project site is located approximately 6 km east of the town of Stilfontein along the N12 and forms part of the proposed, larger Stilfontein PV Cluster. The project area has a rural setting. It is dominated by grassland and low bushes. Some farmsteads and pastures are located within and adjacent to the Stilfontein Cluster project area. The existing 400 kV Hermes – Pluto 1 and 2 powerlines traverse the site in a north-southerly direction (see Figure 1-1).

The proposed Spoonbill facility is intended to generate and sell electricity to Eskom as part of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). If bidding is unsuccessful and a private offtake opportunity arises, this may be pursued. Electricity will either be dispatched directly into the national grid or stored on site in a BESS and evacuated to the grid on demand. A more detailed project description is provided in Section 3 of the BAR for the Spoonbill PV Facility.

The Spoonbill PV facility comprises the following key components (see Figure 1-3):

- PV arrays with a total maximum export capacity of 150 MW;
- Lithium-Ion BESS;
- 11 - 33kV underground cable / overhead powerline between the PV facility and the on-site substation;
- IPP-side² of the 11 – 33kV/132 kV on site substation; and
- Internal infrastructure and structures, including internal cabling, gravel roads, fencing, lighting, stormwater infrastructure, water supply and water storage infrastructure, laydown areas, offices (including ablutions with septic tank / conservancy tank sewage treatment infrastructure) and a security guard house.

The above components are covered by this EMPr, except for the IPP-side of the 11 -33kV/132kV on-site substation, which is covered by the Generic EMPr (see Section 1.1).

² The IPP-side of the on-site substation will receive incoming electricity (11-33 kV) from the Spoonbill PV facility (referred to as "IPP-side") and feed outgoing electricity (132 kV) to the MTS (referred to as "Eskom-side"). The IPP-side of the substation will remain under the administration of the IPP, while the Eskom-side of the substation will be handed over to and operated by Eskom. To ensure that the future operators are the holders of the respective EAs, the IPP-side of the substation is included in the Spoonbill PV facility BA and associated EMPr, and the Eskom-side of the substation and transmission line to the MTS is included in the Spoonbill grid connection BA and associated EMPr.

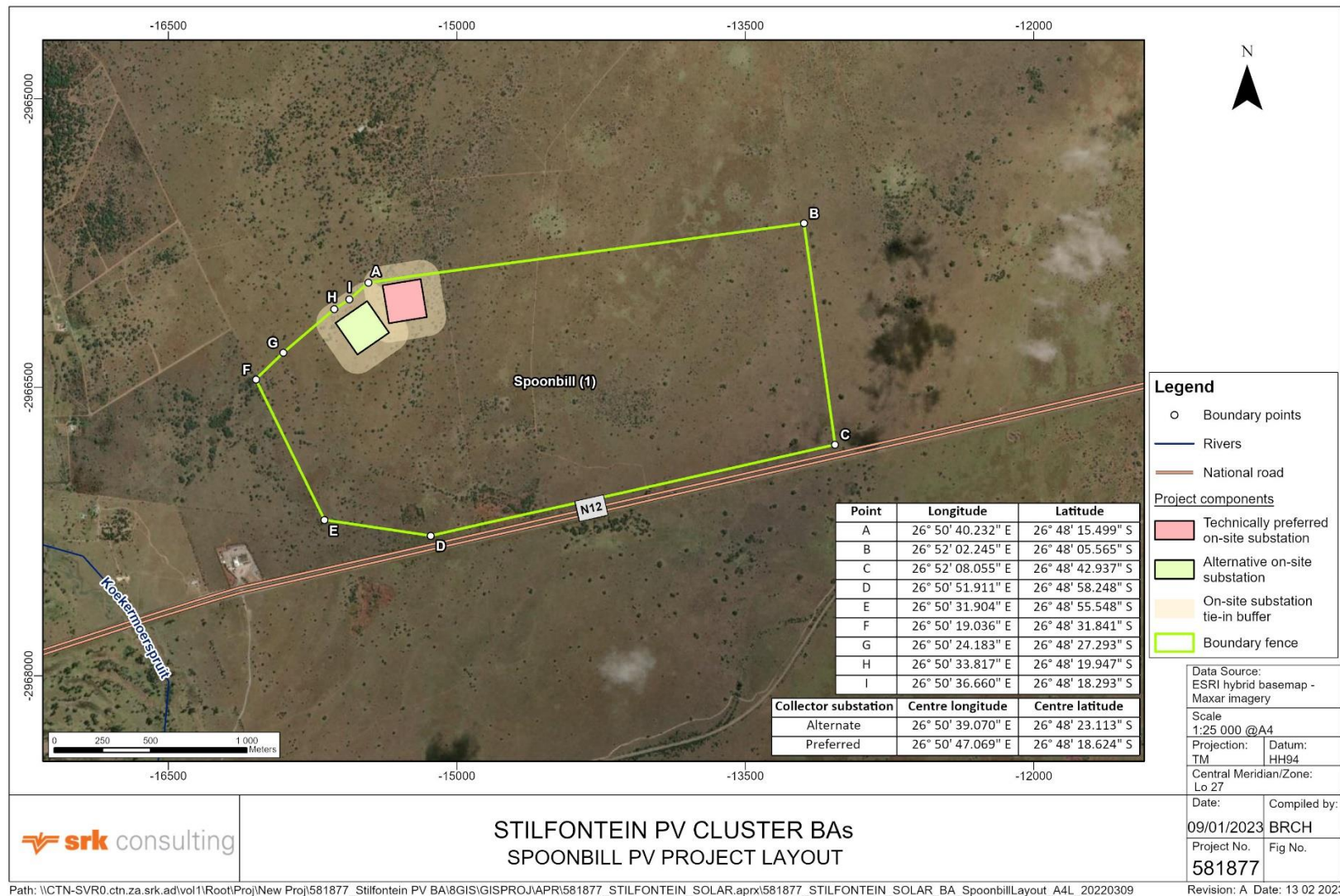
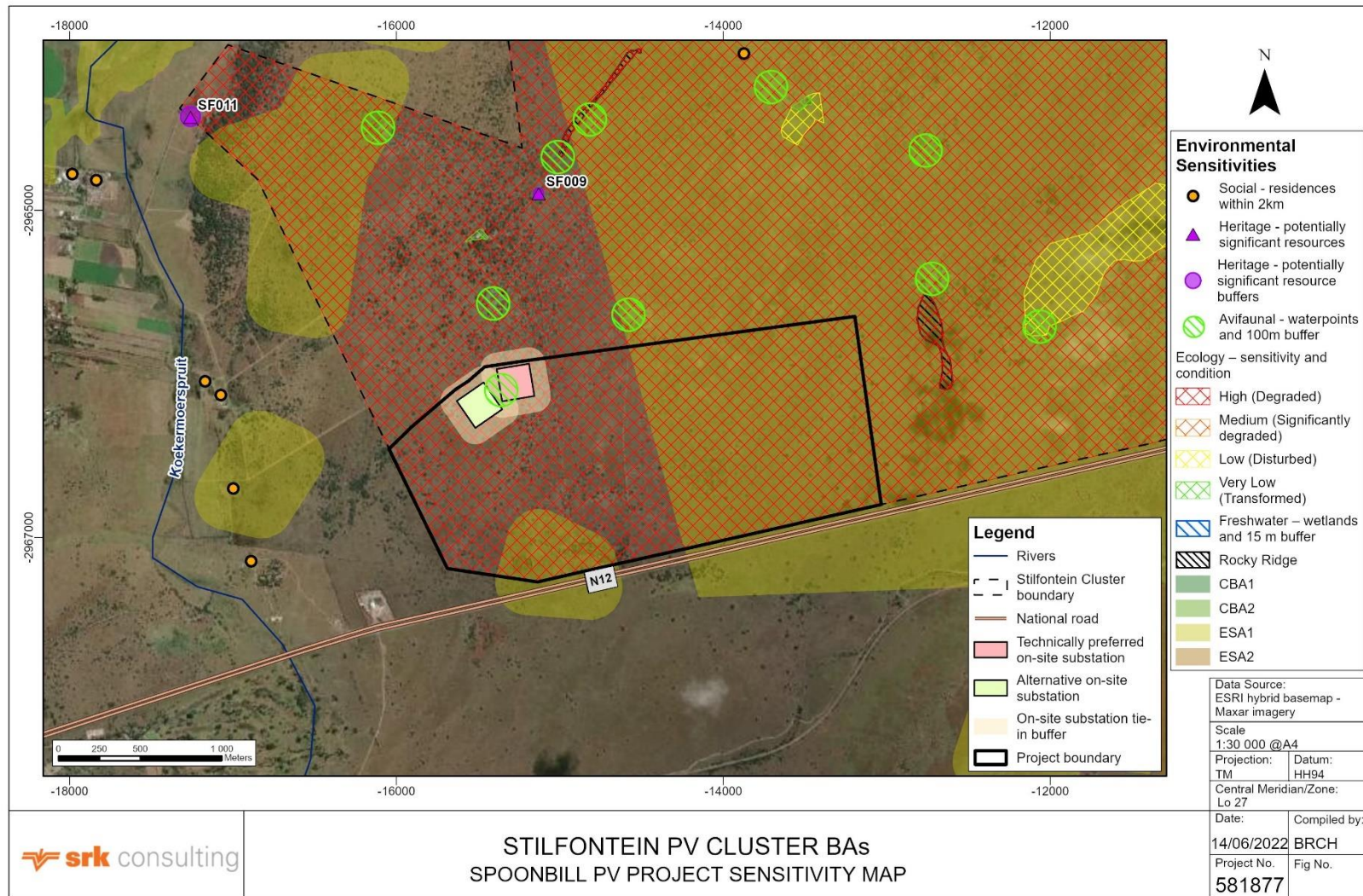


Figure 1-3: Layout of the Spoonbill project



Path: \\CTN-SVR0.ctn.za.srk.ad\vol1\Root\Proj\New Proj\581877_Stilfontein PV BA\8GIS\GISPROJ\PROJ\581877_STILFONTEIN_SENSITIVITY\581877_STILFONTEIN_SENSITIVITY_v2.aprx
581877_STILFONTEIN_SOLAR_BA_SpoonbillSenseA4L_20220613

Revision: A Date: 22 02 2023

Figure 1-4: Environmental sensitivities of the Spoonbill project

1.4 Potential Impacts and Impact Management Outcomes

A summary of the potential impacts of the proposed development identified and assessed in the BAR is presented in Table 1-3. Additional details on the nature of these impacts are provided in the Spoonbill PV BAR.

Table 1-3: Potential impacts of the proposed project

Impact	Description	Impact Status
Construction Phase		
Air Quality	Changes in air quality due to dust generation	Negative
Physical	Reduction and loss of land capability	Negative
Ecological	Degradation and loss of habitat and protected species	Negative
	Spread of alien and invasive species	Negative
	Displacement and loss of fauna	Negative
Avifauna	Bird displacement due to disturbance	Negative
	Bird displacement due to habitat transformation	Negative
Socio- economic	Capital investment contributing to the national, regional and local economy	Positive
	Generation of employment, income and skills	Positive
	Social disruption and change in social dynamics	Negative
	Reduced quality of life and increased risks due to construction near residences	Negative
Cultural-heritage	Loss of heritage resources	Negative
	Loss of fossils	Negative
Visual	Altered Sense of Place and Visual Intrusion	Negative
Traffic	Trip generation	Negative
Operation Phase		
Physical	Reduction and loss of land capability	Negative
Ecological	Degradation and fragmentation of habitat	Negative
	Spread of alien and invasive species	Negative
	Displacement and loss of fauna	Negative
Avifauna	Bird mortality due to collision with solar panels	Negative
	Bird mortality due to entrapment in perimeter fences	Negative
	Bird mortality due to electrocution	Negative
	Bird mortality due to collision with transmission lines	Negative
Socio- economic	Operational investment contributing to the national, regional and local economy	Positive
	Generation of employment, income and skills	Positive
	Increased community prosperity through contributions and income from the project	Positive
Visual	Altered sense of place and visual intrusion caused by the PV array	Negative
	Altered sense of place and visual intrusion caused by the 11-33kV powerlines and pylons	Negative
	Altered sense of place and visual intrusion caused by the BESS and IPP side substation	Negative
	Visual discomfort and impaired visibility (glint and glare)	Negative
	Altered visual quality from nightglow	Negative
Decommissioning Phase		

Impact	Description	Impact Status
Air Quality	Avoid nuisance or health effects to local communities by managing dust entrainment	Negative
Ecological	Degradation and fragmentation of habitat	Negative
	Spread of alien and invasive species	Negative
Avifauna	Bird displacement due to disturbance	Negative
Socio- economic	Reduced employment and funding	Negative
Traffic	Trip generation	Negative

The mitigation and enhancement measures stipulated in the BAR and in this EMPr seek to meet the impact management outcomes³ listed in Table 1-4. A management outcome describes the intended objective or end goal of impact management, effected through the implementation of mitigation measures / impact management actions.

Table 1-4: Impact management outcomes of the EMPr

Impact	Impact Management Outcome
Construction Phase	
Air Quality	Very little or no health effects to local communities caused by dust entrainment
Physical	No unnecessary loss of land capability
Ecological	No unnecessary degradation and loss of habitat and protected species
	Very little or no spread of alien and invasive species
	No unnecessary disturbance to fauna
Avifauna	No unnecessary displacement of avifauna due to disturbance
	No unnecessary displacement of avifauna due to habitat transformation
Socio- economic	Maximised capital investment in the national, regional and local economy
	Maximised generation of employment, income and skills
	No or very limited social disruption and change in social dynamics
	No or very limited disruption to residents' quality of life and risk due to construction activities
Traffic	No or very limited delays to road users from construction activities (trip generation)
Cultural-heritage	No or very limited loss or damage to significant heritage resources
	No or very limited loss of fossils
Visual	No or very limited visual clutter from construction activities, limiting significant visual intrusion to local communities
Operational Phase	
Physical	No unnecessary loss of land capability
Ecological	No unnecessary degradation and fragmentation of habitat
	Very little or no spread of alien and invasive species
	No unnecessary disturbance to fauna
Socio-economic	Maximised operational investment contributing to the national, regional and local economy
	Maximised generation of employment, income and skills
	Enhanced community prosperity through contributions and income from the project
Visual	Very little or no visual intrusion to local communities caused by the PV array

³ In terms of Regulation 36(1) of the EIA Regulations, 2014, where an amendment is required to the impact management **actions** of an EMPr, such **amendments may immediately be effected by the holder** and reflected in the next environmental audit report. However, in terms of Regulation 36(2), where an amendment is required to the impact management **outcomes** of an EMPr, the EMPr may be amended **on application by the holder only**.

Impact	Impact Management Outcome
	Very little or no visual intrusion to local communities caused by the 11-33kV powerlines and pylons
	Very little or no visual intrusion to local communities caused by the BESS and IPP side substation
Avifauna	Very little or no mortality of avifauna due to collision with solar panels
	Very little or no mortality of avifauna due to entrapment in perimeter fences
	Very little or no mortality of avifauna due to due to electrocution
	Very little or no mortality of avifauna due to collision with transmission lines
Decommissioning Phase	
Air Quality	Very little or no health effects to local communities caused by dust entrainment
Ecological	No unnecessary degradation and fragmentation of habitat
	Very little or nospread of alien and invasive species
Avifauna	No unnecessary displacement of avifauna due to disturbance
Socio- economic	Limited reduction in employment and funding
Traffic	No or very limited delays to road users from decommissioning activities (trip generation)

2 Measures Applicable to the Detailed Design Phase

2.1 Roles and Responsibilities

The key role players during the design phase of the project are:

- Mainstream (the proponent);
- Engineering Consultants responsible for the design of the PV Facility and associated infrastructure; and
- Specialist Consultant Team responsible for adapting the existing pro-forma management plans to site-specific, management plans upon project implementation.

Their roles and responsibilities during the detailed design phase with respect to the implementation of the EMPr are outlined below.

Mainstream

- Take overall responsibility for the implementation of the design phase measures listed in Table 2-1 with the support of Engineering Consultants and a Specialist Consultant Team;
- Ensure that the Engineering Consultants and Specialist Consultant Team are aware of and take into consideration all relevant measures in the EMPr; and
- Confirm that all relevant environmental management measures in the EMPr have been incorporated into the project design on completion of the Design Phase.

Engineering Consultants:

- Take cognisance of all relevant measures in the EMPr and ensure integration thereof in the detailed design; and
- Reference the environmental management measures applicable to the Construction (Section 3) and Operational (Section 4) Phases of the Project in all documents that will be applicable to future phases of the Project (e.g. tender documents).

Specialist Consultant Team:

- Take cognisance of all relevant measures in the EMPr and the measures in the pro-forma management plans (see Appendix B to Appendix F) and ensure integration thereof in the detailed site-specific management plans to be compiled upon project implementation.

2.2 Environmental Management Measures

The environmental management and mitigation measures (also called “management actions”) that must be implemented during the Design Phase, as well as responsibilities and timelines for the implementation of these measures and monitoring thereof, are laid out in Table 2-1 below.

Table 2-1: Environmental mitigation measures / management actions that must be implemented during the *Design Phase*

Design Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁴	Suggested Performance Indicators
Authorisations	1.	Ensure that all required licences and permits have been obtained before the start of construction. These include, but may not be limited to: <ul style="list-style-type: none"> • Water Use Authorisations (WUA's); • Land Use Planning Authorisation; • Permits for the relocation and / or destruction of any protected Trees (Camel Thorn [<i>Vachellia erioloba</i>]); • Permits for the relocation of animals; and • Abnormal load permits (if required). 	<ul style="list-style-type: none"> • Proponent 	<ul style="list-style-type: none"> • Before construction commences 	<ul style="list-style-type: none"> • Keep record of all permits, licences and authorisations 	<ul style="list-style-type: none"> • Required licences/permits on file
Environmental compliance	2.	Appoint an independent ECO to oversee construction activities.	<ul style="list-style-type: none"> • Proponent 	<ul style="list-style-type: none"> • Before construction commences 	<ul style="list-style-type: none"> • Review appointment documentation 	<ul style="list-style-type: none"> • ECO appointment documents
	3.	Plan and make adequate financial provision for rehabilitation and restoration activities and clearly allocate timing and responsibility for environmental rehabilitation.	<ul style="list-style-type: none"> • Proponent 		<ul style="list-style-type: none"> • Review Habitat Rehabilitation Plan and financial provisions 	<ul style="list-style-type: none"> • Habitat Rehabilitation Plan and financial provisions
	4.	Include the EMPr in all tender documents to ensure that sufficient resources are allocated to environmental management by the Contractor(s).	<ul style="list-style-type: none"> • Proponent and Engineering consultants 	<ul style="list-style-type: none"> • Prior to call for tenders 	<ul style="list-style-type: none"> • Proponent to check tender documents and contract 	<ul style="list-style-type: none"> • Incorporated in tender documents
Site access and traffic aspects	5.	Design and construct an appropriate and formalised access to the site from the N12, if and when the project is awarded preferential bidder status.	<ul style="list-style-type: none"> • Proponent and Engineering consultants 	<ul style="list-style-type: none"> • Before construction commences 	<ul style="list-style-type: none"> • Review design documentation and approach • Review plan 	<ul style="list-style-type: none"> • Approved access design
	6.	Liaise with the appropriate road authorities to coordinate access improvements and erect road signage on the N12 near the site access warning of possible construction vehicles.				<ul style="list-style-type: none"> • Evidence of engagement
	7.	Compile a road maintenance plan.				<ul style="list-style-type: none"> • Plan available
	8.	Inform local road authorities and road users before unusual traffic is generated, e.g. high volumes or abnormal loads.			<ul style="list-style-type: none"> • Check correspondence 	<ul style="list-style-type: none"> • Correspondence on file
Employment and Procurement	9.	Source as many goods and services as possible from the local and regional economy (e.g. use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally).	<ul style="list-style-type: none"> • Proponent 	<ul style="list-style-type: none"> • Prior to construction phase 	<ul style="list-style-type: none"> • Check records 	<ul style="list-style-type: none"> • Percentage of local recruitment
	10.	Clearly publicise and implement a local recruitment policy.				
	11.	Consult with existing IPP projects that successfully procure from local SMMEs to share learnings, where possible				

⁴ Unless otherwise indicated, monitoring will be undertaken by Mainstream, supported by the authorities where the requirement is specifically stipulated in a licence or permit.

Design Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁴	Suggested Performance Indicators
	12.	Ensure diversity and gender equality in recruitment, as far as possible.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> During design and construction phases 	<ul style="list-style-type: none"> Check records 	<ul style="list-style-type: none"> Percentage of female staff vs male staff Percentage of BEE recruitment
	13.	Work together with impartial local representatives to identify local people during the recruitment process.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Check records 	<ul style="list-style-type: none"> Percentage of local / regional staff
	14.	Develop and implement a fair and transparent procurement policy.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Review policy 	<ul style="list-style-type: none"> Procurement policy Percentage of BEE recruitment
Training	15.	Provide suitable training to service providers, where possible and practicable.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> During design and / or construction phases 	<ul style="list-style-type: none"> Check training attendance register 	<ul style="list-style-type: none"> Training registers
	16.	Provide training to appointed staff and appointed service providers, where possible and practical, on how to position themselves for other employment opportunities once construction ends.				
Social disruption management	17.	Consult with the municipality regarding the capacity of existing services and infrastructure (e.g. provision of water, electricity, waste removal, sanitation and housing) to cope if significant numbers of additional workers are brought into the area during the construction period.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Check records of consultation 	<ul style="list-style-type: none"> Minutes of meeting(s) Email record of consultation
	18.	Consider supporting projects that improve local services and infrastructure and/or deal with social problems or conflicts through the social upliftment programme, if the need arises.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Review list of projects 	<ul style="list-style-type: none"> Stakeholder engagement Project evaluations Project audits
Security risk management	19.	Liaise with nearby residents (up to ~2 km from the project boundary) before and during construction to inform them of construction status and discuss safety management measures to reduce security risks.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Check correspondence 	<ul style="list-style-type: none"> Correspondence on file
	20.	Communicate and implement a compensation procedure in the event of damages directly linked to construction.			<ul style="list-style-type: none"> Check correspondence 	
Waste management	21.	Compile a Waste Management Plan (construction, operation and decommissioning phases), laying out: <ul style="list-style-type: none"> Expected type and amount of waste; Measures to reduce waste; Type and expected volume of recyclable waste; Recycling facilities that will collect / receive waste; Type of storage for different waste types; Waste contractors that will collect and dispose of waste; 	<ul style="list-style-type: none"> Consultant team 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Review of Waste Management Plan 	<ul style="list-style-type: none"> Waste Management Plan in place

Design Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁴	Suggested Performance Indicators
Alien vegetation and open space management	22.	Compile an Alien Vegetation and Open Space Management Plan taking into account the pro forma Alien Vegetation and Open Space Management Plan included in Appendix F. The plan must identify areas for action (if any) and prescribe the necessary removal methods and frequencies to be applied. This plan must be also prescribe a monitoring plan and be updated as/when new data is collated.	<ul style="list-style-type: none"> Consultant team 	<ul style="list-style-type: none"> Prior to the start of land clearing 	<ul style="list-style-type: none"> Review Alien Vegetation and Open Space Management Plan 	<ul style="list-style-type: none"> Site specific alien vegetation and open space management plan in place
	23.	Compile a Waste Management Plan.	<ul style="list-style-type: none"> Consultant team 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Review of Waste Management Plan 	<ul style="list-style-type: none"> Waste Management Plan in place
	24.	Compile a pest control plan that precludes the use of poison as a control measure.	<ul style="list-style-type: none"> Consultant team 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Review of pest control plan 	<ul style="list-style-type: none"> Pest control plan in place
Terrestrial habitat loss / fragmentation	25.	Compile a Hydrocarbon Spill Management Plan.	<ul style="list-style-type: none"> Consultant team 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Review of Hydrocarbon Spill Management Plan 	<ul style="list-style-type: none"> Hydrocarbon Spill Management Plan in place
	26.	Appoint a rehabilitation specialist to compile a Habitat Rehabilitation Plan taking into account the pro forma Habitat Rehabilitation Plan included in Appendix E.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Prior to the start of land clearing 	<ul style="list-style-type: none"> Review Habitat Rehabilitation Plan 	<ul style="list-style-type: none"> Site specific Habitat Rehabilitation Plan in place
Loss of Species of Conservation Concern (SCC)	27.	Appoint a botanical / horticultural specialist to compile a Plant Rescue and Protection Plan taking into account the pro forma plant rescue plan included in Appendix C.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Prior to the start of land clearing 	<ul style="list-style-type: none"> Review Plant Rescue and Protection Plan 	<ul style="list-style-type: none"> Site specific Plant Rescue and Protection Plan in place
Avifauna displacement	28.	Do not place solar panels or infrastructure within 100 m of water reservoirs relocated reservoirs approved by the avifaunal specialist.	<ul style="list-style-type: none"> Engineering consultants 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Review detailed design plans 	<ul style="list-style-type: none"> Final design includes EMPr requirements Consultation with avifauna specialist
	29.	For single wire fences, increase the spacing between at least the top two wires to a minimum of 30 cm and ensure they are correctly tensioned to reduce the snaring risk for owls.				
	30.	Use a single perimeter fence.				
	31.	Bury 11 – 33kV cables where possible.				
	32.	Use Eskom approved bird friendly pole design approved by an avifaunal specialist (preferably the inverted T design with a cross-arm and suspended insulators to provide safe perching space for large birds, especially vultures.)				
Avifauna mortality	33.	Use a single perimeter fence.	<ul style="list-style-type: none"> Engineering consultants 	<ul style="list-style-type: none"> During design phase 	<ul style="list-style-type: none"> Review detailed design plans 	<ul style="list-style-type: none"> Final design includes EMPr requirements
	34.	For single wire fences, increase the spacing between at least the top two wires to a minimum of 30 cm and ensure they are correctly tensioned to reduce the snaring risk for owls.				
	35.	Bury 11 - 33 kV cables where possible.				

Design Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁴	Suggested Performance Indicators
	36.	Use Eskom approved bird friendly pole design approved by an avifaunal specialist (preferably the inverted T design with a cross-arm and suspended insulators to provide safe perching space for large birds, especially vultures.)				
	37.	Mark all the sections of 11-33kV overhead lines with Eskom approved Bird Flight Diverters according to the applicable Eskom standard.				
Visual aspects	38.	Fence the perimeter of the site with a green or black fencing.	<ul style="list-style-type: none"> • Engineering consultants 	<ul style="list-style-type: none"> • During design phase 	<ul style="list-style-type: none"> • Review detailed design plans 	<ul style="list-style-type: none"> • Final design includes EMPr requirements
	39.	Do not install or affix lights on pylons.				
	40.	Consolidate the BESS and on-site substation footprint, if possible.				
	41.	Ensure that the on-site substation roof and BESS container colour blends into the landscape.				
	42.	Reduce the height of lighting masts to a workable minimum.				
	43.	Direct lighting inwards and downwards to limit light pollution.				
Land-based fauna displacement	44.	Design outside lighting to limit impacts on fauna. <ul style="list-style-type: none"> ○ Fit lighting fixtures with baffles, hoods or louvres and directed light downward. ○ Direct outside lighting away from sensitive areas such as the wetland. ○ Avoid fluorescent and mercury vapor lighting. ○ Utilise sodium vapor (yellow) lights wherever possible. ○ Utilise motion detection lighting wherever possible to minimise the unnecessary illumination of areas. 	<ul style="list-style-type: none"> • Engineering consultants 	<ul style="list-style-type: none"> • During design phase 	<ul style="list-style-type: none"> • Review detailed design plans 	<ul style="list-style-type: none"> • Approval of final design
Fire management	45.	Appoint an expert to compile a Fire Management Plan taking into account the pro-forma Fire Management Plan in Appendix D	<ul style="list-style-type: none"> • Proponent 	<ul style="list-style-type: none"> • During design phase 	<ul style="list-style-type: none"> • Review of Fire Management Plan 	<ul style="list-style-type: none"> • Fire Management Plan in place
Dust management	46.	Inform all registered local stakeholders of the impending construction, including the potential for dust entrainment, at least 4 weeks before construction commences.	<ul style="list-style-type: none"> • Proponent 	<ul style="list-style-type: none"> • During design phase 	<ul style="list-style-type: none"> • Review proof of notification 	<ul style="list-style-type: none"> • Notification provided
	47.	Compile a Method Statement for dust management. The Method Statement must be submitted to the ECO for approval at least 14 days before construction begins in the relevant area. The Method Statement must include: <ul style="list-style-type: none"> • Routine dust control measures; • Emergency dust control measures; • Resources required for dust management (equipment, staff and financial); and • A contact number for reporting complaints and concerns regarding dust from construction activities. 	<ul style="list-style-type: none"> • Contractor 	<ul style="list-style-type: none"> • Prior to Construction 	<ul style="list-style-type: none"> • Monitor compliance against plan 	<ul style="list-style-type: none"> • Availability of plan on site

3 Measures Applicable to the Construction Phase

3.1 Roles and Responsibilities

The key role players during the construction phase of the project are anticipated as follows:

- Mainstream (the proponent);
- Resident Engineer (RE), who will oversee the activities of the contractors on site;
- Contractors responsible for the development of the PV facility and associated facilities and infrastructure;
- Any sub-contractors hired by the contractor; and
- Environmental Control Officer (ECO).

The anticipated construction phase organogram is presented in Figure 3-1 and shows the proposed lines of communication during this phase. All instructions relating to the EMPr will be given to the Contractor via the RE. In an emergency situation, the ECO may give an instruction directly to the Contractor/ sub-contractors. Both the Contractor and ECO will report issues of concern to the RE, who in turn will report on progress to the proponent. The proponent will retain responsibility for ensuring that the Contractor fully implements the provisions of the EMPr.

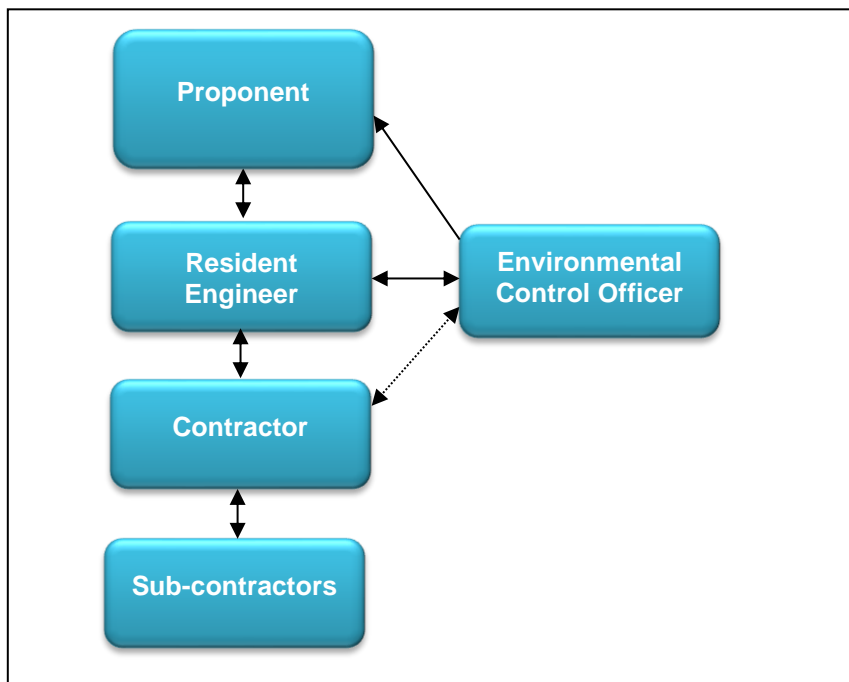


Figure 3-1: Construction Phase Reporting Structure

Key roles and responsibilities during the construction phase with respect to the implementation of the EMPr are outlined below.

Mainstream:

Mainstream has overall responsibility for management of the Project. In terms of environmental management, the proponent will:

- Appoint suitably experienced Engineers who will be responsible for the overall management of activities on site during the Construction Phase;
- Appoint an independent and suitably qualified ECO to monitor compliance with the EMPr for the duration of the Construction Phase;
- Ensure that the Engineers are aware of the requirements of the EMPr, implement the EMPr and monitor the Contractor's activities on site;
- Ensure that the Contractor is aware of and contractually bound to the provisions of this EMPr by including the relevant environmental management requirements in the tender and contract documents, as appropriate;
- Ensure that the Contractor remedies environmental problems timeously and to the satisfaction of the ECO and authorities (when necessary); and
- Notify the authorities should problems not be remedied timeously.

Resident Engineer:

Mainstream will appoint suitably qualified Engineers, who in turn will designate a suitable Resident Engineer (RE) who will be responsible for overseeing activities of the Contractor during the Construction Phase. The RE shall:

- Ensure that the Contractor is duly informed of the EMPr and associated responsibilities and implications of this EMPr prior to commencement of construction;
- Monitor the Contractor's activities (together with the ECO) with regard to the requirements outlined in the EMPr;
- Relay all instructions from the ECO to the Contractor and ensure that these are fully understood and implemented;
- Report any environmental emergencies/concerns to the ECO immediately;
- Act as a point of contact for local residents and community members; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the relevant authorities.

Contractor:

The Contractor will be required to appoint or designate a Contractor's Environmental Representative (CR) who will assume responsibility for the Contractor's environmental management requirements on site and be the point of contact between the Contractor and the ECO. The CR shall:

- Ensure that all activities on site are undertaken in accordance with the EMPr;
- Monitor the Contractor's activities (together with the ECO) with regard to the requirements outlined in the EMPr;
- Ensure that all employees and sub-contractors comply with the EMPr;
- Immediately notify the ECO of any non-compliance with the EMPr, or any other issues of environmental concern; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the ECO.

The Contractor has a duty to demonstrate respect and care for the environment. The Contractor will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the EMPr, environmental regulations and relevant legislation.

Sub-contractors:

All Sub-contractors will be required to:

- Ensure that all employees are duly informed of the EMPr and associated responsibilities and implications of this EMPr prior to commencement of construction;
- Ensure that all activities on site are undertaken in accordance with the EMPr;
- Monitor employees' activities (together with the ECO) with regard to the requirements outlined in the EMPr;
- Immediately notify the ECO of any non-compliance with the EMPr, or any other issues of environmental concern; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the ECO.

The Sub-contractor has a duty to demonstrate respect and care for the environment. The Sub-contractor will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the EMPr, environmental regulations and relevant legislation, resulting from their presence on site.

Environmental Control Officer:

The ECO shall be a suitably qualified/experienced environmental professional or professional firm, appointed by the proponent, for the duration of the Construction Phase of the Project. The ECO shall:

- Request Method Statements from the Contractor prior to the start of relevant construction activities, where required, and accept these (as appropriate) without causing undue delay;
- Monitor, review and verify compliance with the EMPr by the main Contractor, as well as any sub-contractors and specialist contractors;
- Undertake site inspections at least once a month to determine compliance with the EMPr;
- Identify areas of non-compliance and recommend corrective actions (measures) to rectify them in consultation with Mainstream, the RE and the Contractor, as required;
- Compile a checklist highlighting areas of non-compliance following each ECO inspection;
- Ensure follow-up and resolution of all non-compliances;
- Provide feedback for continual improvement in environmental performance;
- Respond to changes in project implementation or unanticipated site activities which are not addressed in the EMPr, and which could potentially have environmental impacts, and advise Mainstream, the RE and Contractor as required; and
- Undertake a site closure inspection, which may result in recommendations for additional clean-up and rehabilitation measures.

3.2 Compliance and Monitoring

3.2.1 Method Statements

A Method Statement is a document setting out specific details regarding the plant, materials, labour and method the Contractor proposes using to carry out certain activities, usually activities that may have a detrimental effect on the environment. It is submitted by the Contractor to the ECO for the ECO to confirm that these methods meet the requirements of the EMPr and acceptable environmental practice. This allows the EMPr to be less prescriptive and affords the Contractor a certain amount of flexibility or to motivate amendments to specifications in the EMPr for consideration by the ECO. It also provides a reference point to detect deviations from the agreed approach to an activity.

Each Method Statement will address environmental management aspects relevant to the activity and will typically provide detailed descriptions of items including, but not necessarily limited to:

- Nature, timing and location of activities;
- Procedural requirements and steps;

- Management responsibilities;
- Material and equipment requirements;
- Transportation of equipment to and from site;
- Method for moving equipment/material while on site;
- How and where material will be stored;
- Emergency response approaches, particularly related to spill containment and clean-up;
- Response to compliance/non-conformance with the requirements of the EMPr; and
- Any other information deemed necessary by the ECO.

The following list provides examples of Method Statements that may be requested from the Contractor:

- Environmental awareness course preparation;
- Material and equipment storage and delivery;
- Fuel storage, dispensing and fuel spills;
- Waste management;
- Management of contaminated water;
- Erosion and stormwater control;
- Cement batching; and
- Any others requested by the ECO.

The Method Statements will be submitted by the Contractor to the ECO not less than **7 days** prior to the intended date of commencement of an activity. The ECO shall accept / reject the Method Statement within **3 days**. An activity for which a Method Statement has been requested shall not commence until the ECO has accepted such method and once accepted, the Contractor shall abide by the relevant Method Statement. A pro forma Method Statement is attached in Appendix A, although a suitable Method Statement format can be agreed between the ECO and Contractor.

3.2.2 Environmental Records and Reports

Environmental records and reports required during the Construction Phase are listed in Table 3-1. There are two categories of reports:

- Reports recommended by the Environmental Assessment Practitioner (EAP) to monitor implementation of the EMPr; and
- Statutory audits and reports prescribed by law and/or the Competent Authority and/or conditions of EA (see below).

Table 3-1: Reports required during the Construction Phase

Report	Frequency	From	To
Environmental Checklist	Weekly	CR	ECO
Environmental Compliance Report	Monthly	ECO	Mainstream
Site Closure Report	End of Contract	ECO	Mainstream
Statutory Environmental Audit Report(s)	To be determined by DFFE	Independent External Auditor	Mainstream

Environmental Checklist

The CR will undertake weekly site inspections to check on the implementation of the EMPr by the Contractor and complete a brief report/checklist after the inspection. The completed checklists shall be submitted to the ECO at the end of each inspection. This checklist should be discussed between the CR and the ECO during the initial site inspection, and agreement reached on the preferred format and content.

Environmental Compliance Reports

The ECO will undertake site inspections at least on a fortnightly basis. The ECO will prepare monthly Environmental Compliance Reports, detailing any environmental issues, non-compliance and actions to be implemented. These reports will be based on the ECO's observations from the ECO inspections undertaken during the course of the month. Environmental Compliance Reports will be submitted to Mainstream and a full record will be kept by the ECO, for submission to the Local Authority and/or DFFE on request.

When more frequent site visits are undertaken by the ECO, the frequency of Environmental Compliance Reports will increase accordingly to allow for timeous reporting of environmental issues and actions required.

Photographic Records

If the ECO identifies any areas of concern, the ECO will request photographic records, which must be submitted by the Contractor for record purposes.

Construction Site Closure Report

The ECO will undertake a final site closure inspection on completion of the Construction Phase. The purpose of this is to confirm compliance with all site closure requirements identified by the ECO, and that the site has been left in an environmentally suitable condition. If outstanding environmental requirements are observed during this inspection, a further inspection must be carried out to confirm compliance. The Site Closure Report will be submitted to Mainstream for record purposes, and to DFFE if requested.

In the event of temporary site closure (e.g. over the December construction shut-down period, or during Care and Maintenance) a similar procedure will be followed and a Temporary Site Closure Report compiled and submitted by the ECO.

Statutory Environmental Audit Reports

In terms of Regulation 34 of the NEMA EIA regulations, 2014 (as amended), Mainstream is required to appoint an independent person with environmental auditing expertise to undertake an environmental audit⁵ to determine compliance with the conditions of the EA and the EMPr and

⁵ In terms of Appendix 7 of the 2014 EIA Regulations. An environmental audit could be required by DFFE (frequency to be specified in the EA) during the Construction Phase and / or the Operation Phase.

recommend improvements (if required). In terms of Regulation 34(2)(d) of the EIA Regulations, 2014 (as amended), the Environmental Audit Reports must be conducted and submitted at intervals confirmed by DFFE in the EA.

SRK recommends that the first Environmental Audit Report be submitted to DFFE within one year of the commencement of the Construction Phase and a second within one year of the start of the Operation Phase.

3.2.3 Corrective Action

Corrective action is a critical component of the implementation–review–corrective action–implementation (or plan-do-check-act) cycle and it is through corrective action that continuous improvement can be achieved. Where repeated non-compliance is recorded, procedures may need to be altered accordingly to avoid the need for repeated corrective action.

If environmental compliance monitoring by the CR and ECO indicates non-conformance with the EMPr or acceptance of Method Statements, the RE will formally notify the Contractor through a Corrective Action Request. The Corrective Action Request documents:

- The nature of the non-conformance/environmental damage;
- The actions or outcomes required to correct the situation; and
- The date by which each corrective or preventive action must be completed.

Upon receipt of the Corrective Action Request, the Contractor will be required to produce a Corrective Action Plan (or similar such as a Close Out Report), which will detail how the required actions will be implemented or how the required actions have been rectified. Additional monitoring by the CR and ECO will then be required to confirm the success or failure of the corrective action.

3.3 Environmental Management Measures

The environmental management and mitigation measures that must be implemented during the Construction Phase, as well as responsibilities and timelines for the implementation of these measures and monitoring thereof, are laid out in Table 3-2 below.

Table 3-2: Environmental mitigation measures / management actions that must be implemented during the *Construction Phase*

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
Site access and traffic aspects	1.	Liaise with the appropriate road authorities to coordinate access improvements and erect road signage on the N12 near the site access warning of possible construction vehicles.	• RE	• Start of construction	• Visual inspections • Document review	• Evidence of engagement • Signage in place • No grievances • No accidents
	2.	Inform local road authorities and road users before unusual traffic is generated, e.g. high volumes or abnormal loads.				
	3.	Stagger deliveries to the site as far as possible.				
	4.	Schedule deliveries outside of commuter peak hours, especially for large vehicles / abnormal loads.				
	5.	Consider scheduling shift changes to occur outside peak hours.				
Site camp establishment	6.	Submit a method statement for Site Camp establishment for acceptance by the ECO at least 10 days prior to the start of construction activities.	• Contractors	• Start of construction	• Visual inspections • Method statement	• Accepted method statement • Site camp suitably fenced • Signage in place
	7.	Minimise the site camp footprint to the minimum required.				
	8.	Keep the premises clean, sanitary and in good repair.				
	9.	Establish a suitably fenced Site Camp at the start of the contract, which will allow for site offices, vehicle, equipment, material and waste storage areas to be consolidated as much as possible.				
	10.	Demarcate construction site boundaries upon establishment. Control security and access to the site. Fence off site boundaries to the satisfaction of the ECO and ensure that plant, labour and materials remain within site boundaries.				
Site demarcation	11.	Clearly demarcate the construction footprint with visible barriers and restrict all construction activities to within the proposed infrastructure area.	• Contractors	• Start of construction	• Visual inspections • Approval by ECO	• Site boundaries demarcated
Safety and security	12.	Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing construction.	• Contractors	• Throughout construction	• Visual inspection and approval by CR and ECO.	• Number of safety/emergency incidents.

⁶ Unless otherwise indicated, monitoring will be undertaken by the ECO, supported by the authorities where the requirement is specifically stipulated in a license or permit.

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	13.	Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site.				
	14.	Secure the Site Camp, particularly to restrict access unauthorized to fuels and any other hazardous substances.				
	15.	Store all construction material and equipment in locked containers within the Site Camp. Employ 24 hour security for the Site Camp.				
	16.	Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances, deep excavations etc.).				
	17.	Advise the ECO of any emergencies on site, together with a record of action taken				
Employment and Procurement	18.	Source as many goods and services as possible from the local and regional economy (e.g. use local contractors and accommodation and equipment suppliers as far as possible and purchase perishable goods locally).	• Proponent	• During design and construction phases	• Check records	<ul style="list-style-type: none"> • Percentage of local / regional staff • Percentage of female staff vs male staff • Percentage of BB-BEE procurement
	19.	Maximise use of local skills and resources through preferential employment of locals where practicable				
	20.	Ensure diversity and gender equality in recruitment, as far as possible.				
	21.	Implement a fair and transparent labour and recruitment policy				
Safety risk management	22.	Maintain a visible security presence on site.	• Proponent	• Throughout construction	<ul style="list-style-type: none"> • Visual inspection • Check incident report 	• Number of safety / theft incidents
	23.	Communicate and implement a compensation procedure in the event of damages directly linked to construction	• Proponent	• Throughout construction	• Review of compensation procedure	• Compensation procedure in place
	24.	Control site access.	• Proponent	• Throughout construction	• Visual inspection	• Number of safety / theft incidents
	25.	Provide transportation to site for workers.	• Proponent	• Throughout construction	• Obtain verbal confirmation from RE/CR	
	26.	Declare areas outside of the construction site as no-go areas for construction staff.	• Proponent	• Prior to the commencement of construction	• Visual inspection	
	27.	Erect and regularly inspect a boundary fence.	• RE/CR/ECO	• Throughout construction	• Visual inspection	

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	28.	Regularly inspect the project area and surrounding area for signs of illegal activity.	<ul style="list-style-type: none"> RE/CR/ECO 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection 	
Skills development training	29.	Provide suitable training to service providers, where possible and practicable.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> During design and construction phases 	<ul style="list-style-type: none"> Keep record of training provided Check training attendance register. 	<ul style="list-style-type: none"> Training attendance register Proportion of workers that completed environmental training
	30.	Provide training to appointed staff and appointed service providers on how to position themselves for other employment opportunities once construction ends.				
Environmental awareness training	31.	<p>Provide environmental awareness training to all personnel on site at the start of their employment. Training should include discussion of:</p> <ul style="list-style-type: none"> Potential impact of construction waste and activities on the environment; Suitable disposal of construction waste and litter; Key measures in the EMPr relevant to worker's activities; How incidents and suggestions for improvement can be reported; Avifauna impacts of off-road driving; Sensitive environmental receptors within the project area; Management requirements in the Environmental Authorisation and the EMPr; How to deal with any fauna species encountered during the construction process; How to identify heritage and paleontological material; and Ensure that all attendees remain for the duration of the training, and on completion, sign an attendance register that clearly indicates participants' names. 	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Before workers start working on-site Before new activities are undertaken 	<ul style="list-style-type: none"> Keep record of training provided Check training attendance register Observe whether activities are executed in line with EMPr requirements 	<ul style="list-style-type: none"> Proportion of workers that completed environmental training Compliance of workers with EMPr
Complaints Register / grievance mechanism	32.	<p>Maintain and disclose a complaints register. The register must record:</p> <ul style="list-style-type: none"> Complainant name and contact details; Date complaint was lodged; Person who recorded the complaint; Nature of the complaint; Actions taken to investigate the complaint and outcome of the investigation; Action taken to remedy the situation; and Date on which feedback was provided to complainant. 	<ul style="list-style-type: none"> Contractor 	<ul style="list-style-type: none"> Duration of construction activities 	<ul style="list-style-type: none"> Keep record of all complaints 	<ul style="list-style-type: none"> Register on site Complaints followed up and closed out
Hazardous materials management	33.	Design and construct hazardous material storage facilities, especially fuel storage, with suitable impermeable materials and a minimum bund containment capacity equal to 110% of the largest container.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection of hazardous materials 	<ul style="list-style-type: none"> Number of incidents of non-compliance with safety procedures concerning hazardous

Construction Phase Measures						
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	34.	Ensure that contaminants (including cement) are not placed directly on the ground (e.g. mix cement on plastic sheeting) to prevent runoff reaching the environment.			handling and storage areas	materials, including waste materials. <ul style="list-style-type: none"> • Number of spills of hazardous materials, including waste materials; • Cost of cleaning up spills. • Evidence of contamination and leaks.
	35.	Keep Material Safety Data Sheets for all hazardous materials on site and ensure that they are available for reference by staff responsible for handling and storage of materials.				
Vegetation clearing	36.	Implement the Plant Rescue and Protection Plan	<ul style="list-style-type: none"> • Botanical / horticultural specialist 	<ul style="list-style-type: none"> • At the start of the construction phase, prior to site establishment 	<ul style="list-style-type: none"> • Visual inspection • Check plants rescued in accordance with Plant Rescue and Protection Plan and relevant permits, as required. • Review records of search and rescue 	<ul style="list-style-type: none"> • Number of SCC relocated
	37.	Restrict vegetation clearance to the immediate development footprint.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection • Check Permit. 	<ul style="list-style-type: none"> • Size of area cleared relative to development footprint • Size of area disturbed outside of construction site boundary • Permit on file.
	38.	Demarcate the construction footprint with visible barriers (i.e safety tape / fencing).				
	39.	Erect signage to demarcate the construction footprint.				
	40.	Designate areas outside the development footprint as No go areas.				
	41.	Clear vegetation by hand cutting to avoid heavy machinery, as far as practically possible.				
	42.	Prohibit land clearing and disturbance to rocky habitats.				
Habitat loss / fragmentation	43.	Limit construction of new roads as much as possible.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection • ECO Closure Inspection 	<ul style="list-style-type: none"> • Size of area disturbed outside of construction site boundary • No. of new roads constructed
	44.	Minimise the number (and size) of laydown, storage and staff facilities.				<ul style="list-style-type: none"> • Size of area disturbed
	45.	Remove all remaining construction materials once the construction phase ends.				<ul style="list-style-type: none"> • Evidence of construction material remaining

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	46.	Store topsoil stockpiles on flat ground and use bunds and/or other stabilisation methods (e.g., netting) to avoid erosion.				<ul style="list-style-type: none"> Topsoil stored on flat area and protected from erosion
	47.	Implement a Hydrocarbon Spill Management Plan.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection for spills Check safe disposal certificates Review Incident Register 	<ul style="list-style-type: none"> No. of hydrocarbon spill incidents Safe disposal certificates on file
	48.	Implement the Fire Management Plan.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection Review of Incident Register 	<ul style="list-style-type: none"> Compliance with Fire Management Plan No of fire incidents
	49.	Implement the Habitat Rehabilitation Plan.	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> As soon as the area is no longer impacted by construction 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Compliance with the Habitat Rehabilitation Plan
	50.	Rehabilitate areas as soon as they are no longer impacted by construction.	<ul style="list-style-type: none"> Botanical / horticultural specialist 		<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Topsoil used for rehabilitation concurrently with construction
	51.	Utilise indigenous vegetation only for habitat rehabilitation.	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> Throughout construction and during rehabilitation phase 	<ul style="list-style-type: none"> Visual inspection Review Habitat Rehabilitation Plan 	<ul style="list-style-type: none"> Compliance with Habitat Rehabilitation Plan
	52.	Return topsoil as soon as possible.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> As soon as the area is no longer impacted by construction 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Topsoil used for rehabilitation concurrently with construction
	53.	Apply surplus topsoil / rehabilitation material to other areas in need of stabilisation and vegetation cover.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Upon completion of construction and rehabilitation 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Surplus topsoil used for rehabilitation in other areas, where required
Alien vegetation management	54.	Compile and implement an Alien Vegetation and Open Space Management Plan, including but not limited to identification of areas for action (if any), prescription of the necessary removal methods and frequencies, monitoring plan and requirements for updates.	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection Review of alien vegetation removal records 	<ul style="list-style-type: none"> Compliance with Alien Vegetation and Open Space Management Plan Absence of alien plants on site.

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	55.	Compile and implement a Waste Management Plan to: <ul style="list-style-type: none"> ○ Prioritize waste management such that all waste is collected, stored and disposed of adequately. ○ Collect and dispose of all waste generated on site, at least on a weekly basis, to prevent rodents and pests. ○ Ensure waste storage bins have lids and are secured to prevent falling over. ○ Compile and implement a pest control plan that does not include the use of poison as a control measure. 	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • Compliance with Waste Management Plan
Avifauna displacement	56.	Retain or relocate existing water reservoirs to ensure at least one waterpoint is retained near the project.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Before removal of existing water reservoirs 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • One retained or removed water reservoir associated with the project
	57.	Restrict activities to the development footprint.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • Size of area disturbed outside of construction site boundary
	58.	Implement best practice measures to control noise and dust.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Check Complaints Register 	<ul style="list-style-type: none"> • No. of noise and dust complaints
	59.	Demarcate access roads clearly.			<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • Access roads demarcated • Evidence of disturbance outside of construction footprint
	60.	Prohibit off-road driving.				
	61.	Minimise construction of new roads.				
	62.	Demarcate access roads clearly.				
	63.	Prohibit off-road driving.				
	64.	Undertake regular ECO audits / inspections to report on compliance with the EMP (including compliance with noise control mechanisms).	<ul style="list-style-type: none"> • ECO 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection • Monthly Environmental Compliance Report 	<ul style="list-style-type: none"> • Percentage compliance with EMP requirements
	65.	Implement best practice measures to control noise and dust.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • No of noise and dust complaints
	66.	Minimise construction of new roads.			<ul style="list-style-type: none"> • Review Incident Report 	
	67.	Implement and strictly enforce the mitigation measures proposed by the botanical specialist.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection • Compliance with the Habitat Rehabilitation Plan 	<ul style="list-style-type: none"> • Compliance with the Habitat Rehabilitation Plan
	68.	Appoint a rehabilitation specialist to develop and implement a Habitat Rehabilitation Plan.	<ul style="list-style-type: none"> • Botanical / horticultural specialist 	<ul style="list-style-type: none"> • As soon as the area is no longer impacted by construction 	<ul style="list-style-type: none"> • Visual inspection • Review records or search and rescue 	<ul style="list-style-type: none"> • Compliance with the Habitat Rehabilitation Plan • No. of plants relocated

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	69.	Conduct site inspections to monitor the progress of rehabilitation, as and when required based on specialist recommendations according to the Habitat Rehabilitation Plan.	<ul style="list-style-type: none"> Contractors and ECO 	<ul style="list-style-type: none"> Throughout construction and during rehabilitation phase 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Alignment with Habitat Rehabilitation Plan Plant cover
	70.	Implement adaptive management to ensure vegetation rehabilitation goals are met.	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> Throughout construction and during rehabilitation phase 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Alignment with Habitat Rehabilitation Plan Plant cover
Land-based fauna displacement	71.	Minimise the time between clearing of an area and subsequent development to avoid fauna from re-entering the site to be disturbed.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> During construction 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> No. of fauna relocated
	72.	Excavate holes / excavations on a needs only basis.				<ul style="list-style-type: none"> Evidence of open excavations / holes
	73.	Areas should be cleared and disturbed only as and when needed.				<ul style="list-style-type: none"> Evidence of cleared areas
	74.	Cover open holes / excavations overnight to prevent fauna mortalities.				<ul style="list-style-type: none"> No. of fauna mortalities
	75.	Restrict construction activities to as few discrete areas as possible at a time, and be systematic, allowing fauna to move off site as activities progress.				
	76.	Create a disturbance (one or two persons walk the area) prior to vegetation clearing activities in order for fauna to move off site (not more than 1 day in advance of clearing).				<ul style="list-style-type: none"> No. of fauna relocated No. of fauna mortalities
Soil conservation	77.	Compile and implement the Stormwater and Erosion Management Plan.	<ul style="list-style-type: none"> Engineering consultants 	<ul style="list-style-type: none"> During design and throughout construction 	<ul style="list-style-type: none"> Visual inspection Review of Stormwater and Erosion Management Plan 	<ul style="list-style-type: none"> Compliance with stormwater management design requirements Evidence of soil erosion
	78.	Drive only on approved access roads to avoid unnecessary compaction.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Evidence of compaction
	79.	Park equipment and vehicles on impermeable surfaces or utilise drip trays to prevent hydrocarbon spills and monitor daily for fluid leaks.			<ul style="list-style-type: none"> Visual inspection Review Incident Register 	<ul style="list-style-type: none"> Evidence of hydrocarbon spills Incident Register
	80.	Implement the Alien Vegetation and Open Space Management.	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection Review of alien vegetation removal records 	<ul style="list-style-type: none"> Compliance with Alien Vegetation and Open Space Management Plan No of alien plants removed

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	81.	Store and maintain topsoil as per best practise in order to utilise it for rehabilitation of eroded areas.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection Review Incident Register / Report Review records of significant pollution events and proof of authority notification 	<ul style="list-style-type: none"> Evidence of hydrocarbon spills Authority notification on file Incident Register / Report Evidence of erosion
	82.	Remediate hydrocarbon spills immediately.				
	83.	Report hydrocarbon spills to the appropriate authorities, if significant pollution to the environment occurs.				
	84.	Clear vegetation only once construction is imminent, to reduce cleared areas and minimise erosion risk.				
Topsoil Storage	85.	Limit construction and lay down areas to areas within the development footprint.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Before construction commences During vegetation clearing During construction 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Incidence of erosion and Incidence of incorrect storage and harvesting of topsoil
	86.	Designate and demarcate areas to be used for topsoil stockpiling.				
	87.	Remove topsoil (up to a maximum of 30 cm depth)				
	88.	Stockpile topsoil prior to the commencement of construction activities (stockpile no higher than 2m) and conserve topsoil for landscaping and rehabilitation.				
	89.	Locate topsoil stockpiles in an area protected from the wind, and agreed to with the ECO.				
	90.	Ensure suitable control of run-off during the construction phase to prevent erosion of topsoil on adjacent land and undeveloped portions of the site.				
	91.	Replace harvested topsoil in areas that are to be rehabilitated as soon as sections of the works are completed (i.e. not only following the completion of all works)				
Concrete / cement work	92.	Use Ready-Mix concrete rather than batching where possible.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection and approval by CR and ECO. 	<ul style="list-style-type: none"> Number of incidents of batching outside works footprint Contamination of water and soil Visible litter / waste on site.
	93.	Ensure that no cement truck delivery chutes are cleaned on site. Cleaning operations are to take place off site at a location where wastewater can be disposed of in the correct manner. If this is not possible a suitable washing facility is to be developed on site in consultation with the ECO				
	94.	Batch cement in a bunded area within the boundaries of the development footprint only (where unavoidable)				
	95.	Ensure that cement is mixed on mortar boards and not directly on the ground (where unavoidable).				
	96.	Physically remove any remains of concrete, either solid, or liquid, immediately and dispose of as waste.				
	97.	Place cement bags in bins and dispose of bags as waste to a licensed waste disposal facility.				

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	98.	Sweep / rake / stack excess aggregate / stone chip / gravel / pavers into piles and dispose at a licensed waste disposal facility.				
Waste management	99.	Implement the Waste Management Plan.	<ul style="list-style-type: none"> Proponent Contractors 	<ul style="list-style-type: none"> Before start of activities on site Throughout construction 	<ul style="list-style-type: none"> Availability of Integrated Waste Management Plan Availability of waste manifests and disposal certificates Visual inspection of waste collection and disposal areas Visual inspection of construction areas (litter) 	<ul style="list-style-type: none"> Integrated Waste Management Plan on file. Monitor procedures to ensure the Waste Management Plan is implemented. Presence of litter Availability of rubbish bins (with lids) and skips Degree to which rubbish bins and skips are filled Total volume of general and hazardous waste storage capacity Total volume of general and hazardous waste stored on site Degree to which different waste is separated Frequency of waste collection
	100.	Aim to reuse or recycle decommissioned items.				
	101.	Arrange for all waste produced to be collected and disposed of by an accredited service provider.				
	102.	Aim to minimise waste through reducing and re-using (packaging) material.				
	103.	Collect recyclables separately and deliver these to suitable facilities or arrange for collection.				
	104.	Collect all waste in bins and/or skips at the construction site.				
	105.	Prevent littering by construction staff at work sites by providing bins or waste bags in sufficient locations.				
	106.	Provide separate bins for hazardous / polluting materials and mark these clearly.				
	107.	Dispose of waste appropriately to prevent pollution of soil and groundwater.				
	108.	Do not allow any burning or burying of waste on site.				
	109.	Collect and dispose of all waste generated on site, preferably weekly but at least monthly, to prevent rodents and pests.				
110.	Ensure waste storage bins have lids and are secured to prevent falling over.					
Stormwater management	111.	Implement an effective Stormwater and Erosion Management Plan	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection of stormwater system Review Stormwater and Erosion Management Plan 	<ul style="list-style-type: none"> Evidence of stormwater contamination Compliance with Stormwater and Erosion Management Plan
	112.	Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and other contaminated waste water and fuels into the stormwater system.				
	113.	Release only clean water into the environment.				
	114.	Re-vegetate denuded areas as soon as possible.	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> As soon as the area is no longer impacted by construction 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Evidence of impacted areas not rehabilitated
	115.	Clear stormwater drains regularly.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Review maintenance schedule 	<ul style="list-style-type: none"> Maintenance schedule in place

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
Erosion management	116.	Ensure that all roads and tracks used for construction have the appropriate water diversion / erosion control structures, if necessary.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Visible surface erosion.
Dust management	117.	Avoid clearing of vegetation until absolutely necessary (i.e. just before excavations).	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual assessment of dust plumes Visual assessment of dust control measures 	<ul style="list-style-type: none"> Visibility of dust coming off construction site Dust mitigation measures in place Number of days that dust plumes are visible Number of registered complaints Size of disturbed areas
	118.	Regularly evaluate the effectiveness of all dust management measures. Amend how or which measures are used if necessary.				
	119.	Stabilise exposed surfaces as soon as is practically possible.				
	120.	Avoid excavation and handling and transport of materials which may generate dust under high wind conditions or when a visible dust plume is present.				
	121.	Limit vehicle speeds to 20 km/h on unconsolidated and non-vegetated areas.				
	122.	Cover trucks transporting loose material to or from site with tarpaulins, plastic or canvas.				
	123.	Implement strict dust control for all roads and bare (unvegetated) areas.				
	124.	Reduce dust generated by vehicles and earth moving machinery, through wetting the soil surface (with non-potable water) and erecting speed limit signage to enforce speed limits.				
	125.	Prohibit the use of non-environmentally friendly dust suppressants to avoid pollution of water sources.				
Noise management	126.	Limit noisy construction activities to day-time from Monday to Friday or in accordance with relevant municipal bylaws, if applicable.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Check Complaints Register 	<ul style="list-style-type: none"> Number of noise complaints
	127.	Control the use of radios, television sets and other such equipment used by workers to a level that does not disturb neighbouring residents/tenants.				
	128.	Notify adjacent residents or business premises before particularly noisy construction activities will take place.				
	129.	Perform as much work as possible within buildings to reduce noise in surrounding areas.				
	130.	Maintain all generators, vehicles, vessels and other equipment in good working order to minimise exhaust fumes and excess noise.				
	131.	Enclose diesel generators used for power supply on site to reduce unnecessary noise.				

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	132.	Investigate potential noise reduction measures, such as mufflers on equipment, if complaints regarding construction noise are received				
Fire management	133.	Implement the Fire Management Plan.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection Review of Incident Register Inspect attendance register for training sessions; and Inspect fire extinguishers and certificates. 	<ul style="list-style-type: none"> Compliance with Fire Management Plan No. of fire incidents Certified extinguishers in appropriate locations.
	134.	Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. the conservation area, flammable material stores any other high fire risk, or environmentally sensitive areas.				
	135.	Ensure that no smoking is permitted on the site except for within a designated area in the Site Camp (to be included in the Site Camp Method Statement). Suitable firefighting equipment must be readily available in this area.				
	136.	Ensure that sufficient fire-fighting equipment is available on site.				
	137.	Equip all fuel stores and waste storage areas with fire extinguishers.				
	138.	Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated.				
	139.	Suitably maintain firefighting equipment.				
Vehicle and equipment maintenance and refuelling	140.	Undertake regular maintenance of vehicles and machinery to identify and repair minor leaks and prevent equipment failures.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspection of vehicles, barges, machinery and refuelling/maintenance areas. 	<ul style="list-style-type: none"> Number of incidents of non-compliance. Number of leaks and spills. Cost of cleaning up spills.
		Use appropriately sized drip trays for all refuelling and/or repairs done on machinery – ensure these are strategically placed to capture any spillage of fuel, oil, etc.				
	141.	Keep spill containment and clean-up equipment at all work sites and for all polluting materials used at the site.				
	142.	Maintain good housekeeping measures for on-site storage of hydrocarbons, cement handling and use, refuelling of vehicles and machinery, and for waste and spill management.				
Protection of archaeological and paleontological resources	143.	Employ an ECO to monitor the construction activities.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Prior to land clearing at start of construction phase 	<ul style="list-style-type: none"> Check Letter of Appointment Visual inspection Monthly Environmental Compliance Report 	<ul style="list-style-type: none"> Percentage compliance with EMPr requirements ECO appointment in place

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	144.	Implement a chance find procedure for palaeontology and heritage finds	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Review chance find procedure 	<ul style="list-style-type: none"> Evidence of compliance with chance find procedure
Protection of fossils	145.	Put aside and photograph any fossils found during excavations and send pictures to a palaeontologist to assess their scientific importance.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Check records 	<ul style="list-style-type: none"> Photographic record on file Evidence of correspondence with palaeontologist on file
	146.	If deemed important, the palaeontologist must obtain a SAHRA permit and remove stromatolites to a recognised repository.	<ul style="list-style-type: none"> Proponent or Palaeontologist 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Check records 	<ul style="list-style-type: none"> Evidence of compliance with measure SAHRA permit on file
Visual aspects	147.	Limit vegetation clearance and the footprint of construction to what is absolutely essential.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Review designs Review Complaints Register Visual inspection 	<ul style="list-style-type: none"> Site camp located strategically to limit vegetation clearance No. of complaints Compliance with EMPr dust management measures Site neat and tidy. Size of area cleared relative to development footprint
	148.	Consolidate the footprint of the construction camp to a functional minimum.				
	149.	Avoid excavation, handling and transport of materials which may generate dust under very windy conditions.				
	150.	Cover stockpiled aggregates and sand to minimise dust generation.				
	151.	Implement dust suppression on access roads during dry conditions.				
	152.	Keep construction site tidy.				
Ablution facilities	153.	Provide ablution facilities (i.e. chemical toilets) for all site staff at a ratio of 1 toilet per 15 workers (absolute minimum 1:25).	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Visual inspections Records of waste disposal 	<ul style="list-style-type: none"> Number of incidents of staff not using facilities Number of pollution incidents
	154.	Secure all temporary / portable toilets to the ground to the satisfaction of the ECO to prevent them toppling due to wind or any other cause.				
	155.	Maintain toilets in a hygienic state (i.e. toilet dispensers to be provided, toilets to be cleaned and serviced regularly (at least "twice- monthly" by an appropriate waste contractor), and toilets to be emptied before long weekends and builders' holidays).				
	156.	Remove / appoint an appropriate Sub-Contractor to remove accumulations of chemicals and treated sewage from the site and dispose of at an approved waste disposal site or sewage plant.				

Construction Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators
	157.	Ensure that no spillages occur when the toilets are cleaned or emptied. Repeated incidents of spillage of chemicals and / or waste (i.e. more than one incident), will require toilets to be placed on a solid base with a sump.				
Response to environmental pollution	158.	In the event of environmental pollution, e.g. through spillages, immediately stop the activity causing the problem.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Maintain register of pollution events and response. Following resumption of activities, frequently inspect repaired equipment to ensure proper functioning. 	<ul style="list-style-type: none"> Number of incidents Time activities stopped Number of recurring incidents Availability and completeness of register
	159.	Implement A Hydrocarbon Spill Management Plan if spills occur.				
	160.	Clean up any spills immediately, through containment and removal of hydrocarbons and appropriate disposal of contaminated soils.				
	161.	Repair faulty equipment as soon as possible.				
	162.	Install additional bunding / containment structures around the equipment which may be the source of a leak / spillage, to prevent pollution from reaching the environment in future.				
	163.	Treat hydrocarbon spills, e.g. during refuelling, with adequate absorbent material, which then needs to be disposed of at a suitable landfill.				
Construction demobilisation and rehabilitation	164.	Implement the Habitat Rehabilitation Plan.	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> As soon as the area is no longer impacted by construction End of construction 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Compliance with the Habitat Rehabilitation Plan Compliance with EMPr rehabilitation requirements
	165.	Conduct site inspections to monitor the progress of rehabilitation.	<ul style="list-style-type: none"> Botanical / horticultural specialist ECO 	<ul style="list-style-type: none"> Throughout construction End of construction 	<ul style="list-style-type: none"> Visual inspection External Audit 	
	166.	Implement adaptive management to ensure vegetation rehabilitation goals are met.	<ul style="list-style-type: none"> Botanical / horticultural specialist 			
	167.	Stabilise slopes disturbed / cleared for construction with geofabric or another appropriate erosion stabilisation technique to prevent erosion, where necessary.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Once construction is complete and Throughout construction if it takes place in phases / different areas sequentially. 	<ul style="list-style-type: none"> Visual inspection of site and Keep record of rehabilitation measures. ECO Closure Report 	<ul style="list-style-type: none"> Records of waste disposal and State of areas on and surrounding the site. Compliance with rehabilitation / demobilisation measures EMPr
	168.	Remove all construction equipment, vehicles, equipment, waste and surplus materials, site office facilities, temporary fencing and other items from the site.				
	169.	Clean up and remove any spills and contaminated soil in the appropriate manner.				
	170.	Do not bury discarded materials on site or on any other land not designated for this purpose.				
	171.	Rehabilitate affected areas on the site.				

Construction Phase Measures							
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁶	Performance Indicators	
	172.	Use harvested topsoil for rehabilitation and landscaping.					
	173.	Use indigenous (preferably endemic) vegetation for landscaping and rehabilitation.					
	174.	Rip all compacted areas outside of the developed areas by means of a commercial ripper that has at least two rows of tines.	• Contractor	• As soon as the area is no longer impacted by construction and • End of construction			• Plant cover establishment success
	175.	Undertake seeding directly after a rainfall event, as far as practically possible.	• Botanical / horticultural specialist				
	176.	Undertake ripping between 1 and 3 days after seeding.					
Temporary site closure (more than 5 days)	177.	Remove equipment from active work areas.	• Contractor	• Temporary site closure	• Check equipment removed from active work areas	• Removal of equipment from active work areas	
	178.	Secure construction camps and provide 24-hour security where necessary.			• Check construction camps secured	• Secured site camp	
	179.	Make fire extinguishers accessible to security staff at construction camps.			• Check fire extinguishers available	• Fire extinguishers available to staff	
	180.	Ventilate hazardous substance stores.			• Check that hazardous substance stores are ventilated	• Hazardous substance stores are ventilated	
	181.	Display emergency procedures and contact details.			• Check that emergency procedures and contact details are displayed	• Display emergency procedures and contact details.	
	182.	Implement dust mitigation (e.g. cover stockpiles).			• Check that dust mitigation is in place	• Dust mitigation has been implemented	
	183.	Secure structures vulnerable to high winds.			• Check that structures vulnerable to high winds are secured	• Structures are secured	
	184.	Empty and secure portable toilets.			• Check the portable toilets are emptied and secured	• Receipt of portable toilet servicing.	
	185.	Empty and secure waste stores.			• Check the waste stores are emptied and secured	• empty waste bins and secured waste stores	

4 Measures Applicable to the Operational Phase

4.1 Roles and Responsibilities

The key role players during the operation phase of the project are:

- Mainstream (the proponent); and
- Site manager.

Mainstream as the proponent retains the overall responsibility of compliance with the EMPr during the operational phase. The site manager is responsible for ensuring that operational activities (e.g. maintenance) undertaken at the PV Facility is carried out in compliance with the requirements of the EMPr.

Key roles and responsibilities during the operational phase with respect to the implementation of the EMPr are outlined below.

Mainstream:

- Comply with the applicable environmental commitments, procedures, restrictions and guidance specified in the EMPr;
- Ensure that the site manager and any contractors or workers are familiar with and understand the requirements of the EMPr that are relevant to their activities;
- Ensure that the site manager regularly discuss environmental topics with staff;
- Conduct environmental inspections, monitoring and reporting, in line with the EMPr; and
- Ensure that all environmental incidents or accidents are investigated and analysed, and that measures are implemented to prevent similar events from happening in the future.

Site Manager:

- Ensure that all activities on site are undertaken in accordance with the EMPr;
- Monitor the activities on site with regard to the requirements outlined in the EMPr;
- Ensure that any employees, contractors and sub-contractors comply with the EMPr;
- Immediately notify Mainstream of any non-compliance with the EMPr, or any other issues of environmental concern; and
- Ensure that non-compliance is remedied timeously.

4.2 Compliance and Monitoring

4.2.1 Method Statements: Maintenance Activities

If a Contractor is appointed to undertake maintenance, a Method Statement may be requested from the Contractor. The Method Statement will be submitted by the Contractor to the Site Manager not

less than **14 days** prior to the intended date of commencement of maintenance. The Site Manager shall approve / reject the Method Statement within **2 days**. An activity covered by a Method Statement shall not commence until the Site Manager has approved of such method and once approved, the Contractor shall abide by the relevant Method Statement. A pro forma Method Statement is attached in Appendix A, although a suitable Method Statement format can be agreed between the Site Manager and Contractor.

4.2.2 Statutory Final Environmental Audit and Audit Report

SRK recommends that the final Statutory Environmental Audit Report be submitted to DFFE within one year of the commencement of the Operational Phase.

The Environmental Audit Report must contain all the information required in Appendix 7 of the NEMA EIA Regulations, 2014, and should be conducted by the same independent environmental auditor that undertook the Construction Phase Environmental Audits (see Section 3.2.2).

4.3 Environmental Management Measures

The environmental management and mitigation measures that must be implemented during the operational phase, as well as responsibilities and timelines for the implementation of these measures and monitoring thereof, are laid out in Table 4-1 below.

Table 4-1: Environmental mitigation measures / management actions that must be implemented during the *Operational Phase*

Operational Phase						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁷	Performance Indicators
Compliance monitoring	1.	Audit compliance with the EMPr.	<ul style="list-style-type: none"> Proponent to appoint an External Auditor 	<ul style="list-style-type: none"> As specified in the EA. 	<ul style="list-style-type: none"> External environmental compliance report 	<ul style="list-style-type: none"> Compliance with EMPr
Permits	2.	Obtain permits for the relocation of plants and animals as and if required.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Before relocation 	<ul style="list-style-type: none"> Inspection of permit 	<ul style="list-style-type: none"> Permit available
Site access and traffic management	3.	Implement the Road Maintenance Plan.	<ul style="list-style-type: none"> Site manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspections Review implementation record 	<ul style="list-style-type: none"> Internal roads in good condition
Employment and Procurement	4.	Source as many goods and services as possible from the local and regional economy (e.g. use local contractors and equipment suppliers as far as possible).	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Review employment records 	<ul style="list-style-type: none"> Percentage of local staff Percentage of goods procured locally Percentage of male vs female staff Percentage of B-BBEE procurement
	5.	Maximise use of local skills and resources through preferential employment of locals where practicable.				
	6.	Ensure diversity and gender equality in recruitment, as far as possible.				
	7.	Develop and implement a fair and transparent procurement policy.				
Skills development training	8.	Provide suitable training to service providers, where possible and practicable.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Review training records 	<ul style="list-style-type: none"> Training attendance register Proportion of workers that completed skills development training
	9.	Provide ancillary training to workers on maximising the use of income and training to further future economic prospects, potentially through projects initiated as part of the social upliftment programme.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Throughout operations 		
Socio-economic impact and benefit management	10.	Regularly engage with community stakeholders to develop meaningful strategies for community development.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Check records 	<ul style="list-style-type: none"> Community development strategy in place Vision for economic development in place Governance plan in place
	11.	Ensure that funding requirements for each project are considered into the future so that projects are viable and sustainable.				
	12.	Set clear goals for each project and phase out funding once these goals are achieved.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Check records 	<ul style="list-style-type: none"> Goals in place

⁷ Unless otherwise indicated, monitoring will be undertaken by the Proponent, supported by the authorities where the requirement is specifically stipulated in a licence or permit and periodic external compliance inspections.

Operational Phase						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁷	Performance Indicators
	13.	Ensure regular external auditing of the Community Trust as well as supported projects (if applicable).	<ul style="list-style-type: none"> Proponent to appoint External Auditor 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> External Audit of Community Trust 	<ul style="list-style-type: none"> Compliance with requirements of the Community Trust
	14.	Consider auditing projects for several years after funding has ceased to ensure their benefits are sustained.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Review Audits on file Review governance plan Check correspondence with staff and communities 	<ul style="list-style-type: none"> Audits in place after cessation of funding Governance plan on file
	15.	Define a vision for economic development in consultation with communities.				
	16.	Develop a governance plan with clear governance rules for a Community Trust, including administration and trustee and beneficiary selection (if applicable).				
	17.	Clearly communicate project duration to staff and communities.				
	18.	Prolong the operational life of the project as much as possible.				
	19.	Assist with the sustainable administration of funds throughout the project lifetime.				
Community complaints	20.	Address and respond to complaints that are made.	<ul style="list-style-type: none"> Site manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Review Complaints Register 	<ul style="list-style-type: none"> Complaints Register in place Evidence of complaints addressed and responded to
Visual aspects	21.	Plant tall vegetation (~5 m in height) along the boundary of the site upon completion of construction, to screen the site but not cast shadow across the PV array.	<ul style="list-style-type: none"> Contractor 	<ul style="list-style-type: none"> Upon completion of construction at the start of the Operational Phase 	<ul style="list-style-type: none"> Visual inspection External environmental compliance report 	<ul style="list-style-type: none"> Tall plants in place Compliance with EMP
	22.	Limit the stacking of containers to a height of 10 m.	<ul style="list-style-type: none"> Site manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> External environmental compliance report 	<ul style="list-style-type: none"> Compliance with EMP
Waste management	23.	Implement the Waste Management Plan.	<ul style="list-style-type: none"> Site manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection Check Waste Management Plan on file 	<ul style="list-style-type: none"> Compliance with Waste Management Plan
	24.	Remove waste from site at regular intervals and dispose of at an appropriately designed and licensed disposal facility able to accept the relevant waste type.	<ul style="list-style-type: none"> Site manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection of waste collection and disposal areas Visual inspection of construction areas (litter) Check waste disposal slips Inspect disposal receipts 	<ul style="list-style-type: none"> Presence of litter Availability of rubbish bins and skips Total volume of general and hazardous waste storage capacity Frequency of waste collection
	25.	Ensure that no waste (e.g. office waste) enters the surrounding environment.				
	26.	Aim to minimise waste through reducing and re-using (e.g. packaging) material.				
	27.	Collect recyclables separately and deliver these to suitable facilities or arrange for collection.				

Operational Phase						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁷	Performance Indicators
	28.	Provide separate bins for hazardous / polluting materials and mark these clearly.				
	29.	Store hazardous / polluting materials on impermeable ground until it is disposed of / collected.				
	30.	Do not allow any burning or burying of waste on site.				
Stormwater management	31.	Implement the Stormwater and Erosion Management Plan.	<ul style="list-style-type: none"> Site manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Review Stormwater and Erosion Management Plan Visually inspect stormwater runoff and drains 	<ul style="list-style-type: none"> Evidence of stormwater contamination Evidence of erosion Compliance with Stormwater and Erosion Management Plan Cleanliness of site.
	32.	Keep outside areas clean to minimise the potential of polluting stormwater.				
	33.	Release only clean water into the environment.				
	34.	Clear stormwater drains regularly.				
Housekeeping	35.	Keep the area of the PV facilities clean and tidy	<ul style="list-style-type: none"> Site manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Site is clean and tidy
Hazardous materials	36.	Prevent discharge of any pollutants, such as chemicals, other contaminated wastewater and fuels into the stormwater system.	<ul style="list-style-type: none"> Site manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection of hazardous materials handling and storage areas 	<ul style="list-style-type: none"> Number of spills of hazardous materials, including waste materials Evidence of contamination and leaks
	37.	Ensure that contaminants (including cement) are not placed directly on the ground (e.g. mix cement on plastic sheeting) to prevent runoff reaching the environment.				
	38.	Keep Material Safety Data Sheets for all hazardous materials on site and ensure that they are available for reference by staff responsible for handling and storage of materials.				
Transportation and refuelling	39.	Undertake regular maintenance of vehicles and machinery to identify and repair minor leaks and prevent equipment failures.	<ul style="list-style-type: none"> Site Manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection of vehicles 	<ul style="list-style-type: none"> Number of incidents of non-compliance Number of leaks and spills
	40.	Undertake any on-site refuelling and maintenance of vehicles/machinery in designated areas with an impermeable surface.				
Response to environmental pollution	41.	In the event of environmental pollution, e.g. through spillages, immediately stop the activity causing the problem.	<ul style="list-style-type: none"> Site Manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Maintain register of pollution events and response Following resumption of activities, frequently inspect 	<ul style="list-style-type: none"> Number of incidents Number of recurring incidents Notification of authorities
	42.	Implement a Hydrocarbon Spill Management Plan if spills occur				

Operational Phase						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁷	Performance Indicators
	43.	Clean up any spills immediately, through containment and removal of free product and appropriate disposal of contaminated soils			repaired equipment to ensure proper functioning	
	44.	Repair faulty equipment as soon as possible.				
	45.	Install additional bunding / containment structures around the equipment that was the source of the leak / spillage to prevent pollution from reaching the environment in future.				
	46.	Treat hydrocarbon spills, e.g. during refuelling, with adequate absorbent material, which then needs to be disposed of at a suitable landfill.				
Avifauna mortality	47.	Investigate electrocution incidents and implement appropriate mitigation by insulating any hardware that causes repeat electrocutions.	<ul style="list-style-type: none"> Site Manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection Review bird mortality register 	<ul style="list-style-type: none"> Bird mortality register on file Number of recorded bird mortalities
Terrestrial habitat fragmentation / degradation	48.	Prohibit staff from bringing or removing any plant species (whether indigenous or exotic) to or from the project site to prevent the spread of exotic or invasive species or the illegal collection of plants.	<ul style="list-style-type: none"> Site Manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection Review Alien Vegetation and Open Space Management Plan 	<ul style="list-style-type: none"> Compliance with Alien Vegetation and Open Space Management Plan Successful management of alien vegetation
	49.	Implement the Alien Vegetation and Open Space Management Plan.	<ul style="list-style-type: none"> Site Manager Botanist / horticulturalist 			
Alien vegetation management	50.	Implement the Alien Vegetation Management Plan (<ul style="list-style-type: none"> Site Manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection Review Alien Vegetation Management Plan 	<ul style="list-style-type: none"> Compliance with Alien Vegetation Management Plan Successful management of alien vegetation
	51.	Implement the Waste Management Plan.	<ul style="list-style-type: none"> Site manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection Check Waste Management Plan on file 	<ul style="list-style-type: none"> Compliance with Waste Management Plan
Land-based fauna displacement	52.	Minimise traffic during the night.	<ul style="list-style-type: none"> Site Manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Complaints Register 	<ul style="list-style-type: none"> No. of noise and traffic and visual complaints Prevalence of amphibian species and nocturnal mammals in the area
	53.	Minimise noise from dusk to dawn to reduce disturbances to amphibian species and nocturnal mammals.				
	54.	Obtain permits for the relocation of animals as and if required.	<ul style="list-style-type: none"> Site Manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Review permits on file 	<ul style="list-style-type: none"> Permits in file

Operational Phase						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁷	Performance Indicators
Soil conservation	55.	Compile and implement a Stormwater and Erosion Management Plan.	<ul style="list-style-type: none"> Site Manager 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspection Review of Stormwater and Erosion Management Plan 	<ul style="list-style-type: none"> Compliance with stormwater management design requirements Evidence of soil erosion
	56.	Drive only on approved access roads to avoid unnecessary compaction.			<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Evidence of compaction
	57.	Park equipment and vehicles on impermeable surfaces or utilise drip trays to prevent hydrocarbon spills and monitor daily for fluid leaks.			<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Evidence of hydrocarbon spills
	58.	Remediate hydrocarbon spills immediately.				
	59.	Report hydrocarbon spills to the appropriate authorities if significant contamination of the environment occurs.				
	60.	Implement the Habitat Rehabilitation Plan guided by the botanical specialist.				

5 Measures Applicable to the Decommissioning Phase

The objective of this section is to provide recommendations for the decommissioning of Spoonbill PV facility and the rehabilitation of the area at the end of the operational lifespan of the facility to achieve sustainable land use conditions and avoid or minimise costs and long-term liabilities to Mainstream.

Very limited information is currently available regarding the anticipated lifespan of the PV facility and the exact method of decommissioning (if the facility is decommissioned). The measures listed in Table 5-1 are based on the assumption that the PV facility and associated infrastructure will be removed at the end of operations. It is however unlikely that the facility will be decommissioned. The likely scenario is that PV equipment that reaches the end of its operational lifespan will be replaced with new equipment and the facility will continue to operate for the foreseeable future.

Details regarding the roles and responsibilities during the decommissioning phase and the desired post-decommissioning land use need to be developed closer to the time of decommissioning by Mainstream in a Decommissioning Plan. This will be done in accordance with prevailing legislation at the time, which will take precedence as and where applicable in terms of specific mitigation requirements stipulated therein.

Table 5-1: Environmental mitigation measures / management actions that must be implemented during the *Decommissioning* Phase

Decommissioning Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁸	Performance Indicators
Determine decommissioning requirements	1.	Initiate consultation with key stakeholders (e.g. landowners) before any planned decommissioning to discuss potential decommissioning options, methods and requirements.	• Proponent	• Approximately 1 year before planned decommissioning	• Monthly review of progress by Mainstream	• Completion of relevant milestones • Relevant authorisations in place
	2.	Determine other potential commercial uses for the equipment and infrastructure to be decommissioned.				
	3.	Identify and assess any potential environmental and societal risks associated with the preferred method of decommissioning.				
	4.	Address potentially significant environmental and societal risks by amending the proposed method of decommissioning to prevent any significant adverse impacts.		• Approximately 6 months before planned decommissioning		
	5.	Prepare a detailed Decommissioning Plan, laying out the: <ul style="list-style-type: none"> • Decommissioning objectives; • Decommissioning procedures; • Decommissioning authorisation requirements (if any) and timeframes associated with this; • Environmental and social implications of decommissioning; • Implementation strategy, including stakeholder engagement; • Waste management, including opportunities to reuse or recycle material. 				
Social impact / benefit management	6.	Assist with recommendations and referrals where possible.	• Proponent	• Approximately 6 months before planned decommissioning	• Review records of referrals on file	• Completion of referrals
Traffic management	7.	Inform local road authorities and road users before unusual traffic is generated, e.g. high volumes or abnormal loads.	•	•	• Document review • Review of grievances	• No grievances • No accidents • No fines • Permits obtained
	8.	Maintain access to the N12.				
	9.	Liaise with the appropriate road authorities to erect road signage on the N12 near the site access warning of possible construction vehicles.				
	10.	Stagger deliveries to and removals from the site as far as possible.				

⁸ Unless otherwise indicated, monitoring will be undertaken by the ECO.

Decommissioning Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁸	Performance Indicators
	11.	Schedule deliveries and removals outside of commuter peak hours, especially for large vehicles / abnormal loads.				
	12.	Obtain abnormal load permits if required.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Prior to delivery of abnormal load components 	<ul style="list-style-type: none"> Document review 	<ul style="list-style-type: none"> Permits in place
Avifauna displacement	13.	Demarcate access roads clearly.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> At commencement of decommissioning and throughout 	<ul style="list-style-type: none"> Visual inspection ECO Compliance Report 	<ul style="list-style-type: none"> Access roads demarcated Evidence of disturbance outside of construction footprint / in buffers No. of noise and dust complaints
	14.	Limit the area of activity to the immediate footprint of the infrastructure as far as possible.				
	15.	Minimise construction of new roads.				
	16.	Prohibit off-road driving.				
	17.	Restrict access to areas outside of the site boundary, including restricting activities in the 100m buffer around reservoirs				
	18.	Implement best practice measures to control noise and dust.				
19.	Undertake regular ECO audit / inspections to audit compliance with the EMPr					
Habitat loss / fragmentation	20.	Confine closure and rehabilitation activities to the disturbed footprint areas only.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> At commencement of decommissioning and throughout 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Size of area disturbed outside of operation phase footprint Demarcation in place
	21.	Declare all areas outside of the disturbed footprint as 'no-go' areas.				
	22.	Avoid access to previously undisturbed or already rehabilitated areas.				
	23.	Utilise indigenous vegetation for habitat rehabilitation.	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> Post decommissioning 	<ul style="list-style-type: none"> Visual inspection Review Habitat Rehabilitation Plan 	<ul style="list-style-type: none"> Compliance with Habitat Rehabilitation Plan
	24.	Reduce dust generated by vehicles and earth moving machinery through wetting the soil surface (with non-potable water) and erecting speed limit	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout decommissioning 	<ul style="list-style-type: none"> Visual inspection ECO Compliance Report Complaints Register 	<ul style="list-style-type: none"> Compliance with EMPr No. of complaints received.
	25.	Compile and implement a Habitat Rehabilitation Plan specific to the decommissioning phase.	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> Prior to the start of decommissioning 	<ul style="list-style-type: none"> Review Habitat Rehabilitation Plan 	<ul style="list-style-type: none"> Compliance with the Habitat Rehabilitation Plan

Decommissioning Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁸	Performance Indicators
Alien vegetation management	26.	Compile and implement an Alien Vegetation and Open Space Management Plan specific to the decommissioning phase. The plan must include estimated monitoring frequency post-closure and indicate when the plan no longer needs to be implemented, to be compliant with legislated requirements at the time	<ul style="list-style-type: none"> Botanical / horticultural specialist 	<ul style="list-style-type: none"> Prior to the start of decommissioning 	<ul style="list-style-type: none"> Review Alien Vegetation and Open Space Management Plan 	<ul style="list-style-type: none"> Compliance with Alien Vegetation and Open Space Management Plan
Waste management	27.	Develop a Waste Management Plan specific to the decommissioning phase, laying out: <ul style="list-style-type: none"> Expected type and amount of waste; Measures to reduce waste; Type and expected volume of recyclable waste; Recycling facilities that will collect / receive waste; Type of storage for different waste types; Waste contractors that will collect waste; and Monitoring procedures to ensure the Waste Management Plan is implemented. 	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> Before start of decommissioning 	<ul style="list-style-type: none"> Review Waste Management Plan specific to decommissioning phase 	<ul style="list-style-type: none"> Plan on file and aims to reuse and recycle waste to divert waste from landfill
	28.	Implement the Waste Management Plan specific to the decommissioning phase.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout decommissioning 	<ul style="list-style-type: none"> Visual inspection of waste collection and disposal areas Review Waste Management Plan Check waste disposal slips 	<ul style="list-style-type: none"> Presence of litter Availability of rubbish bins and skips Degree to which rubbish bins and skips are filled Total volume of general and hazardous waste stored on site Degree to which different waste is separated Frequency of waste collection
Hazardous materials	29.	Use hazardous material storage facilities, especially fuel storage, with suitable impermeable materials and a minimum bund containment capacity equal to 110% of the largest container.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout decommissioning 	<ul style="list-style-type: none"> Visual inspection of hazardous materials handling and storage areas 	<ul style="list-style-type: none"> Number of incidents of non-compliance with safety procedures concerning hazardous materials, including waste materials Number of spills of hazardous materials, including waste materials Cost of cleaning up spills
	30.	Ensure that contaminants (including cement) are not placed directly on the ground (e.g. mix cement on plastic sheeting) to prevent runoff reaching the marine environment.				
	31.	Develop (or adapt and implement) procedures for the safe transport, handling and storage of potential pollutants.				
	32.	Avoid unnecessary use and transport of hazardous substances.				

Decommissioning Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁸	Performance Indicators
	33.	Keep Material Safety Data Sheets for all hazardous materials on site and ensure that they are available for reference by staff responsible for handling and storage of materials.				<ul style="list-style-type: none"> Evidence of contamination and leaks
Vehicle and equipment maintenance and refuelling	34.	Undertake regular maintenance of vehicles and machinery to identify and repair minor leaks and prevent equipment failures.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout decommissioning 	<ul style="list-style-type: none"> Visual inspection of vehicles, barges, machinery and refuelling/maintenance areas 	<ul style="list-style-type: none"> Number of incidents of non-compliance Number of leaks and spills Cost of cleaning up spills.
	35.	Use appropriately sized drip trays for all refuelling and/or repairs done on machinery – ensure these are strategically placed to capture any spillage of fuel, oil, etc.				
	36.	Keep spill containment and clean-up equipment at all work sites and for all polluting materials used at the site.				
	37.	Maintain good housekeeping measures for on-site storage of hydrocarbons, cement handling and use, refuelling of vehicles and machinery, and for waste and spill management.				
Noise management	38.	Limit noisy activities to day-time from Monday to Saturday.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout decommissioning 	<ul style="list-style-type: none"> Check Complaints Register 	<ul style="list-style-type: none"> Number of noise complaints
	39.	Notify adjacent residents or business premises before particularly noisy activities will take place.				
	40.	If complaints regarding noise are received, investigate potential noise reduction measures (such as mufflers on equipment for example).				
Dust management	41.	Regularly evaluate the effectiveness of all dust management measures. Amend how or which measures are used if necessary.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout decommissioning 	<ul style="list-style-type: none"> Visual assessment of dust plumes Visual assessment of dust control measures 	<ul style="list-style-type: none"> Visibility of dust coming off construction site Dust mitigation measures in place Number of days that dust plumes are visible Number of registered complaints Size of disturbed areas
	42.	Stabilise exposed surfaces as soon as is practically possible.				
	43.	Limit vehicle speeds to 20 km/h on unconsolidated and non-vegetated areas.				
	44.	Implement strict dust control for all roads and bare (unvegetated) areas.				
	45.	Reduce dust generated by vehicles and earth moving machinery, through wetting the soil surface (with non-potable water) and erecting speed limit signage to enforce speed limits.				
	46.	Prohibit the use of non-environmentally friendly dust suppressants to avoid pollution of water sources.				
Response to environmental pollution	47.	In the event of environmental pollution, e.g. through spillages, immediately stop the activity causing the problem.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout decommissioning 	<ul style="list-style-type: none"> Maintain register of pollution events and response 	<ul style="list-style-type: none"> Number of incidents Time activities stopped
	48.	Implement a hydrocarbon spill management plan (see ID 20 Design Phase) if spills occur				

Decommissioning Phase Measures						
Aspect	ID	Mitigation Measure / Management Action	Responsible	Implementation Timeframe	Monitoring Methods ⁸	Performance Indicators
	49.	Clean up any spills immediately, through containment and removal of hydrocarbons and appropriate disposal of contaminated soils			<ul style="list-style-type: none"> Following resumption of activities, frequently inspect repaired equipment to ensure proper functioning 	<ul style="list-style-type: none"> Number of recurring incidents Availability and completeness of register
	50.	Repair faulty equipment as soon as possible.				
	51.	Install additional bunding / containment structures around the equipment that was the source of the leak / spillage to prevent pollution from reaching the environment in future.				
	52.	Treat hydrocarbon spills, e.g. during refuelling, with adequate absorbent material, which then needs to be disposed of at a suitable landfill.				
Rehabilitation	53.	Rehabilitate areas as required in terms of the agreement with the land owner, intended future land use, Habitat Rehabilitation Plan and the decommissioning plan.	<ul style="list-style-type: none"> Proponent 	<ul style="list-style-type: none"> After decommissioning 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Success of rehabilitation Notification on file
	54.	Notify relevant authorities and key stakeholders when decommissioning and rehabilitation are completed.			<ul style="list-style-type: none"> Review notifications sent 	
Housekeeping	55.	Keep the area being decommissioned clean and tidy	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout decommissioning 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Site is clean and tidy

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Lauren Elston
Senior Environmental Consultant

Reviewed by

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Christopher Dalgliesh
Partner

Appendix A:

Method Statement Pro Forma

METHOD STATEMENT

(Insert company logo)

TITLE:

Ref No:

DISTRIBUTION AND AUTHORISATION

Requested by:

Date requested:

Signature:

Submitted by:

Date submitted:

Signature:

Approved by RE:

Date approved:

Signature:

Approved by ECO:

Date approved:

Signature:

PROJECT DETAILS (What, How, Where, When)

Brief Description of Work to be Undertaken

Insert description of the scope of work to be undertaken - append a layout diagram if necessary

Description of Process, Methods and Materials

Provide a description of how works will be undertaken, paying special attention to the way in which environmental and social risks that have been identified will be addressed.

Environmental and Social Risks Identified

Insert possible environmental and social risks of the activity (e.g. water contamination, nuisance from dust, etc.)

Duration of Works

Indicate the anticipated duration of works, including anticipated start and completion date.

Appendix B:

Stormwater and Erosion Management Plan Pro Forma

STORMWATER AND EROSION MANAGEMENT PLAN

Doc. Ref No. [insert reference no]

OBJECTIVE

To manage stormwater in order to minimise erosion and prevent impacts to habitat quality and receiving water bodies and / or groundwater as a result of contaminated stormwater, erosion and / or sedimentation.

PROBLEM OUTLINE

Construction and operation of the proposed project can affect natural stormwater flow patterns and quality on site and in surrounding receiving waterbodies. Changes in storm water flow patterns can result in soil erosion, which damages the surrounding landform and habitat quality and also results in sedimentation of receiving water bodies. Contamination of stormwater with hydrocarbons and other chemical pollutants can also compromise the health of the receiving water bodies.

STORMWATER AND EROSION MANAGEMENT PLAN

The following management actions must be implemented:

- Compile and implement a detailed Stormwater and Erosion Management Plan taking into account this Pro-Forma Plan;
- Compile and implement the Habitat Rehabilitation Plan;
- Park equipment and vehicles on impermeable surfaces or utilise drip trays to prevent hydrocarbon spills and monitor daily for fluid leaks;
- Carry out refuelling and maintenance of vehicles on impermeable surfaces, where possible, to avoid hydrocarbon contamination of soil;
- Remediate hydrocarbon spills immediately;
- Report hydrocarbon spills to the appropriate authorities, if significant pollution to the environment occurs;
- Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and other contaminated waste water and fuels into the stormwater system;
- Release only clean water into the environment;
- Clear stormwater drains regularly.
- Ensure that all roads and tracks used for construction have the appropriate water diversion / erosion control structures, if necessary;
- Ensure suitable control of run-off during the construction phase and operation phase to prevent erosion of topsoil on adjacent land and undeveloped portions of the site;
- Re-vegetate denuded areas soon as possible;
- Ensure that all roads and tracks used for construction have the appropriate water diversion / erosion control structures, if necessary.
- Ensure that stormwater management designs incorporate water diversion, erosion control and abatement structures at outlets, if necessary;
- Minimise topsoil stripping and vegetation clearing to what is essential;
- Keep trenches to a minimum and fill as construction proceeds;
- Locate stockpile areas (including topsoil) away from drainage paths and stabilise to avoid erosion;
- Take care when washing solar panels to minimise erosion risk (runoff is often concentrated at a particular drip line); and
- Rehabilitate and repair erosion gullies as they form through regrading and revegetating;

MONITORING AND EVALUATION

The project area needs to be monitored regularly by undertaking a visual inspection of the site to check for evidence of:

- Stormwater contamination;
- Compliance with Stormwater and Erosion Management Plan;
- Evidence of impacted areas not rehabilitated; and

- Visible surface erosion.

A Maintenance Schedule should be established to ensure stormwater drains are regularly cleared.

Regular Environmental Control Officer (ECO) audits / inspections will take place to report on compliance with the Environmental Management Programme (EMPr) and Stormwater and Erosion Control Plan. An External Environmental Audit Report will be undertaken within one year of the start of the Operation Phase to report on compliance with the Environmental Management Programme (EMPr) and Stormwater and Erosion Control Plan.

The effectiveness of stormwater diversion structures must be evaluated to ensure that erosion is kept to a minimum and that sufficient capacity exists to disperse stormwater away from the site;

Update the Stormwater and Erosion Management Plan to include additional actions should these be necessary to manage stormwater and erosion on the site.

Appendix C:

Plant Rescue and Protection Plan Pro Forma

PRO-FORMA¹ PLANT RESCUE AND PROTECTION PLAN

Doc. Ref No. [insert reference no]

OBJECTIVE

To limit the loss of protected species.

PROBLEM OUTLINE

Camel Thorn trees (*Vachellia erioloba*, see Figure 1) are the only protected species recorded throughout the project area. Camel thorn trees are protected under the National Forests Act 84 of 1998 (NFA).



Figure 1 Camelthorn trees in the Stilfontein Cluster project area

Source: (The Biodiversity Company, 2022c)

During construction, Camel Thorn Trees will be cleared within the project footprint in areas where Photo Voltaic (PV) infrastructure and associated facilities are established, e.g. access roads, Battery Energy Storage System (BESS), on-site substation, administrative buildings and laydown area.

MANAGEMENT ACTIONS TO LIMIT THE LOSS OF PROTECTED SPECIES

- Obtain relocation or destruction permits before any protected trees (*Vachellia erioloba*) are relocated or destroyed;
- Appoint a botanical / horticultural specialist to compile a detailed Plant Rescue and Protection Plan (to site- specific requirements) taking into account this Pro-Forma;
- Implement the Plant Rescue and Protection Plan;
- Restrict vegetation clearance to the immediate development footprint;
- Demarcate the construction footprint with visible barriers (i.e safety tape / fencing);
- Erect signage to demarcate the construction footprint;
- Designate areas outside the development footprint as no go areas;
- Minimise vegetation clearing to the minimum required;
- Utilise existing access routes and paths, where possible;
- Limit construction of new roads as much as possible;
- Prohibit land clearing and disturbance of rocky habitats;
- Minimise the number (and size) of laydown, storage and staff facilities;
- Remove all remaining construction materials once the construction phase ends;
- Appoint an expert to compile and implement a Fire Management Plan; and
- Appoint a rehabilitation specialist to develop and implement a Habitat Rehabilitation Plan.

PLANT RESCUE AND PROTECTION PLAN

- Conduct a site walk-through of the development footprint prior to land clearing to identify, locate and record *Vachellia erioloba* (Camel Thorn) that can be successfully re-located;

¹ This is a Pro-Forma Management Plan that should be edited by the appointed botanical / horticultural specialist, once appointed, and implemented by the specialist during the pre-construction phase.

- Obtain the necessary Permits for the relocation and / or destruction of any protected Trees (Camel Thorn);
- Appoint an experienced botanical / horticultural specialist to undertake the search and rescue to remove and safely relocate the protected species that can be successfully relocated. Those species that in the opinion of the specialist cannot be successfully relocated will be destroyed.
- Photograph, tag and record protected species rescued prior to removal;
- Store species in a temporary nursery if not immediately replanted; and
- Monitor relocated protected species and implement further rehabilitation action, if required.

Appendix D:

Fire Management Plan Pro Forma

PRO-FORMA¹ FIRE MANAGEMENT PLAN

Doc. Ref No. [insert reference no]

OBJECTIVE

To reduce the risk of fires occurring on or close to the site and should a fire occur to respond appropriately to avoid injury and / or damage to infrastructure.

PROBLEM OUTLINE

The Grassland Biome, in which the project is located, is a high fire risk biome. Fire plays an important role in the shaping of vegetation communities. However, fires could cause injury to employees and / or damage to infrastructure or the environment if not managed.

MANAGEMENT ACTIONS TO AVOID RISKS ASSOCIATED WITH FIRE

- Ensure that no fires are permitted on or adjacent to site except in areas designated for this purpose. Any such designated areas should be situated as far as possible from vegetated areas, e.g. the conservation area, flammable material stores any other high fire risk, or environmentally sensitive areas;
- Ensure that no smoking is permitted on the site except for within a designated area in the Site Camp (to be included in the Site Camp Method Statement). Suitable firefighting equipment must be readily available in this area;
- Ensure that sufficient fire-fighting equipment is available on site;
- Equip all fuel stores and waste storage areas with fire extinguishers;
- Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated;
- Suitably maintain firefighting equipment;
- Ensure that emergency procedures in relation to fire are established prior to commencing construction;
- Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site.
- Secure the Site Camp, particularly to restrict access unauthorized to fuels and any other hazardous substances;
- Store all construction material and equipment in locked containers within the Site Camp. Employ 24 hour security for the Site Camp; and
- Provide suitable emergency and safety signage on site.

MANAGEMENT ACTIONS IN RESPONSE TO A FIRE OCCURRING

The following action plan is recommended in the event of a fire on site:

- Assess risk;
- Assess safety of persons and environment;
- Attempt to extinguish fire using appropriate equipment, if safe to do so;
- Contain fire if not safe to extinguish fire;
- Inform Site Manager, and other relevant parties (including authorities) of fire incident;
- Inform management and employees of fire risk; and
- Record fire incident on database.

¹ This is a Pro-Forma Management Plan that should be edited by the appointed fire expert, once appointed, and implemented by South Africa Mainstream Renewable Power Developments (Pty) Ltd during the relevant phase of the project (construction, operation or decommissioning phase).

Appendix E:

Habitat Rehabilitation Plan Pro Forma

PRO-FORMA¹ HABITAT REHABILITATION PLAN

Doc. Ref No. [insert reference no]

OBJECTIVE

To rehabilitate disturbed and degraded areas and areas impacted by the construction of the PV facilities to their natural state.

PROBLEM OUTLINE

Areas disturbed during the construction phase are particularly vulnerable to alien invasion as a result of lack of indigenous plant cover to resist invasion, promoting the establishment of alien vegetation. The spread of alien invasive plants can result in the replacement of indigenous plant species, resulting in a reduction in species diversity and ecosystem health and function. Barren area devoid of vegetation will result in erosion by wind and rain and a reduction in plant cover may result in the loss or displacement of fauna. It is therefore necessary to rehabilitate disturbed and degraded areas as soon as they are no longer impacted by construction and to limit the size of construction footprint.

For the purposes of this management plan, habitat rehabilitation is split into four phases:

- Soil conservation and topsoil management;
- Re-vegetation;
- Alien vegetation removal; and
- Monitoring and evaluation.

These are described in more detail in the sections below.

SOIL CONSERVATION AND TOPSOIL MANAGEMENT

Topsoil removed during construction must be stockpiled in designated and demarcated areas to be reused during rehabilitation and landscaping. Cleared areas should be rehabilitated as soon as practically possible when sections of work have been completed to limit topsoil storage time. Topsoil must be spread evenly over the cleared areas and stabilised prior to revegetation. Surplus topsoil can be spread on barren or disturbed areas devoid of vegetation. The following management actions must be implemented:

- Compile and implement the Stormwater and Erosion Management Plan;
- Drive only on approved access roads to avoid unnecessary compaction;
- Park equipment and vehicles on impermeable surfaces or utilise drip trays to prevent hydrocarbon spills and monitor daily for fluid leaks;
- Implement the Alien Vegetation and Open Space Management;
- Store and maintain topsoil as per best practise in order to utilise it for rehabilitation of eroded areas;
- Remediate hydrocarbon spills immediately;
- Report hydrocarbon spills to the appropriate authorities, if significant pollution to the environment occurs;
- Clear vegetation only once construction is imminent, to reduce cleared areas and minimise erosion risk;
- Limit construction and lay down areas to areas within the development footprint;
- Designate and demarcate areas to be used for topsoil stockpiling;
- Remove topsoil (up to a maximum of 30 cm depth);
- Stockpile topsoil prior to the commencement of construction activities (stockpile no higher than 2m) and conserve topsoil for landscaping and rehabilitation;
- Locate topsoil stockpiles in an area protected from the wind, and agreed to with the ECO.
- Ensure suitable control of run-off during the construction phase to prevent erosion of topsoil on adjacent land and undeveloped portions of the site; and

¹ This is a Pro-Forma Management Plan that should be edited by the appointed botanical / horticultural specialist, once appointed, and implemented by the specialist during the relevant phase of the project (construction, operation or decommissioning phase).

- Replace harvested topsoil in areas that are to be rehabilitated as soon as sections of the works are completed (i.e. not only following the completion of all works)

REVEGETATION

Indigenous vegetation must be re-established on site in all areas impacted by the construction of the PV facilities (laydown areas, access roads etc). Seeds and or cuttings could be harvested from indigenous plants in the surrounding environment and indigenous vegetation cleared could be rescued for use during the rehabilitation phase. The following management actions must be implemented:

- Appoint a botanical / horticultural specialist to compile a detailed Plant Rescue and Protection Plan (to site- specific requirements);
- Implement the Plant Rescue and Protection Plan;
- Appoint a rehabilitation specialist to develop and implement a detailed Habitat Rehabilitation Plan taking into account this Pro Forma Plan.

ALIEN VEGETATION MANAGEMENT

- As per the approved Alien Vegetation and Open Space Management Plan.

MONITORING AND EVALUATION

Once rehabilitated, areas need to be demarcated and / or fenced to prevent trampling and erosion, thereby allowing natural vegetation recovery. The areas need to be monitored regularly to remove emerging invasive alien vegetation. Photographic records must be kept of the following:

- Areas to be cleared of vegetation during the initial clearing and regularly during the clearing process;
- Before and after any follow up clearing (e.g. during invasive alien vegetation follow up clearing); and
- During the rehabilitation process.

The Habitat Rehabilitation Management Plan should be reviewed and updated to ensure that the processes captured are accurate and effective.

MANAGEMENT ACTIONS TO PREVENT UNNECESSARY DEGRADATION AND LOSS OF HABITAT AND PROTECTED SPECIES

- Plan and make adequate financial provision for rehabilitation and restoration activities and clearly allocate timing and responsibility for environmental rehabilitation;
- Limit construction of new roads as much as possible;
- Minimise the number (and size) of laydown, storage and staff facilities;
- Remove all remaining construction materials once the construction phase ends;
- Store topsoil stockpiles on flat ground and use bunds and/or other stabilisation methods (e.g., netting) to avoid erosion;
- Implement the Fire Management Plan;
- Implement the Alien Vegetation and Open Space Management Plan;
- Implement the Habitat Rehabilitation Plan;
- Rehabilitate areas as soon as they are no longer impacted by construction;
- Utilise indigenous vegetation only for habitat rehabilitation;
- Return topsoil as soon as possible; and
- Apply surplus topsoil / rehabilitation material to other areas in need of stabilisation and vegetation cover.

Appendix F:

Alien Vegetation and Open Space Management Plan

PRO-FORMA¹ ALIEN VEGETATION AND OPEN SPACE MANAGEMENT PLAN

Doc. Ref No. [insert reference no]

OBJECTIVE

To control alien invasive plant species dispersal and encroachment into open spaces.

PROBLEM OUTLINE

The mismanagement and spread of alien invasive plants can result in the replacement of indigenous species, resulting in a reduction in species diversity and ecosystem health and function. Furthermore, the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM:BA) requires the control of invasive species based on predetermined categories.

The Alien and Invasive Species Regulations (2014) published under the NEM:BA provides a list of invasive species in South Africa. No less than the following five Category 1b invasive plant species are located on the project site and require control:

- *Cirsium vulgare*;
- *Opuntia ficus-indica*;
- *Eucalyptus camaldulensis*;
- *Datura ferox*; and
- *Verbena bonariensis*.

Areas disturbed during the construction phase are particularly vulnerable to alien invasion as a result of lack of indigenous plant cover to resist invasion, promoting the establishment of alien vegetation.

CLEARING METHODS

Clearing techniques used are dependent on the species targeted. There are three broad types of alien invasive species management techniques: mechanical, chemical or biological control. Mechanical control involves the physical removal of plants and includes hand-pulling, uprooting, and felling. Chemical control uses herbicides targeted to specific plant species and biological control makes use of a species' natural enemies to reduce its competitive advantage and thereby control its populations. The preferred control methods for the identified Category 1b plant species found at the project site are:

- *Cirsium vulgare* – mechanical control;
- *Opuntia ficus-indica* – biological control or chemical control;
- *Eucalyptus camaldulensis* – mechanical control (ring-barking);
- *Datura ferox* – chemical control; and
- *Verbena bonariensis* – chemical control.

Areas targeted for invasive species clearing include those areas where plant species stands are abundant and where natural areas have been transformed by invasive plant species. Frequency of invasive plant species control is dependent on the species targeted and the type of initial control method applied. The most successful invasive alien vegetation control is often those where a combination of two types of control measures (e.g. mechanical and chemical treatment) are implemented.

The preferred clearing method for most alien species can be obtained from the Department of Water and Sanitation (DWS) website: <https://www.dws.gov.za/wfw/control/>

USE OF HERBICIDES

Although manual clearing of alien species is preferable, it may be ineffective for many woody and weedy species. The following should be implemented, if practically possible:

¹ This is a Pro-Forma Management Plan that should be edited by the appointed botanical / horticultural specialist, once appointed, and implemented by the specialist during the relevant phase of the project (construction, operation or decommissioning phase).

- Minimise the contamination area as far as practically possible, through the careful and accurate application of herbicide. Consider using coarse droplet nozzles;
- Utilise products that targets specific alien species, where possible to avoid damage and disturbance to indigenous vegetation;
- Prevent contamination of waterbodies during the application of the herbicide; and
- Implement appropriate health and safety procedures during the herbicide storage, handling and disposal.

MANAGEMENT ACTIONS TO AVOID OR LIMIT ALIEN INVASION

- Appoint a botanical / horticultural specialist to compile and implement a detailed Alien Vegetation and Open Space Management Plan. The plan must identify areas for action (if any) and prescribe the necessary removal methods and frequencies to be applied. This plan must be also prescribe a monitoring plan and be updated as/when new data is collated;
- Restrict vegetation clearance to the immediate development footprint;
- Designate areas outside the development footprint as no-go areas;
- Clear vegetation by hand cutting to avoid heavy machinery, as far as practically possible;
- Ensure that no vegetation is removed or disturbed outside the delineated construction site boundary;
- Control access to the project area;
- Control alien vegetation regrowth throughout the site by clearing alien vegetation on a regular basis; and
- Implement the Habitat Rehabilitation Plan to avoid disturbed areas during construction (open spaces) being encroached with alien invasive vegetation.

ALIEN VEGETATION MONITORING PLAN

The botanical / horticultural specialist, once appointed, must compiled an Alien Vegetation Monitoring Plan. The plans should be based on infestation size, cost to control, and available manpower and should be specific to the species targeted. The aim of the monitoring and action plan will be to ensure that the invasive species are contained and controlled.

Photographic records (with photographs taken annually of the same area) of cleared areas can be used to monitor plant growth and species spread and inform the appropriate action plan for their control.

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