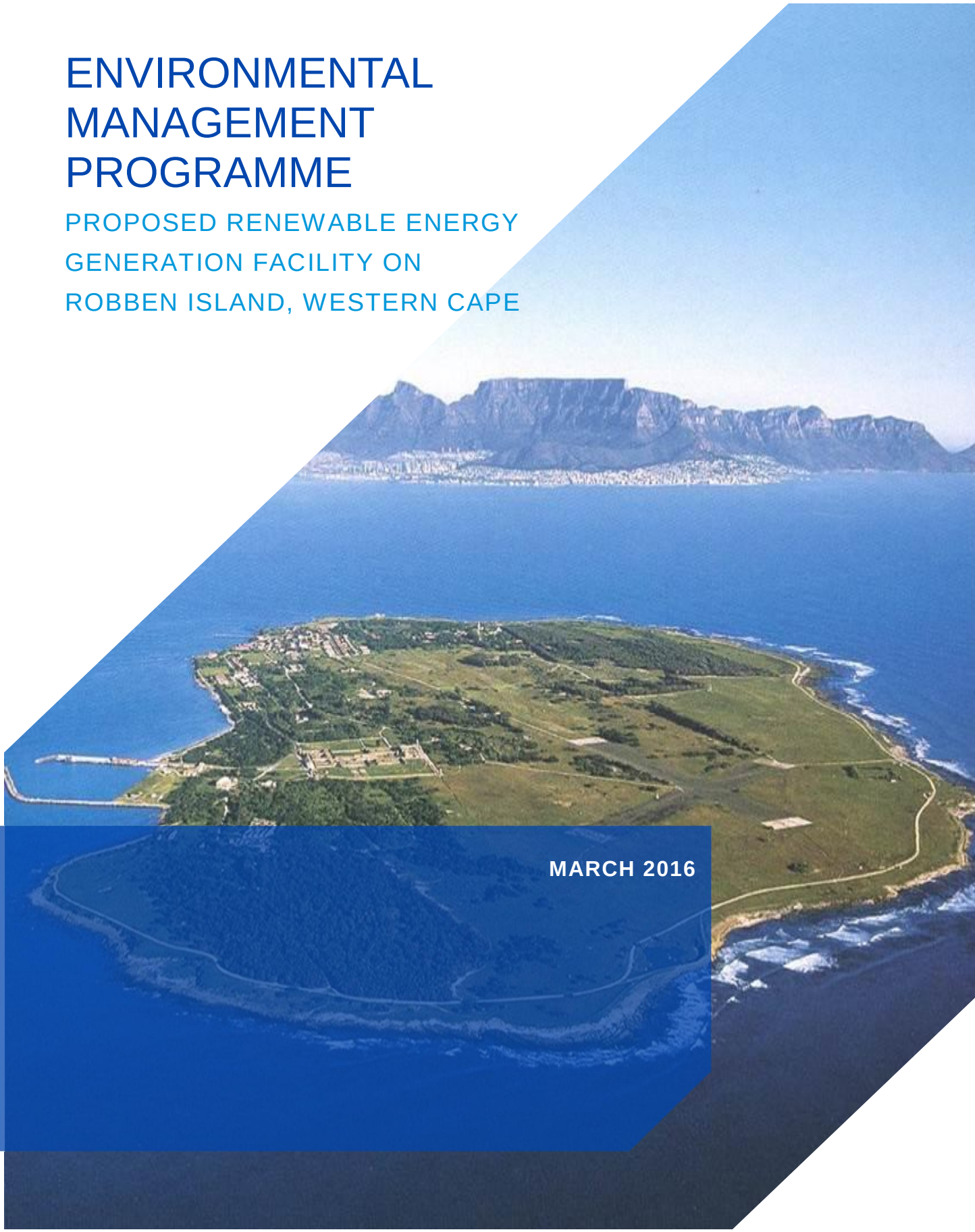
ENVIRONMENTAL MANAGEMENT PROGRAMME

PROPOSED RENEWABLE ENERGY GENERATION FACILITY ON ROBBEN ISLAND, WESTERN CAPE



MARCH 2016

WSP | PARSONS BRINCKERHOFF

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PROPOSED RENEWABLE ENERGY GENERATION FACILITY ON ROBBEN ISLAND, WESTERN CAPE.

Robben Island Museum

Project no: 47539
Date: March 2016

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Signature				
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PRODUCTION TEAM

CLIENT

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Department of Tourism	Bernard Meyer

WSP | PARSONS BRINCKERHOFF

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Project Manager	Jacqui Fincham
Engineering Manager	Andrew Galbraith

SUBCONSULTANTS

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Visual Specialist	Belinda Gebhardt
Ecological Specialist	Simon Todd Consulting
Avifaunal Specialist	Arcus Consultancy Services

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

The National Department of Tourism is currently rolling out a national project which entails the installation of land mounted renewable energy generation facilities at a number of important and iconic South African Tourist Destinations. Robben Island has been identified as one of the sites on which a renewable energy generation facility could be constructed.

WSP| Parsons Brinckerhoff, Environment & Energy, Africa (WSP|PB) was appointed to undertake the Basic Assessment Process in support of the Environmental Authorisation (EA) application required in order to construct and operate a Photovoltaic Facility on Robben Island.

1.2 PROJECT DESCRIPTION

Robben Island Museum (RIM), in partnership with the Department of Tourism, are proposing to install land mounted Photovoltaic (PV) Technology on Robben Island to improve its sustainability efforts and reduce power generation costs on the Island. Currently, RIM spends approximately R 11 million on diesel a year and it is anticipated that the installation of a PV facility will greatly reduce this cost.

The Island has its own power supply system which provides the island with its electricity needs. This is achieved by five 275 kilowatt generators that are driven on diesel. Almost half of the power used is consumed by the desalination plant, which is located within the village precinct to the southeast of the Island. The generation of electricity is critical to the development of Robben Island and therefore the Integrated Conservation Management Plan (ICMP) (2013-2018) for Robben Island has identified the need to increase the Island's electricity efficiency. The desalination plant currently produces up to 500 000litres of potable water per day.

It is proposed that the energy generated through the operation of the PV facility is used to power the desalination plant. The PV facility will have the generation capacity of approximately 500kW.

RIM is a public entity responsible for managing, maintaining, presenting, developing and marketing Robben Island as a national estate and World Heritage Site. It was established by the Department of Arts and Culture in 1997.

Initially, two feasible sites were identified as potential site alternatives (**Figures 1 and 2**) for the location of the proposed PV facility and assessed as part of the Basic Assessment Process. The two sites are as follows:

Site Alternative 1 (preferred option): The old cricket ground which is located within the village precinct on the south-eastern boundary of the island. The cricket ground refers to the site of a previously formal, now degraded, open space with a cricket ground relatively recently topped by a cricket mat on the ground. The earliest history of the site indicates that it was a marginal space the Convict Station and the Male Leaper Wards (demolished in the 1930s) and was possibly the southern end of the site of part of the Male Leaper settlement. It is a formal structured open space in the system of places and spaces that during the prison period were occupied by the warders, and now occupied by ex-prisoners and Robben Island Employees.

Site Alternative 2: The agricultural site, or landbou, is located off the coastline and towards the middle of the island, directly between the old agricultural buildings (specifically the piggery), the Lime Quarry and the area of 'bush' located east of the agricultural buildings and marked as planned planting to be considered for conservation in Le Grange (2001). It is contained in a

natural dip in topography between these features. In the 1960s prisoners worked at the site, initially as a form of punishment but later it was seen more as 'social rehabilitation'.

During the assessment phase of the project, site alternative 2 was eliminated as a potential site as the Heritage Impact Assessment has identified the significant cultural and heritage value associated with the site and therefore should not be disturbed or altered in any way. In addition, the Fauna and Flora Impact Assessment noted that site alternative 2 had a greater ecological value and would have more significant irreversible impacts should it be selected. As a result site alternative 2 was rejected as a feasible site and Site Alternative 1 has been progressed as the preferred site. A summary of the full site alternative assessment is included within the Alternative Site Selection Assessment Report attached as **Appendix J1** of the BAR.

The proposed PV facility will have a footprint of approximately 1 ha (including associated infrastructure). Currently, the desalination plant is powered by means of an 11 kV powerline originating from the Islands power plant, and will continue to run through this. The electricity generated through the PV facility will run to an existing power plant and then be converted and fed to the desalination plant. All cables (electrical and fibre optic) associated with the project will be installed underground within existing roads.

The PV cells will be fixed tilt polycrystalline PV modules mounted onto aluminium or steel galvanised frames with pile driven, screw driven or concrete foundations. The maximum tilt height of the panels will be 1.9m and have a life span of approximately 20 years. It is envisaged that the PV structures and associated infrastructure will co-exist with wildlife where possible, having species grazing or browsing around and under them. However, it is likely that should penguins be allowed access, they will utilise these structures for burrowing under as they will provide a shade source. The ongoing operational cleaning requirements and maintenance requirements may present a significant disturbance to the penguins and therefore a perimeter fence is being proposed for the facility. This fence will not need to exceed 0.8m in height but is will need to be burrow proof. The opportunity exists to provide a designated area for a research project to initially test the compatibility of the breeding penguins with an operating PV facility.

Following consultation with Earthwatch, UCT and SANCCOB, it was raised that the proposed PV facility provides an exciting opportunity for a penguin initiative, where a new penguin colony could potentially be established within an area that will be cordoned off with access being provided within the perimeter fence facing the coast. This would have great conservation value in that it would provide a control test environment from which to monitor the penguin's movements and behaviour. The proposed 'Penguin Initiative Project' has been described in further detail within **Appendix J2** of the BAR.

The Penguin Initiative Project proposal would be to offer up a defined section of the PV facility to the penguins and keep the remainder of the facility securely fenced. The maintenance and operation of this 'penguin colony' section will be managed under a strict programme of regular and controlled access for cleaning and maintenance. No ad hoc access to this section will be permitted unless deemed absolutely necessary, limiting the disturbance to the penguins. The remainder of the facility can then be cleaned on a standing roster with flexibility being available to clean on an ad hoc basis when deemed necessary e.g. high wind conditions that may have resulted in significant sea spray onto panels or seasonal bird breeding periods when higher frequency of bird dropping are experienced.

There are currently too many unknowns at this stage of the project such a) the feasibility of placing artificial nests under the PV panels; b) how such an initiative would be financed, manged and monitored; c) whether the design of the structures would provide suitable shade/conditions to attract the penguins; d) the frequency and intensity of operational activities (including cleaning), and the exact methods/activities that would be conducted, and therefore the level of potential disturbance to either breeding or moulting birds. The initiative will therefore be taken forward and picked up in the final design and pre-construction phase of the project through consultation with the DEA, Earthwatch, UCT and SANCCOB.

Due to the World Heritage Status of the Island and the Ecological and Avifaunal sensitivities, the following specialist input has been provided in support of the Basic Assessment Process:

- Heritage Impact Assessment
- Visual Impact Assessment
- Fauna and Flora Impact Assessment
- Avifaunal Impact Assessment

The full reports are attached to the BAR in **Appendix D**.

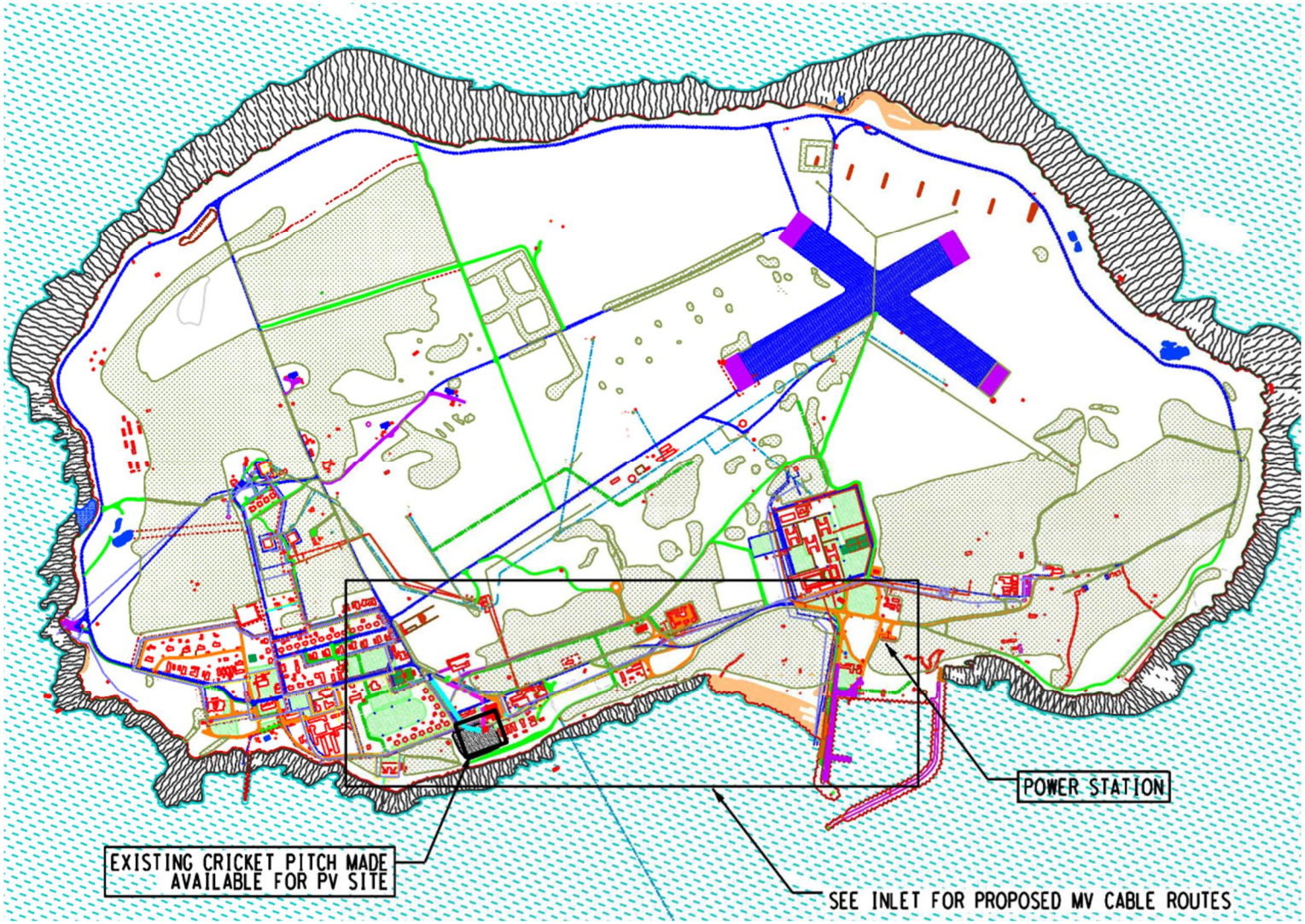

Figure 1-1: The location of the Cricket Ground on Robben Island

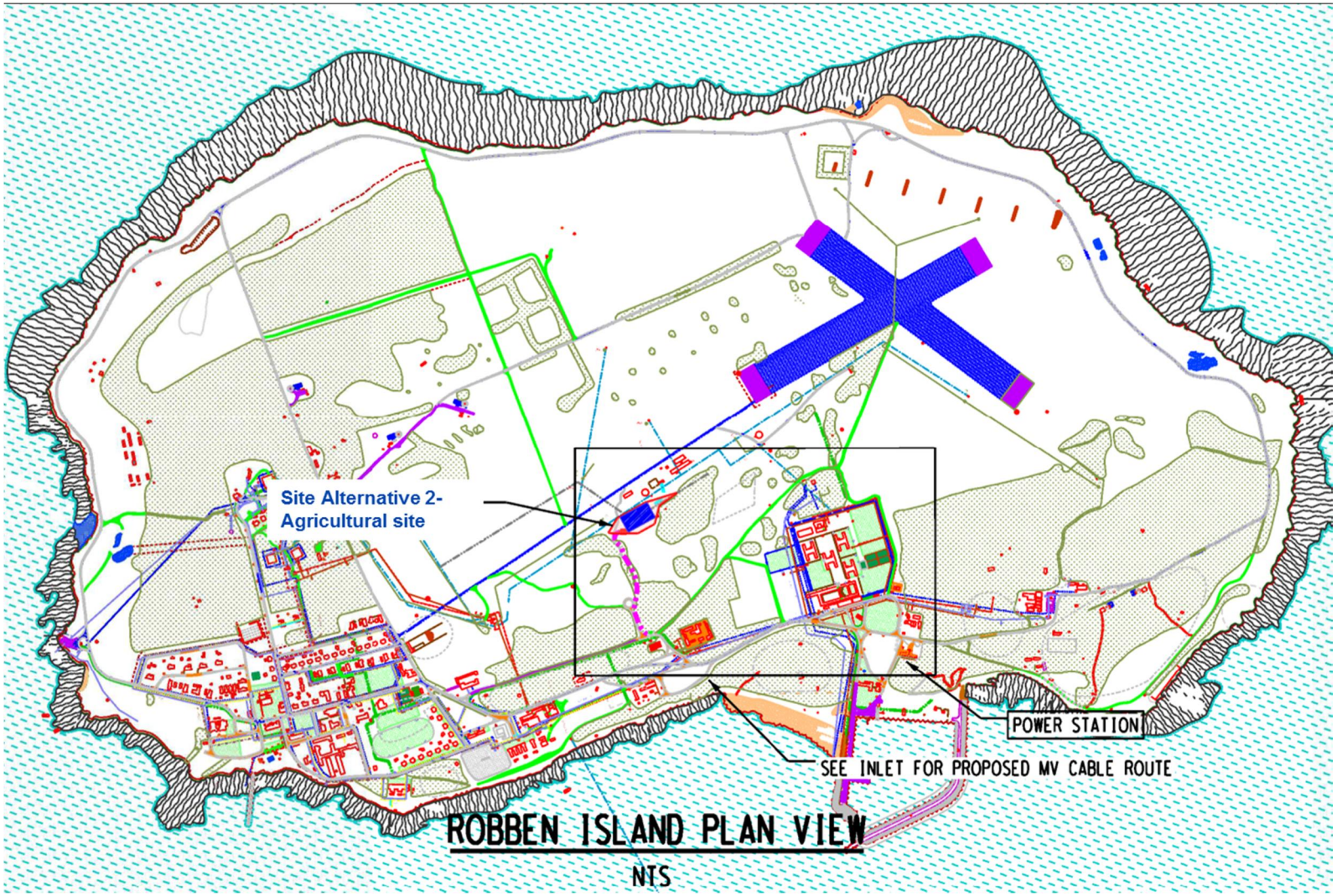

Figure 1-2: The location of the Agricultural Site on Robben Island

1.3 AIM OF THIS DOCUMENT

This EMPr outlines measures to be implemented in order to minimise adverse environmental degradation and enhance positive impacts associated with construction and operation of the proposed PV Facility. It serves as a guide for the contractor and the workforce on their roles and responsibilities concerning environmental management on site, and it provides a framework for environmental monitoring throughout the construction and operational period. The purpose of the EMPr is to:

- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
  - Minimise disturbance of the natural environment;
  - Prevent pollution of land, air and water;
  - Protect the cultural and historical value of the Island;
  - Protect indigenous flora and fauna;
  - Prevent soil erosion and facilitate re-vegetation;
  - Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
  - Adopt the best practicable means available to prevent or minimise adverse environmental impacts;
  - Identify and mitigate against any potential impact on ecology;
  - Describe all monitoring procedures required to identify impacts on the environment; and
  - Train employees and contractors with regard to environmental obligations.

2 LEGAL FRAMEWORK

An application form has been submitted in terms of the NEMA and the EIA Regulations 2014 (GN.R. 983 and 985) to the Department of Environmental Affairs (DEA).

Table 2-1: Activities triggered by the proposed PV Facility under GN.R. 983

GN.R. 983- LISTING NOTICE 1	APPLICABILITY
1) The development of facilities or infrastructure for the generation of electricity from a renewable resource where- *(i) the electricity output is more than 10 megawatts but less than 20 megawatts; or* *(ii)* ***the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare;*** *Excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.*	The proposed Photovoltaic (PV) Facility will not have an electricity output exceeding 20 megawatts, however, it may cover an area of 1 hectare or more. This activity is therefore triggered by the proposed development.

GN.R. 983- LISTING NOTICE 1	APPLICABILITY
(12) The development of- *(i) canals exceeding 100 square metres in size;* *(ii) channels exceeding 100 square metres in size;* *(iii) bridges exceeding 100 square metres in size;* *(iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size;* *(v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size;* *(vi) bulk storm water outlet structures exceeding 100 square metres in size;* *(vii) marinas exceeding 100 square metres in size;* *(viii) jetties exceeding 100 square metres in size;* *(ix) slipways exceeding 100 square metres in size;* *(x) buildings exceeding 100 square metres in size;* *(xi) boardwalks exceeding 100 square metres in size; or* *(xii)* ***infrastructure or structures with a physical footprint of 100 square metres or more****;* *where such development occurs-* *(a) within a watercourse;* *(b) in front of a* ***development setback****; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; -* *excluding-* *(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;* *(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;* *(dd) where such development occurs within an urban area; or* *(ee) where such development occurs within existing roads or road reserves.*	There is no defined development set-back line on Robben Island and therefore this activity is triggered by the proposed development.
(15) The development of structures in the ***coastal public property*** *where the development footprint is bigger than 50 square metres, excluding –* *(i) the development of structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *(ii) the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;* *(iii) the development of temporary structures within the beach zone where such structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared; or* *(iv) activities listed in activity 14 in Listing Notice 2 of 2014, in which case that activity applies.*	Coastal Public Property as stated in section 7 (1) (c) and 7 (1) (d) of the Integrated Coastal Management Act (No. 24 of 2008) (ICM Act): *"7.Composition of coastal public property-* *1) Coastal public property consists of-* *a. coastal waters;* *b. land submerged by coastal waters, including-* *(i) land flooded by coastal waters which subsequently becomes part of the bed of coastal waters; and* *(ii) the substrata beneath such land;* *(iii) any natural island within coastal waters;* *(iv) the seashore, including-* *(i) the seashore of a natural or reclaimed island; and* *(ii) the seashore of reclaimed*

GN.R. 983- LISTING NOTICE 1	APPLICABILITY
	land;" Based on the definition, Robben Island does form part of Coastal Public Property and therefore this activity is triggered as a result of the proposed development.
(17) Development- *(i) in the sea;* *(ii) in an estuary;* *(iii) within the littoral active zone;* *(iv) in front of a development setback; or* *(v)* ***if no development setback exists, within a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever is the greater****;* *in respect of-* *(a) fixed or floating jetties and slipways;* *(b) tidal pools;* *(c) embankments;* *(d) rock revetments or stabilising structures including stabilising walls;* *(e) buildings of 50 square metres or more; or* *(f)* ***infrastructure with a development footprint of 50 square metres or more*** *-* *but excluding-* *(aa) the development of infrastructure and structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *(bb) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;* *(cc) the development of temporary infrastructure or structures where such structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared; or* *(dd) where such development occurs within an* ***urban area****.*	Site Alternative 1, the cricket ground, is located within 100m of the high water mark and therefore this activity is triggered by the proposed development.
(19) The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- *(i) a watercourse;* *(ii) the seashore; or* *(iii) the littoral active zone, an estuary or a distance of* ***100 metres inland of the high-water mark*** *of the sea or an estuary, whichever distance is the greater-* *but excluding where such infilling, depositing , dredging, excavation, removal or moving-* *(a) will* ***occur behind a development setback****;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.*	There is no defined development setback line on Robben Island and therefore this activity is triggered by the proposed development.

Table 2-2: Activities triggered by the proposed PV facility in terms of GN.R. 985

GN.R. 985- Listing Notice 3	Applicability
(12) The **clearance of an area of 300 square metres** or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **In Eastern Cape, Free State, Gauteng, Limpopo, North West and Western Cape provinces:** ii) Within critical biodiversity areas identified in bioregional plans; iii) Within the littoral active zone or **100 metres inland from high water mar**k of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or ...	Site Alternative 1, the Cricket Ground site is within 100m of the high water mark, although it is not covered by indigenous vegetation.
(14) The development of- (i) canals exceeding 10 square metres in size ; (ii) channels exceeding 10 square metres in size; (iii) bridges exceeding 10 square metres in size; (iv) dams, where the dam, including infrastructure and water surface area exceeds 10 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size; (vi) bulk storm water outlet structures exceeding 10 square metres in size; (vii) marinas exceeding 10 square metres in size; (viii) jetties exceeding 10 square metres in size; (ix) slipways exceeding 10 square metres in size; (x) buildings exceeding 10 square metres in size; (xi) boardwalks exceeding 10 square metres in size; or (xii) **infrastructure or structures with a physical footprint of 10 square metres or more;** where such development occurs- (a) within a watercourse; (b) in front of a **development setback**; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. In Western Cape: i. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) **World Heritage Sites**; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas listed in terms of an International Convention;	There is no defined development setback line on Robben Island and therefore this activity is triggered by the proposed development. In addition, Robben Island is a World Heritage Site.

GN.R. 985- Listing Notice 3	Applicability
(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; or (hh) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined.	

This EMPr has been drafted to be in line with the 2014 EIA Regulations Appendix 4, which outlines the information which must be included within an EMPr.

REQUIREMENT	SECTION
EMPr requirements as per Appendix 4 of the NEMA EIA Regulations 2014	
a) Details of the EAP who prepared the report.	Section 4
b) The expertise of that EAP (including the Curriculum Vitae).	Section 4 and **Appendix H** of the BAR.
c) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 1
d) A map at an appropriate scale which superimposes the proposed activity, its associated structures and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Section 1, **Appendix C** of this document and **Appendix C** of the BAR
e) A description of the management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including- (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant operation activities.	Section 3
f) A description and identification of impact management outcomes required for the aspects outlined above.	Section 6
g) A description of the proposed impact management actions, identifying the manner in which the impact management objectives and outcomes are contemplated in e) and f) above will be achieved, and must, where applicable, include actions to- (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards	Section 6

REQUIREMENT	SECTION
or practices; (iii) Comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) Comply with any financial provisions for rehabilitation, where applicable.	
h) The method of monitoring the implementation impact of the impact management actions contemplated in g).	Section 6
i) The frequency of monitoring the implementation of the impact management actions contemplated in g).	Section 5.5
j) An indication of the persons who will be responsible for the implementation of the impact management actions.	Section 5.1
k) The time period within which the impact management actions contemplated in paragraph g) must be implemented.	Section 6
l) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph g).	Section 6
m) A program for reporting compliance, taking into account the requirements as prescribed by the regulations.	Section 5.5
n) An environmental awareness plan describing the manner in which- (i) The applicant attends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	Section 5.3
o) Any specific information that maybe required by the competent authority.	N/A

3 KEY IMPACTS IDENTIFIED

The potential impacts associated with the proposed project were identified and assessed in the Basic Assessment Report for Site Alternative 1, the cricket ground, are detailed in **Table 3-1** below.

Table 3-1: Summary of the impacts identified and assessed during the Basic Assessment process

ASPECT	IMPACT	SIGNIFICANCE	
		Pre-Mitigation	Post Mitigation
Construction Phase			
Direct Impacts			
Ground and Surface Water	Potential risk of ground and surface water during construction	Very Low (-ve)	No Change

ASPECT	IMPACT	SIGNIFICANCE	
Fauna and Flora	Loss of sensitive Vegetation	No Change	No Change
	Disturbance and habitat loss for fauna	No Change	No Change
	Increased wind erosion and consequent degradation to the affected areas	No Change	No Change
Socio-economic	Temporary job creation during the construction phase	Low (+ve)	N/A
Cultural/Heritage	Impact on OUV criterion (iii) the buildings of Robben Island bear eloquent witness to its sombre.	Low (-ve)	Very Low (-ve)
	Impact on OUV criterion (vi) Robben Island and its prison buildings symbolize the triumph of human spirit, freedom and of democracy	Low (-ve)	Very Low (-ve)
	Visual Intrusions	Very Low (-ve)	Very Low (-ve)
	Change in character of the site	Very Low (-ve)	N/A
	Vulnerability to further loss of historical meaning	Very Low (-ve)	N/A
	Potential for new information that contributes to layered understandings of the site and Island through the discovery of building foundations and artefacts.	Medium (+ve)	N/A
Noise	Increase in ambient noise as a result of construction activities.	Very Low (-ve)	Very Low (-ve)
Visual	The potential for visual disturbance as a result of the construction activities	Very Low (-ve)	Very Low (-ve)
Traffic	Increase in vehicular movement on the Island	Very Low (-ve)	Very Low (-ve)
Air Quality	Decrease in ambient air quality as a result of construction activities	Very Low (-ve)	No Change
Avifaunal	Habitat destruction	Very Low (-ve)	No Change
	Disturbance of certain sensitive species	Medium (-ve)	Low (-ve)
	Pollution of habitats	Very Low (-ve)	No Change
Waste	Construction generated waste and minor domestic waste produced onsite.	Very Low (-ve)	No Change
Indirect Impacts			
N/A			

ASPECT	IMPACT	SIGNIFICANCE	
Cumulative Impacts			
N/A			
Operational Phase			
Direct Impacts			
Fauna and Flora	The disturbance of fauna and flora as a result of operational activities	Very Low (-ve)	Very Low (-ve)
Cultural/Heritage	Improvement in the economic and environmental circumstances and sustainability of the Island and WHS	Low (+ve)	N/A
	Potential for restoring historic meaning and conservation through use	Low (+ve)	N/A
	Change in character of the site	Low (-ve)	N/A
Noise	Potential noise impacts associated with the operational activities such as cleaning, maintenance and up keep	Very Low (-ve)	No Change
Visual	Visual quality	Low (-ve)	Low (-ve)
	Visual absorption capacity	Medium (+ve)	Medium (+ve)
	Visual exposure and visibility	Low (-ve)	Low (-ve)
	Visual Intrusion	Very Low (-ve)	Very Low (-ve)
	Sensitivity of receptors	Low (-ve)	Low (-ve)
Avifaunal	Collision with PV Panels	Very Low (-ve)	Very Low (-ve)
	Electrocution	No Change	No Change
	Disturbance and noise from operational activities	Low (-ve)	Very Low (-ve)
	The creation of nesting and/or roosting habitats	Very Low (-ve)	Very Low (-ve)
	The creation of a Penguin Colony in a designated area of the PV facility (Penguin Initiative Project).	Medium (+ve)	Medium (+ve)
	The pollution of habitats as a result of operational activities	Very Low (-ve)	No Change
Indirect Impacts			
Socio-Economic	The fibre optic cable to be installed as part of the proposed PV facility will	Low (+ve)	N/A

ASPECT	IMPACT	SIGNIFICANCE	
	improve internet access on the Island.		
Cumulative Impacts			
Fauna and Flora	Habitat loss and fragmentation on Robben Island	No Change	No Change
No-Go			
Natural Resources	Impacts associated with the continued use of a non-renewable resource	Medium (-ve)	N/A

4 DETAILS OF THE PROJECT APPLICANT AND EAP

Table 4-1: Project Applicant Details

Project Applicant	
Applicant:	Department of Public Works
Company Registration:	N/A
Contact Person:	Frederick Johson
Postal Address:	Private Bag X9027, Cape Town, 8000
Telephone:	021 402 2197
Fax:	086 272 6230
Email:	Frederick.johnson@dpw.gov.za

WSP| Parsons Brinckerhoff Environment and Energy, Africa was appointed to undertake the function of Environmental Assessment Practitioner (EAP) to facilitate the basic assessment processes and is the author of this EMPr. WSP| Parsons Brinckerhoff is a leading international environmental consultancy with a broad range of expertise in the environmental industry. Relevant details of the EAP representative is presented in **Table 4-2.**

Table 4-2: Project EAP Details

Environmental Assessment Practitioner (EAP)	
EAP	WSP Environmental (Pty) Ltd
Contact Person	Jacqui Fincham
Qualification/ Associations:	BSc (Hons), ICB Registered Assessor (EAPSA), SACNASP Prof. Nat.Scientist
Physical Address:	The Pavilion, 1st Floor, Corner Portswood and Beach

Environmental Assessment Practitioner (EAP)	
	Road, V&A Waterfront, Cape Town, 8001
Telephone:	021 481 8795
Fax:	021 481 8799
Email:	Jacqui.Fincham@wspgroup.co.za

Jacqui's knowledge as an environmental practitioner is based on a 3 year Bachelor of Science degree and a post graduate honour's degree in Biotechnology. Jacqui also received a Diploma in Sustainable Development and has completed various short courses on environmental management systems and auditing. She has been working as an Environmental Scientist since April 1998 which now amounts to 18 years subsequent professional experience. Undertaking Environmental Impact Assessments requires strong project management skills, people skills and a broad knowledge of environmental issues which are Jacqui's strengths. Jacqui understands it is important to be able to determine what likely impacts an activity might result in and how these different impacts might interact. As an Environmental Impact Assessment (EIA) project manager it is necessary to have a good working knowledge of the physical and social environment. This was obtained in Jacqui's undergraduate degree where she studied ecological and chemical systems. In addition, as an environmental practitioner, Jacqui has worked closely with a multidisciplinary team providing her with the opportunity to develop a technical understanding of subjects such as: ecology, air quality, transport, noise, visual impacts, geology, ground contamination, surface water, groundwater, wind and microclimate. She has project managed over 200 projects during her career from small scoping studies, feasibility studies, sustainability assessments, environmental management plans to larger full scale environmental impact assessments for significant developments. Refer to **Appendix H** of the BAR for Jacqui's Curriculum Vitae (CV).

5 ENVIRONMENTAL MANAGEMENT

5.1 RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT

This section of the report forms the core of the EMPr and outlines specific issues related to the proposed construction and operation and the recommended mitigation measures. Timeframes stipulated for the implementation of the mitigation and monitoring measures have been categorised as 'on-going' indicating immediate and on-going implementation following commencement of the relevant project phase, or where possible a specific date has been stated for implementation.

Table 5-1: Roles and Responsibilities

RESPONSIBLE PERON	RESPONSIBILITIES
The Applicant (DPW)	§ The Applicant (DPW) has the responsibility for appointing a Project Manager (PM) and Environmental Manager (EM).
Project Manager (PM)	§ Appointing the appropriately qualified contractor to coordinate, supervise and expedite different action plans. § Review and approve the EMPr prior to authorisation by the DEA. § Ensuring adherence to DEA conditions of the Environmental Authorisation (EA) and any other legislation relevant to the

RESPONSIBLE PERON	RESPONSIBILITIES
	construction and operation of the PV facility. § Ensuring adherence to all statutory safety, health and environmental standards. § Ensuring transparency in the operation and management of the site. § Ensure resource allocation for implementation of the EMPr requirements. § Ensure that environmental requirements are integrated into project plans, work method statements, tender and contract documents. § Ensure necessary support to the Environmental Manager (EM) for implementation of the EMPr. § Participate in incident investigations (as required). § Ensuring compliance with the provisions for duty of care and remediation damage in accordance with Section 28 in terms of NEMA (no 107 of 1998) and its obligations regarding the control of emergency incidents in terms of Section 30 of NEMA. § Notifying the DEA of any incident as defined in section 30(1) (a) of NEMA (Control of Emergency Incident).
Environmental Manager (EM)	■ Be fully conversant with EMPr and the conditions of the EA. ■ Approve method statements. ■ Have overall responsibility for the implementation of the conditions of the EA and the EMPr. ■ Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution and unnecessary degradation onsite; ■ Ensure communication of EMPr requirements to relevant project, contractor and sub-contractor personnel. ■ Monitor compliance of EMPr implementation and compliance of all contractors and sub-contractors through internal weekly checklists. ■ Facilitate environmental induction of all project staff and either deliver or coordinate delivery of all such training that would be required for the effective implementation of the EMPr. ■ Maintain training records for all project personnel including contractors. ■ Maintain environmental incidents and stakeholder complaints register. ■ Report significant incidents internally and externally as required by law and the conditions of authorisation. ■ Investigate incidents and recommend corrective and preventative actions. ■ Provide support and advice to the contractor and all sub-contractors in the implementation of environmental management

RESPONSIBLE PERON	RESPONSIBILITIES
	procedures and corrective actions. ■ Ensure maintenance of site document control requirements.
Environmental Control Officer (ECO)	■ Ensuring compliance against the EMPr and the conditions outlined within the EA. ■ Liaising with the DEA and stakeholders (if required). ■ Identification of potential areas for improvement during construction. ■ Undertaking on-going monitoring of the construction through bi-monthly (every two weeks) site visits and recording key findings. ■ Advising the project manager and contractors on environmental matters during construction phase of the development. ■ Monitoring implementation of the EMPr by the contractor. ■ Advising the project manager on the actions or issues impacting on the environment and provide appropriate recommendations to address or rectify these matters.
Contractors, Sub- Contractors and Service Providers	■ Managing the construction and operational activities with due care and diligence. ■ Complying with all elements of the EMPr. ■ Adhering to any environmental instructions issued by the Project Manager/ Environmental Manager or ECO. ■ Ensuring stakeholder interest is reported to the EM or ECO. ■ Maintaining relevant documentation for review by the ECO.

5.2 TRAINING AND INDUCTION EMPLOYESS

The Environmental Manager (EM) has a responsibility to ensure that all those involved in the project (including the Contractors, Sub-contractors and Suppliers) are aware of, and familiar with, the environmental requirements of the project, specifically relating to the penguins and how they are to be protected. All Contractors have to be given some assurance that they understand the EMPr and they will undertake to comply with the conditions therein. All senior and supervisory staff members shall familiarise themselves with the full content of the EMPr and the Environmental Authorisation. They shall know and understand the specifications of the EMPr and be able to assist other staff members in matters relating to the EMPr.

It is recommended that an environmental awareness training programme for all staff members be arranged by the Environmental Manager/ ECO and Contractor. Before commencing with any work, all staff members shall be appropriately briefed about the EMPr as well as relevant occupational health and safety issues. All new staff members are to undergo induction (including the environmental awareness training programme) prior to the commencing of construction activities.

5.3 ENVIRONMENTAL AWARENESS PLAN

The NEMA requires that an environmental awareness plan be submitted as a part of the EMPr submission. The project proponent has a responsibility to ensure that all those people involved in the project are aware of and familiar with the environmental requirements for the project (this includes sub-contractors, casual labour, etc.). The EMPr shall be part of the terms of reference for all contractors, sub-contractors and suppliers. All contractors, sub-contractors and suppliers have to assure that they understand the EMPr and they will comply with the conditions herein. All senior and supervisory members shall familiarise themselves with the full contents of the EMPr,

understand the specifications of the EMPr and shall be able to assist other staff members in matters relating to the EMPr.

An environmental awareness training programme for all staff members shall be put in place by the EM or ECO. All staff members shall be appropriately briefed about the EMPr and relevant occupational health and safety issues.

5.4 COMPLIANTS REGISTER AND ENVIRONMENTAL INCIDENTS BOOK

The EM must record any complaints received from the community. The complaint should be brought to the attention of the project manager and ECO and must be responded to accordingly. A complaints register templates has been provided within **Appendix A**. The following information must be recorded:

- Time, date and nature of the complaint;
- Response and investigation undertaken; and
- Actions taken and by whom.

All complaints received will be investigated and a response (even if pending further investigation) should be given to the complainant within 7 working days. All environmental incidents occurring on the site will be recorded. The following information will be provided:

- Time, date, location and nature of the incident;
- Prevailing weather conditions;
- Activity being undertaken on the site over the complaint period; and
- Actions taken and by whom.

5.5 ENVIRONMENTAL MONITORING, REPORTING AND STAKEHOLDER FEEDBACK

The following monitoring and reporting must be undertaken:

Construction phase:

- EM weekly monitoring and reporting against the EA and EMPr. Reports to be kept within the Environmental file held on site.
- ECO bi-monthly monitoring and monthly reporting against the EMPr and EA. Reports to be kept within the Environmental file on site.
- Close-out report following the construction phase to be submitted to the DEA by the ECO.

Operational phase:

- Bi-monthly inspections of the site to determine the long term impacts on the avifauna. The behaviour of the penguins should be monitored to ensure that penguins are not negatively impacted by the operating and maintenance of the PV facility and that they maintain their current breeding locations.

5.6 DEALING WITH NON-COMPLIANCE WITHIN THE EMPR

The Department of Tourism may put in place in the contractors contract, procedures to motivate the contractor and staff members to comply with the EMPr, and to deal with acts of non-compliance, or deliberate any malicious damage to the environment by staff members. Fines/penalties have been set out (**Appendix B**), according to the cost required to rehabilitate an

area to the satisfaction of the ECO. All fines or penalties received shall be allocated to a local environmental benefit programme and proof of the funds being transferred to the suitable recipient must be placed within the environmental site file.

5.7 EMPR AMENDMENTS/EMPR INSTRUCTIONS

Should it become evident that an element of the EMPr cannot be implemented then an amendment may need to be pursued. No EMPr amendment (relaxation or revision of any EMPr Mitigation Measure) shall be allowed without approval from the Project Manager and relevant authorities (i.e. the DEA) if required. Motivations for EMPr amendments may be discussed with WSP|PB. WSP|PB may propose EMPr amendments on behalf of the Applicant or issue EMPr instructions (for corrective actions, remediation and rehabilitation). These amendments or instructions issued by WSP|PB shall be implemented within the timeframe specified.

6 ENVIRONMENTAL MANAGEMENT PROGRAMME

In order to ensure compliance with the findings of the Basic Assessment the tables below outline the applicable actions that must be undertaken and implemented onsite during the construction and operational phase of the project.

6.1 CONSTRUCTION PHASE

Table 6-1: Environmental Management Programme- Construction Phase

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
6.1.1 ADMINISTRATIVE REQUIREMENTS			
Objectives	§ To define roles and responsibilities for environmental management; § To ensure suitable environmental training and induction to all employees; and § To promote environmental awareness.		
Environmental Training and Induction	§ The overall responsibility for the environmental management and cost associated with the implementation of the EMPr lies with the Applicant. § The EM must ensure that all site personnel involved in construction activities are aware of and are familiar with the EMPr, the key environmental issues associated with the construction activities as well as the consequences of non-compliance with the EMPr. § The EM and Contractors must ensure all staff are supplied with the correct personal protective equipment (PPE). § Principles of equality, gender equality and non-discrimination must be implemented.	Prior to commencement of and during construction phase (Ongoing)	**DPW** **PM** **EM**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ No alcohol or drugs, and no workers influenced by alcohol or drugs shall be allowed on site. § An environmental file containing the EMPr and the EA must be kept onsite. The file must be maintained throughout the construction period to include: o Environmental incidents register o Internal weekly reports o Monthly ECO reports o Waste disposal documents o Attendance registers for Induction and Environmental Awareness Training § Ensure compliance to the Occupational Health and Safety Act (85 of 1993) requirements. § The Applicant must appoint a suitably trained individual (EM or alike) who has experience in handling the local bird species and has been trained by SANCCOB prior to the commencement of construction activities. This individual should be the only member of the construction team responsible for the removal and relocation of any distressed or injured birds from site during the operational phase. § The trained “bird handler” is responsible for the daily monitoring and maintenance of the fencing surrounding the construction site. It is suggested that the fence is thoroughly inspected a minimum of twice a day. The bird handler must immediately remove any distressed or trapped birds that have been identified from site. A decision must then be made by the bird handler whether appropriately relocate any birds that have been removed from the site or transport the bird(s) to SANCCOB for further evaluation and treatment.		
Environmental Awareness	§ The EM must ensure that an environmental awareness programme is in place for all on-site personnel describing the key environmental issues associated with the	During construction phase (Ongoing)	**EM**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	construction activities, potential impacts thereof and required mitigation measures.		
Duty of Care	§ All personnel involved with the construction activities onsite will be responsible for implementing measures to prevent pollution or degradation of the environment from occurring, continuing or recurring. Insofar as such harm to the environment is authorised by law, or cannot reasonably be avoided or stopped, personnel shall minimise and rectify such pollution or degradation of the environment.	During construction phase (Ongoing)	
Avifaunal restrictions on the construction site	§ The facility footprint is to be reduced to ensure that no construction (or associated activities) occurs to the east or south of the red line (**Appendix C**) indicating the start of avifaunal sensitive areas. § Major construction activities[1] are to be restricted to the months of September, October, November, December, January and February. Should construction activities continue after February, an Avifaunal Specialist will need to approve the construction activities.	Prior to and during the construction phase (ongoing)	**PM** **EM**
Indicator/ Compliance Mechanism	§ Induction training register. § Close-out on incidents received. § Environmental incidents register. § Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO. § Environmental awareness programme register.	During construction phase (Ongoing)	**EM** **ECO**

[1] These are to be defined by an avifaunal specialist in consultation with the selected contractor, once appointed. Such activities may include vegetation clearing, earth works, excavation, pilling, PV panel erection, drilling and blasting.

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ Method statements for all the construction phases.		
6.1.2 WORK COMMENCEMENT AND CONSTRUCTION CAMP ESTABLISHMENT			
Objectives	§ Ensure sound environmental management during the erection of the construction camp. § An independent ECO must be appointed to monitor the construction activities on the site. § The ECO should work closely with the EM.		
Construction commitments	§ Method statements should be submitted to the ECO for approval prior to the commencement of any construction activity. § Before construction can begin, the contractor shall submit to the engineer and ECO for his/ her approval, plans of the exact location, extent and construction details of these facilities and the impact mitigation measures the contractor proposes to put in place. The camp site shall be selected such that it avoids the need to remove any indigenous tree species. § Detailed, electronic colour photographs shall be taken of the proposed site before any clearing may commence. These records are to be kept by the engineer for consultation during rehabilitation of the site. § Appropriate waste facilities (heavy bins with lids) must be provided at the camp in order to ensure onsite waste management and segregation continues throughout the construction process. These should be emptied on a regular basis. § The construction camp must be kept neat and tidy with appropriate ablution facilities. § A chemical/hazardous substances working area must be identified where relevant, placed on/in impermeable layer/surface and within bunding.	Prior to and during the construction phase (ongoing)	**EM** **ECO** **Contractors/Sub-contractors**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ All building waste must be collected and disposed of appropriately on regular basis and disposal certificates and documents must be kept onsite in the environmental file. § Contractor to develop an Emergency Response Plan or adopt the Robben Island Emergency procedures. § Prior to construction, the avifaunal specialist must conduct a site walkover, accompanied by the EM, to identify all penguin nest sites (potential, active or artificial) at risk from disturbance, which would need to be buffered by a suitable distance and declared no-go areas. § The appointed ECO and EM must be trained by an avifaunal specialist and the and the Robben Island Environmental officer/manager to identify the focal species as well as the signs that indicate possible breeding by these species, and then to take appropriate action (e.g. designation of no-go areas and awareness training of staff) to prevent disturbance of new sites being used by these species. Before taking action, the Robben Island Environmental Officer/Manager must be consulted. § An ecologist must be appointed to assist with the final design and plant selection for vegetation screening. § Any construction offices, temporary ablutions and related facilities must be sensitively placed on the site where they will be least visible from key viewpoints.		
Indicator / Compliance Mechanism	§ Method statements completed and submitted. § Close-out on incidents received. § Environmental incidents register. § Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO.	Prior to and during the construction phase (ongoing)	**EM** **ECO**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ Waste disposal certificates and documents. § Emergency Response Plan present onsite.		
6.1.3 SOIL, SURFACE AND GROUND WATER MANAGEMENT			
Objectives	§ Ensure sound environmental management regarding soil, surface and groundwater during the construction activities. § Ensure the prevention of stormwater and waste water pollution.		
Soil, Surface and Ground water Commitments	§ All potential stormwater contaminants must be bunded in the site camp to prevent run-off. No liquid or substance other than uncontaminated rainwater runoff shall emanate from the site. § Re-fuelling or hazardous materials handling must be carried out within a bunded area. § All cement waste water shall be collected in a container and allowed to evaporate. Under no circumstances shall it be allowed to enter soil, surface or groundwater resources, including storm water. § A drainage system must be identified for the construction camp. § Drip trays must be placed under all equipment and vehicles which has the potential to drip oil or fuel when in use or stationary. § Equipment, machinery and vehicles should be serviced regularly at an offsite location, and daily inspections should be conducted to ensure that the equipment, vehicles and machinery are performing at optimum performance standards and to ensure that there are no leakages of vehicle fuel/oil tanks.	During construction phase (Ongoing)	**EM** **ECO** **Contractor/ Sub-contractor**
Indicator/ Compliance Mechanism	§ Close-out on incidents received.	During construction phase (Ongoing)	**EM**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ Environmental incidents register. § Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO. § Machinery maintenance and safety certificate must be required from each separate hire company for each piece of equipment hired, where applicable.		**ECO**
6.1.4 FAUNA AND FLORA			
Objectives	§ To avoid harm, danger or loss to indigenous and protect plant and animal species.		
Fauna and Flora Commitments	§ Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared and vegetation clearing must remain within the site boundary. § Sensitive areas need to be cordoned off with hazard tape or similar. § All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises, and owls which are often persecuted out of superstition. An electric fence should not be used, in order to prevent tortoise mortality. § Sensitive intact areas should be demarcated as no-go areas with construction tape or similar. § Any fauna threatened by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer. § Any disturbed areas where wind erosion is a potential problem should be rehabilitated and protected with geotextiles or similar protective measures. § Temporary access tracks should be kept to a minimum in order to limit direct	During construction phase (Ongoing)	**EM** **ECO** **Contractor/ Sub-contractor**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	vegetation loss and habitat fragmentation, while designated no-go areas must be enforced e.g. no unnecessary off road driving outside of designated areas. This includes the **parking of vehicles** and **turning of vehicles**. § Topsoil shall be removed from all areas where physical disturbance of the surface will occur and shall be stored and adequately protected for re-use during rehabilitation. Storage of topsoil must be done in such a manner that the soil can be backfilled in the correct order with the top layers being returned to the top layer. § The topsoil stockpiles shall be stored, ensuring that they do not interfere with the flow of water to cause damming or erosion, or itself be eroded by the action of water. § Following construction activities, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken.		
Indicator/ Compliance Mechanism	§ Close-out on incidents received. § Environmental incidents register. § Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO.	During construction phase (Ongoing)	**EM** **ECO**
6.1.5 CULTURAL AND HERITAGE ASPECTS			
Objectives	§ To ensure that appropriate steps are taken to protect heritage resources on site and in the surrounding area.		
Cultural/ Heritage Commitments	§ Landscape planting around the boundaries (at the coastline and Beach Road) of using indigenous forms of vegetation. § A heritage specialist should be appointed during excavation activities in the	During construction phase (Ongoing)	**EM** **ECO** **Contractors/ Sub-**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	construction phase. § All staff must undergo training to ensure that they are aware of the possibility of uncovering items of cultural or heritage value and the relevant procedure on the steps to take encase of such items being discovered. § South African Heritage Resources Agency (SAHRA) must be contacted if any heritage objects are identified during earthmoving activities and all development should cease until further notice and the following procedure is to be followed: o Stop construction o Mark area clearly and visibly and restrict entry o Report to SAHRA to investigate, and o Ensure SAHRA report findings of graves to local police station. Should the contractor be unsure of the any of the above aspects, the ECO should be contacted immediately. § Any items or information of significance discovered regarding the site needs to be recorded. All information discovered needs to be made available for use in future publications and historical archives.		**contractors**
Indicator/ Compliance Mechanism	§ Close-out on incidents received. § Environmental incidents register. § Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO.	During construction phase (Ongoing)	**EM** **ECO**
6.1.6 TRAINING AND SOCIO-ECONOMIC ASPECTS DURING CONSTRUCTION			

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
Objectives	§ To ensure that staff has adequate training and are provided with necessary safety equipment.		
Socio-economic Commitments	§ The EM and ECO must ensure that all direct and sub-contracted site personnel have a basic level of environmental awareness training that has been offered to them. § The EM/ ECO must be available to explain more difficult and technical environmental issues at project commencement. § The ECO must ensure that all site staff have been informed of the details of the EMP document as well as the conditions of the EA. § Regular 'reminder' sessions must be included within the weekly/monthly toolbox talks being run by project manager to ensure that staff are reminded about environmental and safety issues and emergency procedures. § Ensure all employees are supplied with the correct personal protective equipment.	During construction phase (Ongoing)	**EM** **ECO** **Contractors/ Sub-contractors**
Indicator/ Compliance Mechanism	§ Training Register. § Environmental incidents register. § Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO.	During construction phase (Ongoing)	**EM** **ECO**
6.1.7 NOISE MANAGEMENT			
Objectives	§ To manage the minor noise that may arise from the site during the construction activities. § To adhere to the South African National Standards (SANS) 10103:2008 noise limits and the Provincial Noise Control Regulations		

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	PN200/2-13.		
Noise Management Commitments	§ No loud music is allowed to be played onsite. § The construction activities must comply with the Provincial Noise Control Regulations PN200/2-13, in that: o The SANS 10103 Table 2 – The typical rating level for noise district is adhered to. o No Noise Disturbance is caused in terms of the Provincial Noise Control Regulations PN200/2013.	During construction phase (Ongoing)	**EM** **ECO** **Contractors/ Sub-contractors**
Indicator/ Compliance Mechanism	§ Close-out on incidents received. § Complaints Register. § Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO. § PPE Register	During construction phase (Ongoing)	**EM** **ECO**
6.1.8 VISUAL IMPACTS			
Objectives	§ To prevent visual intrusion caused by construction activities.		
Visual Commitments	§ Signage related to the project must be discreet and confined to entrances. No corporate or advertising signage is permitted. § The colour of the solar array structures, such as supports and the rear of the panels, should be carefully selected, and be in the dark grey or green range, to	During construction phase (Ongoing)	**PM** **EM** **Contractors/ Sub-contractors**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	minimise visibility and avoid reflectivity.		
Indicator/ Compliance Mechanism	§ Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO.	During construction phase (Ongoing)	**EM** **ECO**
6.1.9 AIR QUALITY IMPACTS			
Objectives	§ Ensure sound environmental management regarding air quality and odour during construction thereby preventing air pollution.		
Air Quality Commitments	§ The contractor must ensure that necessary equipment is in place to control dust generated during construction, where required. § No burning of waste, such as plastic bags, cement bags and litter is permitted.	During construction phase (Ongoing)	**EM** **Contractor/ Sub-contractor**
Indicator/ Compliance Mechanism	§ Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO. § Electronic or hard copy of complaints/incidents/non-conformance register.	During construction phase (Ongoing)	**EM** **ECO**
6.1.10 AVIFAUNAL IMPACTS			
Objectives	§ To avoid harm or disturbance to the protected bird species breeding on the Island.		
Avifaunal Commitments	§ The penguin habitat on the boundary of the site and in close proximity to the site that may potentially be used by nesting penguins in the future must be identified, and its removal prohibited. § Ensure appropriately trained individual deals with all bird incidents.	Prior to commencement of and during construction phase (Ongoing)	**EM** **ECO** **Contractor/ Sub-contractor**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ Construction area must be continuously fenced to avoid disturbing / harming penguin colony. § Keep STRICTLY to the speed limit of 40km/h on the island and slow down even further to 30km/h in the vicinity of nesting sites and penguin crossings. § The construction site must be clearly demarcated and corded off within which all activities are to occur. No-go areas must be identified and strictly controlled so that no staff enter these areas under any condition. These areas include: o All beaches and rocky shores with a buffer of 25m from the high water mark. o 20 m buffer around suitable penguin nesting habitat (to be identified by the specialist during a site walkover once the final site is authorised and the exact construction footprint is known, but prior to construction).		
Indicator/ Compliance Mechanism	§ Close-out on incidents received. § Environmental incidents register. § Weekly internal monitoring and reporting. § Bi-monthly monitoring and monthly reporting by the ECO.	During construction phase (Ongoing)	**EM** **ECO**
6.1.12 WASTE MANAGEMENT			
Objectives	§ To manage waste in a manner that prevents detrimental impacts on the environment.		
Waste Management Objectives	§ Relevant Robben Island waste management procedures must be followed. § Under no circumstances is waste to be burnt or buried on-site.	During construction phase (Ongoing)	**EM** **ECO**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ Suitably covered and tip-proof receptacles must be available at all times and conveniently placed for the disposal of waste generated during construction. These receptacles must be emptied on a regular basis and transported to mainland with the rest of the general waste produced on the Island. § Training of staff in the principles of waste management, including waste separation and the waste hierarchy to be undertaken during induction. § Recycling of waste should be included in the training and induction procedures and appropriate bins for recyclable waste provided. § Hazardous wastes (e.g. used oils) shall be stored in appropriate hazardous waste receptacles and disposed of appropriately at a hazardous waste disposal facility. Waste disposal dockets for this need to be kept in the environmental file.		
	§ Labelled bins for different waste streams (i.e. general rubbish and recycling) § Safe Disposal Certificates.	During construction phase (Ongoing)	**EM** **ECO**

6.2 OPERATIONAL PHASE

Table 6-2: Environmental Management Programme- Construction Phase

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
6.2.1 ADMINISTRATIVE REQUIREMENTS			
Objectives	§ To define roles and responsibilities for environmental management; § To ensure suitable environmental training and induction to all employees; and		

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ To promote environmental awareness.		
Environmental Training and Induction	§ The overall responsibility for the environmental management and cost associated with the implementation of the EMPr lies with the Applicant. § The EM must undertake annual monitoring of activities during the operational phase to ensure compliance with the EMPr (this aspect is likely to be undertaken by RIM Environmental Manager). § All new staff to obtain induction training on the site EMPr requirements and company procedures/ codes of conduct. § Principles of equality, gender equality and non-discrimination must be implemented. § Ensure compliance to the Occupational Health and Safety Act (85 of 1993) requirements.	During operational phase (Ongoing)	**DPW** **PM** **EM**
Duty of Care	§ The Department of Public Works must take reasonable measures to prevent pollution or degradation of the environment from occurring, continuing or recurring. Insofar as such harm to the environment is authorised by law, or cannot reasonably be avoided or stopped, personnel shall minimise and rectify such pollution or degradation of the environment.	During operational phase (Ongoing)	**DPW**
Avifauna Requirements	§ A site specific Operational Environmental Management Plan (OEMP) must be implemented, which gives appropriate and detailed description of how operational and maintenance activities must be conducted to reduce the unnecessary disturbance to avifauna.	During operational phase (Ongoing)	**EM**
Indicator/ Compliance Mechanism	§ Induction training register. § Environmental incidents register.	During operational phase (Ongoing)	**DPW** **EM**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ Annual monitoring and reporting.		
6.2.2 FAUNA AND FLORA			
Objectives	§ To avoid harm, danger or loss to indigenous and protect plant and animal species.		
Fauna and Flora Commitments	§ Maintenance activities must be undertaken during working hours. § Activities associated with the operating of the PV facility must remain within the boundaries of the facility. § The fences around the boundaries of the PV facility must be maintained in such a way as to allow animals to migrate through the PV facility, with the exception of penguins. § The development should not have an electric fence around it. § If the facility must be lit at night, then this should be with downward-directed lights that do not attract insects. § Only indigenous vegetation natural to the area and as agreed to by Robben Island Museum and the Department of Public Works may be used for the purposes of landscaping during the operational phase.	During operational phase (Ongoing)	**EM** **DPW** **Contractor/ Sub-contractor**
Indicator/ Compliance Mechanism	§ Close-out on incidents received. § Environmental incidents register. § Annual monitoring and reporting.	During operational phase (Ongoing)	**DPW** **EM**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
6.2.3 CULTURAL AND HERITAGE ASPECTS			
Objectives	§ To ensure that appropriate steps are taken to protect heritage resources on site and in the surrounding area.		
Cultural/ Heritage Commitments	§ Any items or information of significance discovered regarding the site needs to be recorded. All information discovered needs to be made available for use in future publications and historical archives.	During operational phase (Ongoing)	**DPW** **EM** **Contractors/ Sub-contractors**
Indicator/ Compliance Mechanism	§ Close-out on incidents received. § Environmental incidents register. § Annual monitoring and reporting.	During construction phase (Ongoing)	**EM** **ECO**
6.2.4 NOISE MANAGEMENT			
Objectives	§ To manage the minor noise that may arise from the site during the operational activities. § To adhere to the South African National Standards (SANS) 10103:2008 noise limits and the Provincial Noise Control Regulations PN200/2-13.		
Noise Management Commitments	§ No loud music is allowed to be played onsite. § The operational activities must comply with the Provincial Noise Control Regulations PN200/2-13, in that: o The SANS 10103 Table 2 – The typical rating level for noise district is adhered to.	During operational phase (Ongoing)	**EM** **ECO** **Contractors/ Sub-contractors**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	o No Noise Disturbance is caused in terms of the Provincial Noise Control Regulations PN200/2013.		
Indicator/ Compliance Mechanism	§ Annual monitoring and reporting.	During operational phase (Ongoing)	**DPW** **EM**
6.2.5 VISUAL IMPACTS			
Objectives	§ To prevent visual intrusion caused by operation of the facility.		
Visual Commitments	§ The site must be maintained in a neat and orderly manner. § Ground level at site boundary must remain natural ground level. § The site must be maintained in a neat and orderly manner. § Vegetation screens must be established along Beach Road and the coastline. § If required, install light fixtures that provide precisely directed illumination. § Lighting should be activated on movement of illegal entry to the site. § Avoid high top security lighting. § Wire mesh or Clear-Vu fencing should be used for perimeter fencing. § Signage related to the project must be discreet and confined to the entrances. No corporate or advertising signage is permitted.	During operational phase (Ongoing)	**DPW** **EM**
Indicator/ Compliance Mechanism	§ Annual monitoring and reporting.	During operational phase (Ongoing)	**DPW** **EM**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
6.2.6 AVIFAUNAL IMPACTS			
Objectives	§ To avoid harm or disturbance to the protected bird species breeding on the Island.		
Avifaunal Commitments	§ Any major maintenance or repair work which requires heavy equipment and a small workforce should be, where possible, undertaken between the months of October and March. § An avifaunal specialist must compile an operational phase monitoring protocol for monitoring the PV site for avifaunal collisions which must be recorded and reported to Birdlife SA. § All exposed electrified infrastructure is to be properly secured and insulated. § Bird perch deterrents, and physical exclusion barriers, frames and covers may reduce incidence of birds perching and nesting on substation infrastructure. It is proposed that spikes be erected on top of the panels to deter birds from perching. § Electrocutions to be monitored and recorded at the solar facility and reported to Endangered Wildlife Trust's (EWTs) Wildlife and Energy Programme (WEP) to determine if further mitigation action is required. § Potential faulting (caused by nesting and perching of birds on structures) may require detailed. Upon completion of construction the EWT's WEP is to be contacted to determine if mitigation is required and if so, what mitigation measures are to be implemented. § No nests may be removed, without first consulting the avifaunal specialist. § The appointed Operations Facility Manager must be trained by an avifaunal specialist to identify the focal species as well as the signs that indicate possible breeding by these species.	During operational phase (Ongoing)	**EM** **Contractor/ Sub-contractor**

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ Where possible, scheduled maintenance must be restricted to the months of November, December, January and February. More regular Maintenance such as cleaning is permitted outside of these times, but should be kept to the bear minimum. § No go areas must be identified and strictly controlled so that no maintenance staff enters these areas under any condition. These include: o All beaches and rocky shores with a buffer of 25 m from the high water mark. o 20 m buffer around suitable penguin nesting habitat. § Approximately 80% of the site is to be enclosed by a penguin proof fence that (as far as possible) prevents penguins from burrowing under and gaining access to the site. The avifaunal specialist must approve the final fence to be used by the contractor and the exact design and dimensions of such a fence will be finalised prior to construction through consultation between the contractor and the avifaunal specialist. § The section of the facility, approximately 20%, that will be utilised as part of the Penguin Initiative must be fenced off in consultation with the avifaunal specialists, DEA Oceans and Coasts and SANCOBB. <u>Penguin Colony Area:</u> § Access to the colony area is to be restricted to cleaning and maintenance activities only. § Cleaning is to be undertaken on a regular continual basis by only a small number of individuals. § All staff undertaking cleaning and maintenance must undergo training by SANCOBB on handling of penguins. § Noise must be kept to a minimum (i.e. no shouting or loud music).		

DESCRIPTION OF ACTIVITY	ENVRIONMENTAL MANAGEMENT & MITIGATION MEASURES	IMPLEMENTATION TIMEFRAME	RESPONSIBILITY (PM,EM, ECO, Contractor/Sub-Contractor)
	§ Staff must keep interactions with the penguins to a minimum.		
Indicator/ Compliance Mechanism	§ Annual monitoring and reporting.	During operational phase (Ongoing)	**DPW** **EM**

7 CONCLUSIONS

The anticipated environmental impacts associated with the proposed construction and operation of the PV facility have been evaluated according to their significance, which is determined as a result of an assessment of the Severity, Extent, Duration, Frequency and Probability. Severity, Extent, and Duration averaged gives the consequence associated with the impact and Frequency and Probability averaged gives the likelihood of the impact occurring. All impacts were assessed in the BAR without and then with mitigation/ management measures in place. The EMPr (this report) consolidates all mitigation and management measures devised for the purpose of the proposed construction and operation of the proposed PV facility.

In terms of NEMA, everyone is required to take reasonable measures to ensure that they do not pollute the environment. Reasonable measures include informing and educating employees about the environmental risks of their work and training them to operate in an environmentally responsible manner. Furthermore, in terms of NEMA, the cost to repair any environmental damage shall be borne by the person responsible for the damage.

If the above-mentioned management recommendations are adopted it is anticipated that the low negative environmental impacts associated with the proposed construction and operation of the PV facility can be mitigated. The appointed Environmental Manager and Environmental Control Officer will need to monitor the site throughout the construction phase to ensure that the required environmental controls are in place and working effectively.

Appendix A

COMPLAINTS REGISTER TEMPLATE

DATE	TIME	DESCRIPTION OF INCIDENT	ACTION TAKEN	INDIVIDUAL RESPONISBLE FOR ACTION

Appendix B

FINES AND PENALTIES

Fines

Fines will be issued if no effort has been made to rectify reported non- conformances during the weekly internal monitoring and monthly ECO reporting. The ECO will issue fines for the transgressions listed below.

Transgression	Action to be taken	Timeframe for rectification	Fine
Any persons, vehicles, or thing related to the Contractors operations within areas which have been designated "no-go" areas.	No warning- fine to be issued immediately	None	R 500 per incident
Any individuals not wearing the correct PPE.	Issue warning	Prior to next ECO site visit	R 250 per incident
Any accident resulting in the fatality of bird life or damage to eggs.	No warning- fine to be issued immediately	None	R 500 per incident
Any construction related vehicle driving in excess of designated speed limits.	No warning issue fine	None	R 500 per incident
No drip trays placed under machinery or vehicles that have the potential to leak oil.	Issue warning	Prior to next ECO site visit	R 500 per incidents
Persistent and un-repaired oil leaks from machinery.	Issue warning	Prior to next ECO site visit	R 500 per incident
Litter on site.	Issue warning	Prior to next ECO site visit	R250
Damage to vegetation outside of the boundary of the site	No warning issue fine	None	R 500 per incident
Mixing of waste concrete or spilled concrete on the bare ground	Issue warning	Prior to next ECO site visit	R 250 per incident
No evidence of waste being separated in to the appropriate waste receptacles.	Issue warning	Prior to next ECO site visit	R 250
Any Person, vehicle, item or anything else related to the Contractors operations causing a nuisance	No warning issue fine	None	R 500 per incident

Additional fines may be issued per incident at the discretion of the ECO. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the Environmental Specifications. The Client will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract.

Penalties

Where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications, he shall be liable to pay a penalty fine over and above any other contractual consequence. The Contractor is deemed NOT to have complied with this Specification if:

a. Within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of the Specification.
b. Environmental damage ensues due to negligence.
c. The Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific timeframe.
d. The Contractor fails to respond adequately to complaints from the public or any I&AP.

Payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

An Environmental Performance Guarantee of 5% of Contract Value shall be deposited by the Contractor with the Engineer. This fund shall be used in the event of penalties or rehabilitation costs for non-conformance or contraventions of the EMP. The balance shall be given back to the Contractor at Contract closure. The following penalties are suggested for transgressions:

Transgression	**Penalty**
Damage to indigenous vegetation	**A penalty equivalent in value to the cost of restoration plus 20%.**

Damage to sensitive environments	**A penalty equivalent in value to the cost of restoration plus 20%.**
Damage to cultural sites	**A penalty to a maximum of R 10 000 shall be paid for any damage to any cultural/ historical sites**

Appendix C

MAP OF THE AVIFAUNAL SENSITIVE SITES

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Avifaunal Sensitive Area

Data Source:
South African Department of
Rural Development and Land Reform -
Chief Directorate: National Geo-spatial Information

Projection Geogrpahic - WGS1984

Project:	Robben Island PV Project
Project No:	47539
Drawn by:	Bronwyn Fisher
Reviewed by:	Bronwyn Fisher

Date:
March 2016

Figure No.
1

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