

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE INSTALLATION OF A SOLAR PHOTOVOLTAIC POWER PLANT AT ESKOM ARNOT POWER STATION

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME
DEA REFERENCE NUMBER 14/12/16/3/3/2/760

JULY 2015



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July 2015**

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LIST OF Acronyms

BBBEE	Broad Black Based Economic Empowerment
DC	Direct Current
DEA	Department of Environmental Affairs
DEIAr	Draft Environmental Impact Assessment report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EO	Environmental officer
EIA	Environmental Impact Assessment
Eskom	Eskom Holdings SOC Ltd
EMPr	Environmental Management Programme
HIA	Heritage Impact Assessment
IAIA	International Association of Impact Assessment
ILISO	ILISO Consulting (Pty) Ltd
MSDA	Material Safety Data Sheet
NDM	Nkangala District Municipality
NEMA	National Environmental Management Act 1998 (Act 107 of 1998)
NEMBA	National Environmental Management Biodiversity Act 2004 (Act 10 of 2004)
NEMWA	National Environmental Management Waste Act 2008 (Act 59 of 2008)
NHRA	National Heritage Resource Act 1009 (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
OHSA	Occupational Health and Safety Act 1993 (Act 85 of 1993)
O&M	Operations and Maintenance building
PPE	Personal Protective Equipment
PV	Photovoltaic
RDL	Red Data Lists
SACNSP	South African Council for Natural Scientific Professions
SANCOLD	South African Committee on Large Dams
STLM	Steve Tshwete Local Municipality
WUL	Water Use License
WML	Waste Management Licence
WMMS	Water Management Method Statement

Abbreviations

CO ₂	Carbon Dioxide
CH ₄	Methane
CFC's	Chlorofluorocarbons
GWh	Gigawatt hour
GW	Gigawatt
ha	hectare
km	Kilometre
km ²	Square Kilometre
KWh/m ²	Kilowatt-hour per metre squared

MWh	Mega Watt hour
MWp	Mega Watt peak
m	Metre



ENVIRONMENTAL IMPACT ASSESSMENT FOR THE INSTALLATION OF A SOLAR PHOTOVOLTAIC POWER PLANT AT ESKOM'S ARNOT POWER STATION DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

1. INTRODUCTION

Eskom Holdings SOC Ltd (Eskom), proposes to construct and operate a Photovoltaic (PV) Plant on the property of the Eskom Arnot Power Station, located on the farm Rietkuil 491JS in Mpumalanga (**Figure 1**). Arnot Power Station is located approximately 50 km east of Middelburg and forms part of the Steve Tshwete Local Municipality (STLM). The STLM is situated at the center of Nkangala District Municipality (NDM) and covers a geographical area of approximately 3,976 km². The towns and settlements within the Municipality include Middelburg, Mhluzi, Hendrina, Kwazamokuhle, Rietkuil, Pullenshope, Komati, Presidentsrus, Naledi, Lesedi, Kranspoort, Blinkpan, Koorfontein, Kwa-Makalane and Doornkop. **Table 1** provides details regarding the project location.

Table 1: Project Location

Province	Mpumalanga
District Municipality	Nkangala District Municipality
Local Municipality	Steve Tshwete Local Municipality
Ward number(s)	7
Nearest town(s)	Rietkuil
Farm name(s) and number(s)	Rietkuil 491JS
Portion number(s)	Remainder of Portion 24
21 digit Surveyor General Code	T0JS00000000049100024
Title Deed	T1721/971

1.1 PURPOSE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

This Environmental Management Programme (EMPr) is prepared as part of the requirements of the 2010 Environmental Impact Assessment Regulations promulgated under the National Environmental Management Act (NEMA, Act 107 of 1998) (NEMA) as amended 2010. The EMPr is to be submitted to the national Department of Environmental Affairs (DEA) as part of the application for environmental authorisation for the proposed Solar PV Plant at Arnot Power Station (DEA Reference 14/12/16/3/3/2/760). This draft EMPr is made available for public comment, as part of the Draft Environmental Impact Assessment report (DEIAr).

The engineering design process is ongoing during the construction period and project changes can result in requirements in the EMPr having to be amended and re-considered. The EMPr is a dynamic document, which will be reviewed, revised and updated during the life span of the project.

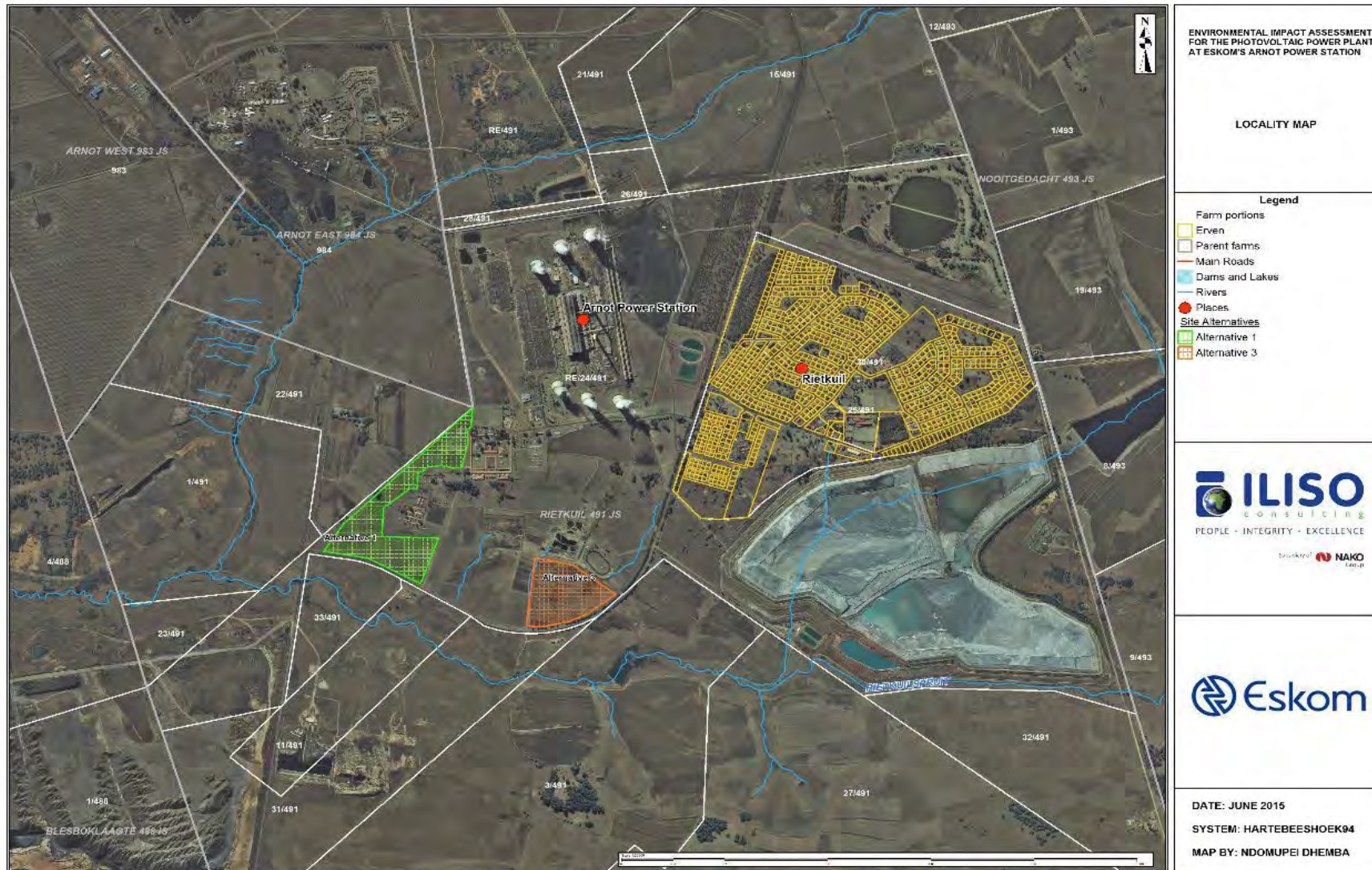


Figure 1: Locality Map for Solar PV Alternative sites at Arnot Power Station

1.2 PROJECT TEAM

ILISO Consulting (Pty) Ltd was appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the EIA and compile the EMP with input from the specialists.

1.2.1 Details and Expertise of the Environmental Assessment Practitioner (EAP)

Ms Terry Calmeyer is a Director of ILISO Consulting Environmental Management (Pty) Ltd and a certified Environmental Assessment Practitioner (EAP). She has a Master's degree in Environmental Management and over 20 years' experience. She specialises in Environmental Impact Assessments, the environmental components of project implementation and Project Management. Terry serves on the International Association of Impact Assessment (IAIA) Council, is the past President of the South African Affiliation of the International Association of Impact Assessment and an active member of the South African Committee on Large Dams (SANCOLD), the Environmental Law Association and the International Association for Public Participation. She has been involved in a variety of EIAs including those for transmission lines, water supply projects, dams, roads, railways, waste water treatment works and airports, in South Africa, Uganda, Lesotho, Botswana, Namibia and Mozambique.

1.2.2 Details of the Project Team

In addition to the EAP, the ILISO Consulting (Pty) Ltd project team includes the following individuals: Mr Deon Esterhuizen (Project Director), Sandhisha Jay Narain (Assistant EAP), Joseph Masilela, Ruan Schoeman (Public Participation Process administrators), and Ndomupei Dhemba (GIS specialist). A summary of the project team, their roles is provided in **Table 2 and Table 3**. Curricula Vitae of the project team and specialist are included in **Appendix A** of the DEIAr.

Table 2: Summary of the ILISO Project Team and their Roles

Role	Project Team Member	Company
Project Director/Leader	Deon Esterhuizen	ILISO Consulting (Pty) Ltd
Project Manager/EAP	Ms Terry Calmeyer	ILISO Consulting (Pty) Ltd
Public Participation Process Manager	Ms Terry Calmeyer	ILISO Consulting (Pty) Ltd
Assistant EAP	Ms Sandhisha Jay Narain	ILISO Consulting (Pty) Ltd
GIS	Ms Ndomupei Dhemba	ILISO Consulting (Pty) Ltd
Public Participation Process Administrators	Mr Joseph Masilela Mr Ruan Schoeman	ILISO Consulting (Pty) Ltd

Table 3: Specialist Studies Undertaken

Specialist Study	Specialist	Company
Fauna, Flora and Wetland Assessment	Mr Emile van der Westhuizen	Scientific Aquatic Services
	Stephen van Staden	
	Mr Hennie de Beer	
	Christopher Hooton	
Soil Impact Assessment and Agricultural Potential	Dr David Garry Paterson	ARC-Institute for Soil, Climate and Water
Social Impact Assessment	Mrs Nanja Churr	Kayamandi Development Services
Heritage Impact Assessment	Dr Johnny van Schalkwyk	Independent Consultant

A short description of the key qualifications and capabilities of the ILISO team members and Specialists are presented below.

Mr Deon Esterhuizen has a Master's degree in Environmental Management with more than 20 years of experience in water and environment related projects, which include water resource management, water quality management, water use registration and licensing of water users, including project management of multi-disciplinary studies. He has extensive experience in a wide-range of environmentally related projects, processes and applications for private, commercial and industrial clients, in addition to local, provincial and national government departments. Deon has been involved with various projects for Eskom such as the Waste Management Application Licence for Ingula and Kusile. He has also been responsible for obtaining various Environmental Authorisations for the Gautrain. He is registered as a professional natural scientist with the South African Council for Natural Scientific Professions (SACNSP).

Ms Sandhisha Jay Narain is an Environmental Consultant with an Honours degree in Environmental Management. She has 6 years on site Environmental Management and Environmental Compliance Auditing and Monitoring experience. Sandhisha has been involved in the implementation of the Environmental Management Plan for the Moses Mabhida Stadium, compliance monitoring of Transnet's New Multi-Purpose Pipeline Project and was project based at the Spring Grove Dam as the Environmental Monitor for the Engineering Consultant. She is also an accredited Green Star SA Professional.

Ms Ndomupei Dhemba has 9 years' experience and a Master's degree in GIS and Remote Sensing for Environmental Management. She has been involved in a number of EIA programmes as a Biodiversity and GIS & Remote Sensing Specialist in Zimbabwe, Botswana, Tanzania and South Africa. Ndomupei also has extensive experience in licencing of water users and the completion of Environmental Impact Assessments in support of the issuing of Environmental Authorisations. She is

conversant with ArcGIS, ERDAS, ILWIS, Planet GIS, Google earth Pro, Expert GPS and ENVI.

Mr Joseph Masilela has 8 years' experience in office administration and community liaison work. This includes arranging meetings, facilitating community workshops, meeting with traditional authorities and assisting on all project related work. Joseph assists with secretarial functions for projects including the maintenance of attendance registers and databases for all projects. He also undertakes field work and data input into AutoCAD programmes.

Mr Ruan Christiaan Schoeman has 3 years' experience and an Honours Degree in Geography from the University of Johannesburg. Ruan has gained on site experience as an Eskom Environmental Officer for the Spitskop – Dinaledi 400kV Transmission Power Lines Section G and the Dinaledi Substation. He is experienced in ISO 14001 implementation and compliance monitoring applicable to environmental legislation.

Mr Stephen van Staden has a Master's degree from the University of Johannesburg in Environmental Management. Stephen has experience on over 1 000 environmental assessment projects specifically with aquatic and wetland ecological studies as well as terrestrial ecological assessments and project management. Stephen has a professional career spanning more than 10 years, most of which have been as the owner and managing member of Scientific Aquatic Services. He is registered by the South African River Health Project as an accredited aquatic biomonitoring specialist and is also registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions in the field of ecology. Stephen is also a member of the Gauteng Wetland Forum and South African Soil Surveyors Association

Mr Emile van der Westhuizen has 9 years' experience in Ecological Assessments and has a Bachelor of Science (BSc) Botany and Environmental Management degree from UNISA and holds a BSc (Hons) Plant science degree with specialisation in terrestrial plant ecology from the University Of Pretoria. Emile's skills include GIS and Wetland Delineation processes. He has extensive experience in EIA's, BA's, and Water Use Licensing, the development of Rehabilitation Plans, Landscape plans and Visual Assessments. Emile has been involved in various projects throughout Africa (including South Africa, Ghana, the DRC and Mozambique) focusing on terrestrial ecological assessments which involve phytosociological community assessments, RDL faunal and floral species assessments, alien and invasive species control methods and rehabilitation plans.

Mr Hennie de Beer has a National Diploma in Nature Conservation and extensive experience in Ground Hornbill Monitoring and Vegetation Monitoring at the Timbavati Private Nature Reserve. He has assisted members of the Agriculture Research Council doing Vegetation Condition Assessments on +/- 750 sites in the Lowveld area as well as at Gorongosa National Park. Hennie has also done work on eradicating problem aquatic plants in water canals, assisted in water quality

monitoring and data analysis. He currently serves as an ecologist, specializing in avifaunal studies.

Mr Christopher Hooton obtained his National Diploma in Nature Conservation and completed his BTech Nature Conservation degree both at Tshwane University of Technology. He has gained 3 years' experience as an ecologist, specialising in faunal studies. Chris worked for the Lowveld Wild Dog Project, based in Savé Valley Conservancy, Zimbabwe where he gained invaluable field experience collaring, tracking and population management of the Wild Dogs, and assisted with a lion and leopard collaring project.

Mrs Nanja Churr has 14 years' experience and Bachelor of Science Degree in Town and Regional Planning (cum laude). She has acquired excellent skills in the field of socio-economic and economic development of rural and urban communities, inclusive of the dynamic impacts associated with socio-economic and economic impact assessments, urban frameworks, economic frameworks, development plans, feasibility studies, urban revitalisation studies, integrated development planning, local economic development plans, socio-economic research, baseline surveys and needs assessment, rural and community development, policy analysis and formulation, macro-economic analysis, feasibility studies and business plan development. Nanja has also obtained valuable International Training in Canada on Regional Planning and Economic Investment Analysis, theory of economic development, and practice of Economic Development.

Dr David Garry Paterson has more than 30 years' work experience as a soils specialist. Dr Paterson has experience in soil classification and mapping, soil interpretations, soil survey project management environmental assessment, soil survey and land capability course presentation and ground penetrating radar.

Dr J A van Schalkwyk, D Litt et Phil, heritage consultant, has been working in the field of heritage management for more than 30 years. Based at the National Museum of Cultural History, Pretoria, he has actively done research in the fields of anthropology, archaeology, museology, tourism and impact assessment. This work was done in Limpopo Province, Gauteng, Mpumalanga, North West Province, Eastern Cape, Northern Cape, Botswana, Zimbabwe, Malawi, Lesotho and Swaziland. He has curated various exhibitions at different museums and has published more than 60 papers. During this period he has done more than 1 500 impact assessments (archaeological, anthropological and social) for various government departments and developers. Projects include environmental frameworks, roads, pipelines, power lines, dams, mining developments, water purification works, historical landscapes, refuse dumps and urban developments

2. PROJECT OVERVIEW

The proposed PV Plant requires a footprint of 25.8 ha to generate the projected power peak (electricity) of 17.2 MWp, this is referred to as Alternative Site 1. An alternative site, referred to as Alternative Site 3 was also considered and has a footprint of 14.4 ha with a projected power peak (electricity) of 9.6 MWp.

Alternative Site 1 is anticipated to have the least significant impact on ecological resources and generate greater benefits from a social perspective. Development of Alternative Site 1 will therefore allow for greater electricity export to the grid even though the proposed project will be used for Eskom's own consumption at Arnot Power Station. Alternative 1 was therefore proposed in the Draft Environmental Impact Assessment Report (DEIAR) as the preferred site.

A detailed description of the proposed Solar PV Plant is contained in Chapter 1 of the DEIAR and a description of the affected environment and related impacts is provided in Chapters 6 and 8 of the DEIAR respectively. A summary of Project components relative to the Alternative Sites proposed is presented in **Table 4 and 5** respectively. Layout maps for each Alternative Site proposed is presented in **Figure 2 and 3**. A sensitivity map and buffer zones are presented in **Figure 4**. No activity is to infringe or permitted within these buffers, unless authorised by the Department of Water and Sanitation (DWS).

2.1 SUMMARY OF PROJECT COMPONENTS, RELEVANT FOOTPRINT AND DIMENSIONS

Tables 4 and 5 present a summary of the project components relative footprints and dimensions for Alternative Site 1 and 3.

Table 4: Alternative 1 Project Components, footprint and dimensions

Component	Description	Approximate Dimension (m)	Approximate Footprint (ha)
PV panels (height & width)	68,800 (c-si technology)	1.64 m x 0.982 m	25.8 ha
	172,000 (thin film technology)	1.2 m x 0.60 m	
Generation Capacity	17.2 MWp		
Mounting Structure	Fixed tilted mounting structure	Up to 3 m	
Inverter Cabins	Approximately 17	80 m x 4 m	320 m ²
Transformer	Approximately 17	Located inside Inverter cabins	
Substation (Switching station)	1 Building	12 m x 11 m	132 m ²
O&M Building	1 Building	11m x 13 m	143 m ²
Capacity of on-site substation	17 MWp	-	-
Construction Camp/laydown area	Located close to the Power Station, on the	50 m x 80 m	0.4 ha

	north side of the proposed site		
Internal roads	Ring road, vertical and horizontal roads	Between 3 and 5 m in width	42,000 m ²
Transmission line	Overhead line	3000 m	33,000 m ² considering 11 m servitude
Fencing	Wire triple fencing	3 m in height	Up to 36,000 m ² considering up to 10 m distance between first and last fence and 3,600 m of fence perimeter
Slope	Approximately 4.1 % North-East/South-West		
Position of the solar facilities	25°57'19.57"S 29°46'49.93"E		
Cable route and trench dimensions	Direct Current (DC) cable will be connected in a string, with cable trays. The cables will be underground at a depth of 1 m and most likely will be along internal roads		
Cut and fill areas along roads and at substation /transformer sites	Approximately 819 m ³ ~ 850 m ³ considering excavation for the MV Cabins, O&M Building and Switching Station foundation. 1 m depth		
Spoil heaps	819 m ³ ~ 850 m ³ considering that the volume excavated for the MV Cabins, Operation and Maintenance (O&M) Building and Switching Station foundation. This will be located within the proposed area		

Table 5: Alternative 3 Project Components, footprint and dimensions

Component	Description	Approximate Dimension (m)	Approximate Footprint (ha)
PV panels (height & width)	38,400 (c-si technology)	1.64 m x 0.982 m	14.4 ha
	96,000 (thin film technology)	1.2 m x 0.6 m	
Generation Capacity	9.6 MWp		
Mounting Structure	Fixed tilted mounting structure	Up to 3 m	
Inverter Cabins	Approximately 10	80 m x 4 m	320 m ²
Transformer	Approximately 10	Located inside MV cabins	
Substation (Switching station)	1 Building	12 m x 11 m	132 m ²
O&M Building	1 Building	11 m x 13 m	143 m ²
Capacity of on-site substation	9 MWp	-	-
Construction Camp/laydown area	Located on the north Side of the site.	Approximately 50 m 80 m	Approximately 0.4 ha

Internal roads	Ring road, vertical and horizontal roads	Between 3 and 5 m in width	Approximately 24,000 m ²
Transmission line	Overhead line	4000 m	Approximately up to 44,000 considering 11 meters servitude m ²
Fencing	Triple Wire fence	3 m in height	Approximately 18,000 up to m ² considering 10 m distance between first and last fence and 1,800 meters of fence perimeter
Slope	1%		
Position of the solar facilities	25°57'35.53"S 29°47'25.89"E		
Foundation footprint (considering the MV Cabins, O&M Building and Switching Station)	Approximately 591 m ² ~ 600 m ²		
Cable route and trench dimensions (where they are not along internal roads)	DC cable will be connected in a string with cable trays. The cables will be underground at a maximum depth of 1 m and most likely will be along internal roads		
Cut and fill areas along roads and at substation /transformer sites along indicating the expected volume of each cut and fill	Approximately 595 m ³ ~ 600 m ³ considering excavation for the MV Cabins, O&M Building and Switching Station foundation 1 m depth		
Spoil heaps	Approximately 595 m ³ ~ 600 m ³ considering that the volume excavated for the MV Cabins, O&M Building and Switching Station foundation. This will be located within the proposed area.		

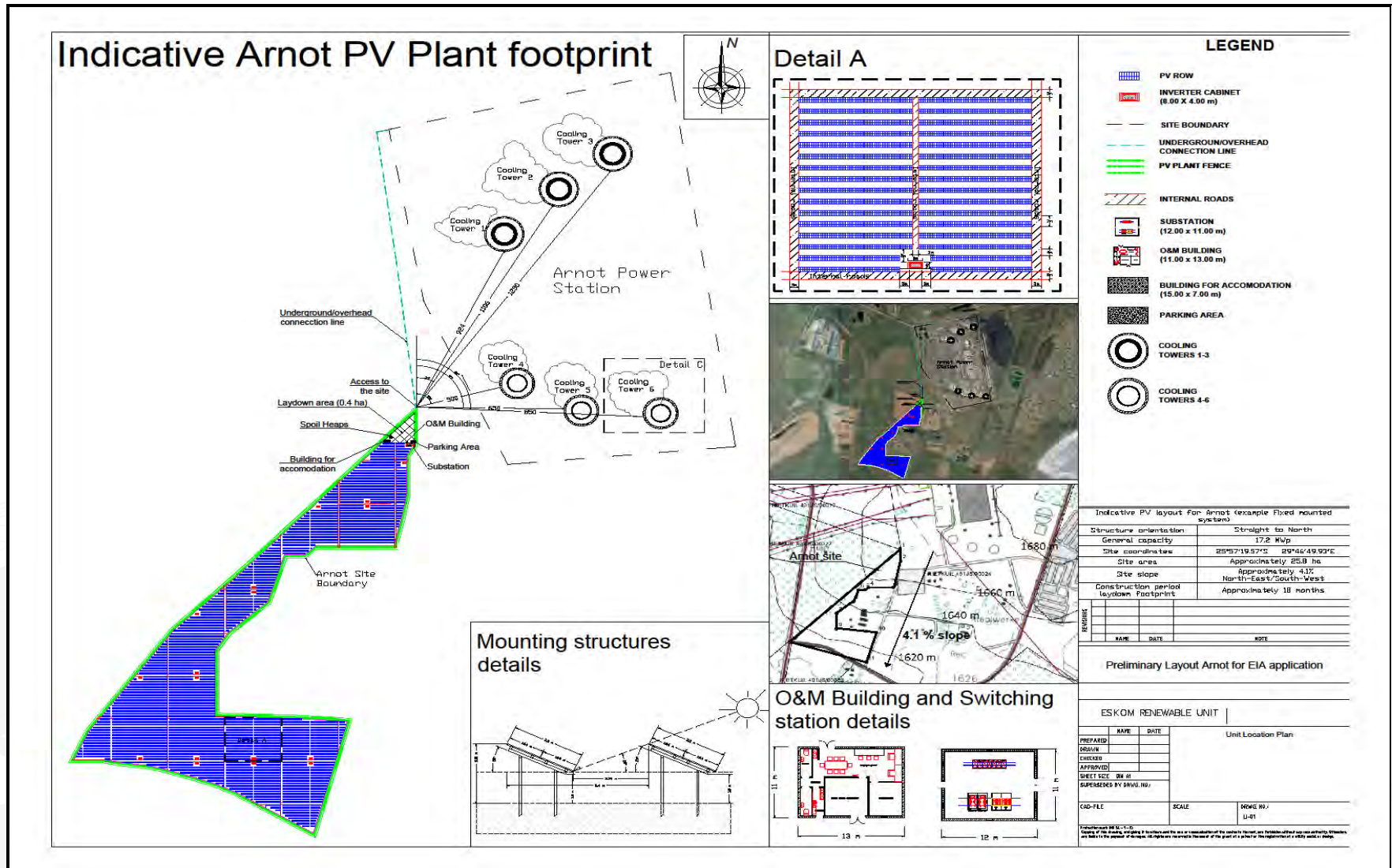


Figure 2: Alternative Site 1

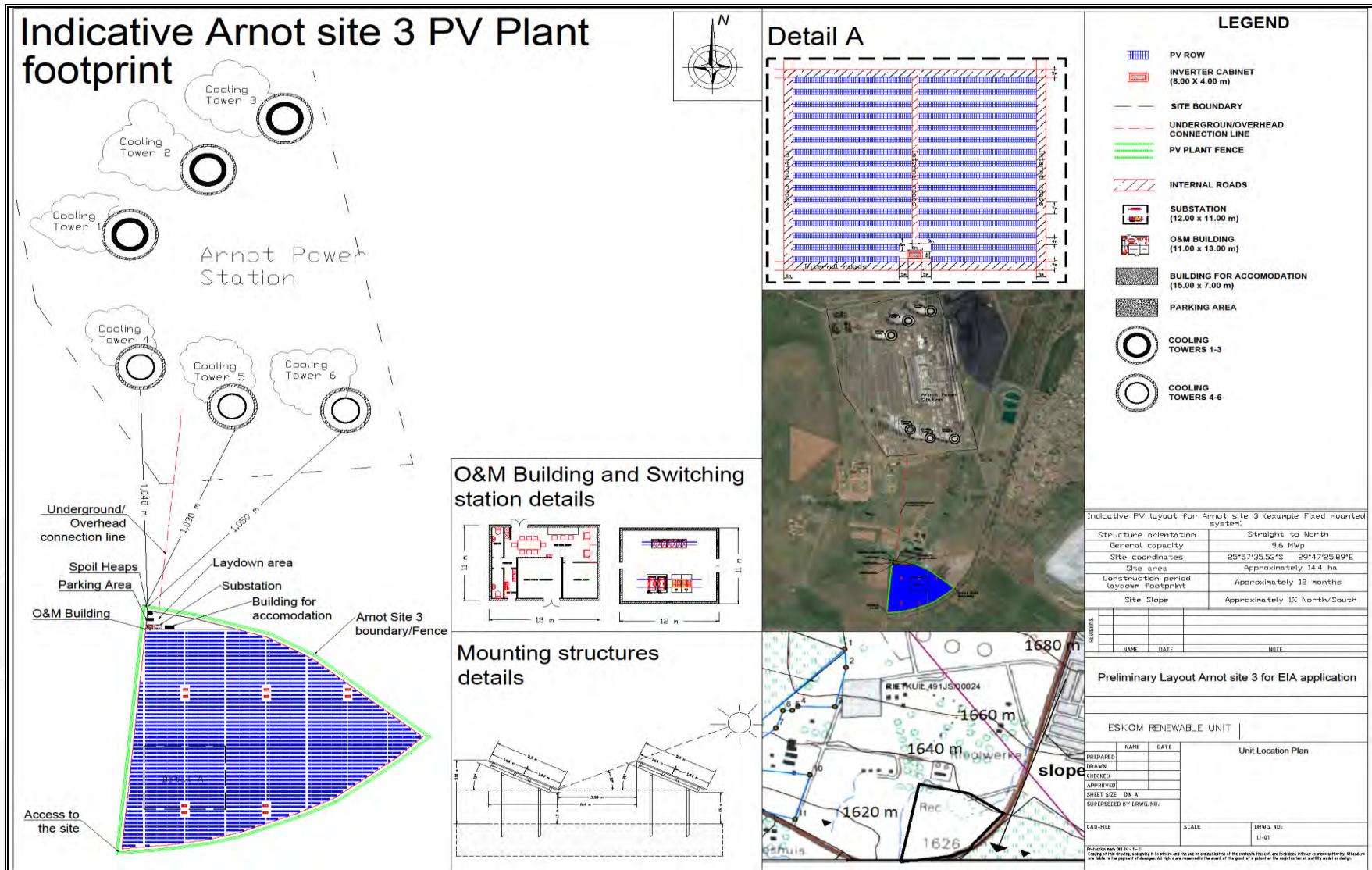


Figure 3: Alternative Site 3

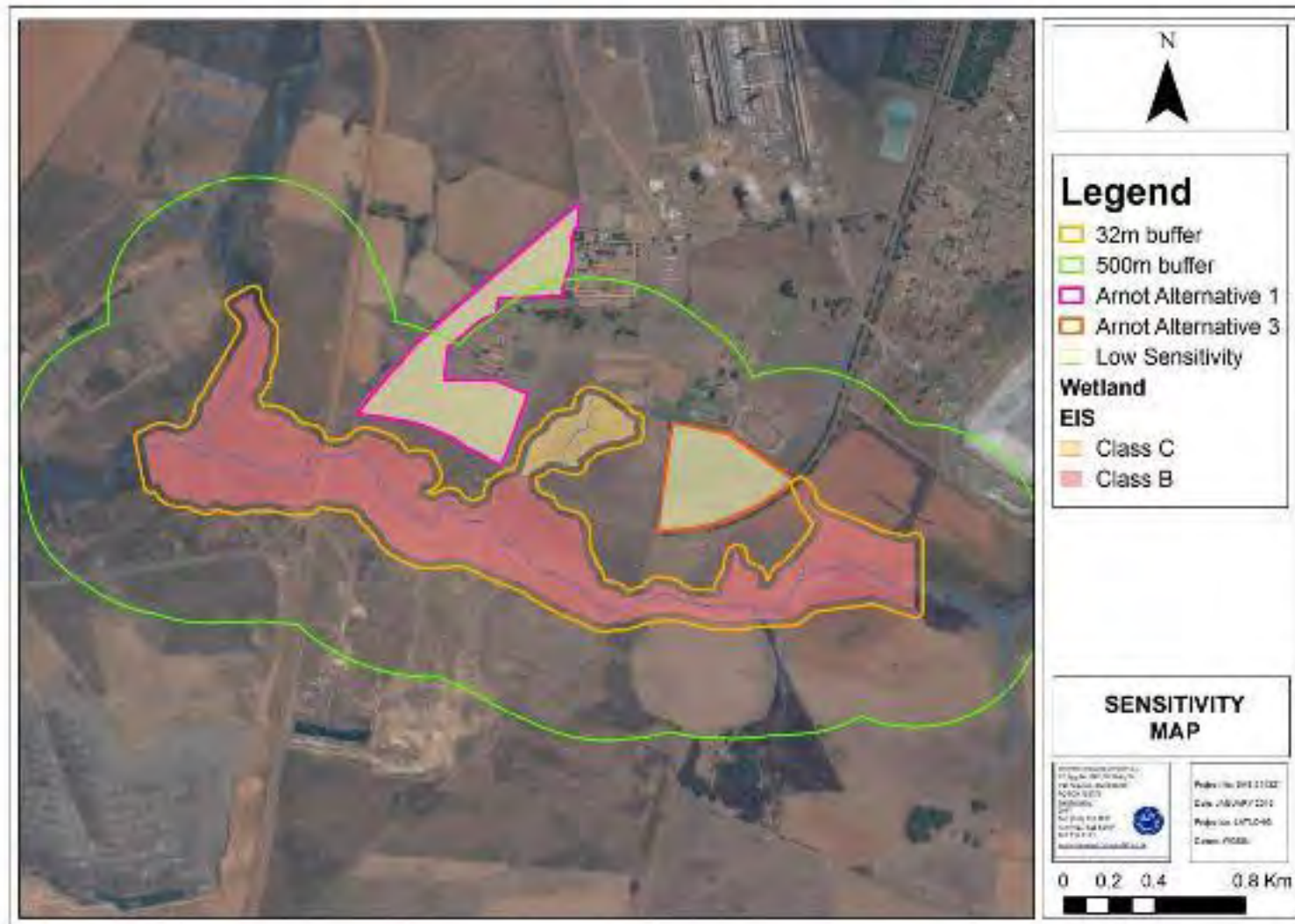


Figure 4: Sensitivity Map

3. ENVIRONMENTAL MANAGEMENT PROGRAMME

3.1 SCOPE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMP follows an approach of identifying an over-arching aim and objectives, accompanied by management actions that are aimed at achieving these objectives. The EMP is divided into four (4) phases of the project cycle:

- Planning and design phase;
- Construction phase;
- Operational phase;
- Decommissioning phase;

3.2 OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The objective of the EMP is to design, construct, operate and decommission the proposed PV Plant in a manner that:

- Minimises the ecological footprint of the project on the local environment;
- Minimises impacts on fauna, avifauna, flora and wetland ecosystems;
- Facilitates harmonious co-existence between the project and other land uses in the area.

3.3 STRUCTURE OF THE EMP

The EMP aims to address the environmental management throughout the project life-cycle, from planning and design, through construction, operation and decommissioning.

The EMP has been structured to include the following aspects:

Chapter 4 specifies roles, responsibilities and compliance monitoring requirements.

Chapter 5 highlights all relevant legislative requirements and principles.

Chapter 6 provides the measures applicable to the Planning and Design Phase.

Chapter 7 provides mitigation and management plans for the construction phase. It is divided according to the following sub-sections:

- Section 7.1: Site Establishment and Construction layout management and mitigation plan.
- Section 7.2: Natural Material Sourcing and Earthworks.
- Section 7.3: Noise Control Management and Mitigation Plan.
- Section 7.4. Dust Abatement and Mitigation Plan.
- Section 7.5.Waste Management and Mitigation Plan.
- Section 7.6 Emergency Preparedness Plan.
- Section 7.7 Soil Protection and Erosion Management and Mitigation Plan.
- Section 7.8 Water Management and Mitigation Plan.
- Section 7.9 Traffic and Transportation Management and Mitigation Plan.
- Section 7.10 Flora, Fauna and Avifauna Management and Mitigation Plan.
- Section 7.11 Socio-economic Management and Mitigation Plan
- Section 7.12 Heritage Management and Mitigation Plan
- Section 7.13 Site Rehabilitation

Chapter 8 provides Mitigation and Management Plans for the Operation Phase
Chapter 9 provides Mitigation and Management Plans for the Decommissioning Phase
Chapter 10 Conclusion



4. ROLES; RESPONSIBILITY AND COMPLIANCE MONITORING REQUIREMENTS

The purpose of this section is to define roles for personnel and allocate responsibilities in the implementation and monitoring of the EMPr.

4.1 DEPARTMENT OF ENVIRONMENTAL AFFAIRS (DEA)

The DEA, on behalf of the Minister, plays a lead role in the implementation of national environmental policies, legislation and regulations. Their role is to ensure that the the installation of a PV Plant at Arnot Power Station is implemented in a sustainable manner, in compliance to the relevant environmental legislation. DEA is responsible for approving the EMPr for the installation of a PV Plant at Arnot Power Station and any revisions and amendments thereto.

4.2 ESKOM HOLDINGS SOC LTD

Eskom is the applicant of the authorisation, the developer of the project and the Client of the Contractor and Environmental Control Officer (ECO). Under the South African environmental law, applicants are accountable for the potential impacts of activities being undertaken as well as managing these impacts. Eskom, therefore, has the overall environmental responsibility to ensure that the implementation of the EMPr complies with national and provincial legislation as well as with the conditions of the Environmental Authorisation (EA).

Eskom may delegate environmental compliance / responsibility to nominated agents such as the Contractor and ECO.

4.3 CONTRACTOR

The Contractor is responsible for the implementation of this EMPr and EA and must ensure works on site are conducted in an environmentally sensitive manner and fully in accordance with the requirements of the EMPr, at all times. The Contractor may appoint an environmental officer (EO) to assist with the implementation of the EMPr. The EO will be responsible but not limited to the following:

- Conduct a pre-construction survey of site, together with the ECO. The EO will document findings of the pre-construction survey in a report with photographic reference for the ECO to review before construction commences.
- The designated no go areas, as agreed with by Eskom and the ECO must be demarcated before construction commences.
- Ensure that all appointed sub-contractors are aware of this EMPr and their responsibilities in relation to the implementation of EMPr. Basic environmental awareness training shall be carried out for all employees and shall be included in safety training/induction.
- A copy of the EMPr shall always be made available on site.
- Conduct daily inspections of site and maintain a daily record of all environmental related activities on site.
- Implement a public's complaint procedure and ensure that all complaints are documented and all public comments or issues are appropriately addressed.

- Ensure that environmental mitigation measures are included in construction method statements for implementation.
- Ensure that the Code of Conduct is signed by all personnel responsible for activities that could have a negative impact on the environment.
- Maintain and manage an incidents and non-conformance register.
- Compile Method Statements for the following but not limited to:
 - Environmental Training;
 - Pollution Prevention;
 - Waste Management;
 - Hazardous Chemical Management;
 - Storm Water Management ;
 - Emergency Response;
 - Rehabilitation;
 - Rescue and relocation of fauna, avifauna and flora;
 - Complaints Procedure.
- Keep the following on file:
 - Daily reports/inspection checklists;
 - Environmental Training records;
 - Waste disposal certificates/waybills;
 - Copies of all permits and agreements required during the construction phase;
 - Non-conformance reports.

4.4 ENVIRONMENTAL CONTROL OFFICER

Eskom will appoint a suitably qualified ECO who will be responsible for monitoring and auditing the implementation of the EMPr and EA during the construction and decommissioning phases. The designation of the ECO is reserved for a suitably qualified independent environmental consultant, with adequate environmental knowledge to understand and implement the EMPr. Once appointed, the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring of the DEA.

The duties of the ECO during construction phase will include but are not limited to:

- Evaluation of the EIA documents and verify environmental condition of the project footprint.
- Prior to the commencement of construction activities the ECO and Contractor will conduct a pre-construction survey of site. The findings of the pre-construction survey must be documented in a report with photographic reference by the Contractor for the ECO's review. The construction procedure, designated no go areas and activity zones must also be confirmed at this time by the Contractor and Eskom and agreed with by the ECO.
- Bi-weekly (i.e. every two weeks) monitoring of site activities during construction must take place to ensure adherence to environmental laws and the conditions contained in the EA and EMPr.
- Monthly reports and relevant checklists on the findings of the monitoring sessions must be compiled and submitted to Eskom and the Contractor.

- Provide independent compliance reporting to environmental authorities as required by DEA.
- Conduct quarterly audits and compile report on audit findings for submission to Eskom and environmental authorities.
- Reporting of any non-conformances within 48 hours of identification of such non-conformance to the relevant authorities.
- Ensure that the requisite remedial action is implemented in the event of noncompliance.
- Maintain a non-conformance register.
- Ensure the proactive and effective implementation and management of environmental protection measures.
- Ensure that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed.
- Liaison with Eskom, Contractor and DEA.

4.5 CONTRACTOR MANAGEMENT

Contractor management will be affected through specific activities as listed below:

- At the tender briefing meeting environmental management expectations during the project shall be highlighted.
- The EMP shall be included with the contract documents.
- Once the Contractor is appointed they should be instructed to develop a document that should indicate how they plan to ensure compliance with the EMP; and
- Fines and penalties shall be managed in accordance with the Public Management Finance Act.

4.6 INCIDENTS AND NON-CONFORMANCES

According to Section 30 of the National Environmental Management Act (NEMA): *“Incident” means an unexpected sudden occurrence including a major emission, fire or explosion leading to serious danger to the public or potential serious pollution of or detriment to the environment, whether immediate or delayed.*

In terms of the above definition:

The Emergency response plan/method statement should be initiated in response to an incident as classified in **Table 6**. The incident must be reported to the ECO and DEA as per Section 30 (3) of NEMA. An emergency incident report required in terms of Section 30(5) of NEMA must be submitted to DEA’s Environmental Management Inspectorate for processing. A close out certificate issued by the Inspectorate indicating that measures undertaken were to the department’s satisfaction should be obtained by the ECO, if possible.

A chemical spill is defined as a potential liquid hydrocarbon or chemical spill or other release which can create a hazard to life or property or create environmental damage. Examples include liquid hydrocarbons, compressor or other equipment lube oil,

evaporative cooler acid water, liquid odorant, or other substances that contain controlled or hazardous substances. Spills and other environmental incidents have been classified according to the risk to the environment and appropriate responses are indicated in **Table 6**.

Table 6: Classification of Environmental Incident

Level	Definition	Response Required
Level 1	A Minor Emergency which can be controlled entirely by the personnel and facilities located within the immediate vicinity of the accident/incident site. These include events which cause minor property or equipment damage that are non-disruptive to operations, and do not pose a safety risk to personnel or property outside of the boundaries of the development footprint.	Recorded in the incidents register and managed accordingly
Level 2	A Level 2 Incident is defined as a Moderate Emergency which is disruptive, but not extensive, and forces <u>a portion</u> of the employer operation to be temporarily suspended or shut down. A Level 2 Incident is a spill or hazardous product release which has the potential to cause harm to personnel, the public, or the environment and includes a chemical spill of more than 35 l to land; or any chemical spill to water resources.	Recorded in the incidents register and managed accordingly
Level 3 to 5 Incidents	A Level 3 to 5 Incident is defined as a Serious (3), Major (4) to Catastrophic (5) alert requiring the intervention of external support services and that can have serious impacts on ecology, humans and on the overall Project.	Report the incident to the ECO immediately. The ECO will submit an emergency incident report to DEA. The incident must also be recorded in the incidents register

In the above cases, it will be the decision of the site management as to whether work stoppage must be implemented. In most cases, work in the area where the incident occurred will be stopped until all safety clearances have been given. Unless, there is a fatal accident, then the whole site will stop.

The holder of the authorisation must notify DEA, in writing and within 48 (forty eight) hours, if any condition of the Environmental Authorisation cannot be or is not adhered to. The notification must be accompanied by reasons for the non-compliance. Non-compliance with a condition of the Environmental Authorisation may result in criminal prosecution or other actions provided for in NEMA and the regulations.

4.7 PENALTIES AND FINES

A penalties and fines system shall be developed and implemented as per Eskom's procedure.



5. LEGISLATIVE REQUIREMENTS AND PRINCIPLES

5.1 ENVIRONMENTAL PRINCIPLES

The following principles should be considered at all times during the pre-construction and construction phase activities.

- The environment is considered to be composed of both biophysical and social components.
- Construction is a disruptive activity and due consideration must be given to the environment, including the social environment, during the execution of a project to minimise the impact on affected parties.
- Minimisation of areas disturbed by construction activities (i.e. the footprint of the construction area) should minimise many of the construction related environmental impacts of the project and reduce rehabilitation requirements and costs.
- As minimum requirements, all relevant standards relating to international, national, provincial and local legislation, as applicable, shall be adhered to. This includes requirements relating to waste emissions (e.g. hazardous, airborne, liquid and solid), waste disposal practices, noise regulations, road traffic ordinances, etc.
- Every effort should be made to minimise, reclaim and/or recycle “waste” material.

5.2 ENVIRONMENTAL PERMITS, LICENCES AND AUTHORISATIONS

Commencement of the project is subject to obtaining all necessary permits, licences and/or authorisations required in terms of South African environmental legislation. A number of activities were applied for as part of the EIA process. Should the project trigger any other activities not included in the applications submitted, a separate application process must be followed and these activities authorised before the project can commence.

Such activities may include:

- **Waste management** - The management of waste is regulated by the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) and associated Regulations.

GN 921 lists Waste Management Activities in respect of which a Waste Management Licence (WML) is required; these include various activities associated with the storage of waste, reuse, recycling and recovery of waste, treatment of waste (which includes the remediation of contaminated land) and disposal of waste. The Schedule to the Notice distinguishes between two categories of waste management activities which require licensing and for which a basic assessment process (for Category A Waste Management Activities) or an Environmental Impact Assessment process (for Category B Waste Management Activities) must be conducted. A third category (Category C) refers to activities for which norms and standards have been set.

- **Storage of hazardous substances** - Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which may include the Hazardous Substances Act, the Occupational Health and Safety Act, and relevant associated Regulations. No more than 500 m³ of hazardous substances may be stored on site without an environmental authorisation.
- **Health and safety of work teams** - Construction Regulations (2003) published under the Occupational Health and Safety Act (Act No 85 of 1993) apply to construction activities including “the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work”. A “health and safety plan” which addresses hazards, and includes safe working procedures to mitigate, reduce or control the hazards identified, is required under this Act. A risk assessment must also be undertaken by an appropriately qualified person(s) and the Contractor shall ensure that all employees under his or her control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences, and thereafter at such times as may be determined in the risk assessment.
- **Heritage resources** – Before any heritage resources are demolished or damaged a permit must be obtained. Permit applications must be submitted to the relevant Heritage Resources Authority).
- **Removal of graves** - Permits are required for the removal of graves in terms of the National Heritage Resources Act (No 25 of 1999) section 36.
- **Removal of trees** – The removal of trees protected in terms of the National Forests Act (No 84 of 1998) requires a licence from the Department of Agriculture, Forestry and Fisheries (DAFF).
- **Removal and transportation of endangered fauna and flora** - A permit must be obtained from the provincial nature conservation agency for the removal or destruction of indigenous protected and endangered plant and animal species. Copies of permits required must be submitted to the DEA for record keeping purposes.
- **Water abstractions** – Water abstracted from any sources for construction purposes requires authorisation from DWS.

6. PLANNING AND DESIGN

6.1 GENERAL

This section of the EMP provides a framework for environmental protection during the planning and design phases of the project, leading up to, but not including, the establishment on site by the appointed Contractor.

The pre-construction activities are the responsibility of Eskom as the authorisation holder. Should the authorisation be transferred to another party, that party would be responsible.

6.2 SOCIO-ECONOMIC MANAGEMENT PLAN

- a) Develop and adopt a local procurement policy to maximise the benefit to the local economy.
- b) Develop a database of local companies, specifically BBEE companies, which qualify as potential service providers prior to the commencement of the tender process for construction contractors. These companies should be notified of tender and invited to bid.
- c) Local employment policy shall be developed together with a training programme.
- d) A list of locally available labour and skills shall be developed. Preference shall be given to local communities for employment opportunities; and
- e) Recruitment shall be based on sound labour practices and with gender equality in mind.

6.3 SITE LAYOUT PLANNING

- a) All construction activities shall be contained within the PV facility footprints to minimise disturbance outside these areas.
- b) All water courses, wetlands, drainage systems and pans must be considered as No-go areas.
- c) No development or operational activities may take place within buffer zones presented in **Figure 4** unless authorised by DWS.
- d) Clearly demarcate sensitive areas into which no construction activities should encroach.
- e) Where construction will obstruct existing access, be sure to allow for alternative temporary access routes.

6.4 ACCESS ROADS AND ROAD UPGRADES

- a) Internal roads shall be designed to have minimal impact on the environment; and where internal roads need to be realigned, these should not cross drainage lines.
- b) A traffic management plan shall be compiled and implemented during the construction and operational phase.
- c) A transportation plan shall be compiled and implemented for the transport of panel components.

- d) Engage with the roads authorities prior to construction to ensure the necessary road upgrades, permits, traffic escorts etc. are scheduled.



7. MANAGEMENT AND MITIGATION PLANS FOR CONSTRUCTION

This Chapter provides specific and detailed management and mitigation plans for the construction phase of the project. Each management and mitigation plan deals with a specific construction or environmental aspect. The management and mitigations plans structure provides for a section that describes the purpose of the aspect, the specific components of the aspect, objectives and targets for each component and specific management and mitigation requirements.

Each management and mitigation plan includes objectives, targets and mitigation requirements. If the mitigation requirements are found to be insufficient to effectively mitigate potential negative impacts the Contractor may be instructed to prepare a detailed method statement to effectively mitigate potential negative impacts.



7.1 SITE ESTABLISHMENT AND CONSTRUCTION LAYDOWN AREA

This management and mitigation plan defines the establishment and management of the general site and the construction laydown area to prevent or minimise environmental impacts these might cause.

The plan is made up of the following components:

- Site Clearance;
- Site offices;
- Ablution facilities;
- Eating areas;
- Environmental Awareness;
- Hazardous materials handling and storage;
- Gates and Fences

7.1.1 Site Clearance

Objective

Limit extent of areas cleared for construction purposes and to contain all activities within the development foot print.

Target

- To minimise impacts associated with the establishment of the site office.
- Compliance with SANS standards for site clearance (SANS 2001-BS1:2008).

Management and mitigation requirements

- a) Site clearance shall occur in a planned manner.
- b) No areas falling outside of the approved footprint may be cleared for construction purposes.
- c) Adhere to SANS standards (SANS 2001-BS1:2008) or Eskom Bush Clearing procedure for site clearance.

7.1.2 Site Offices

Objective

To minimise impacts associated with the establishment, operation and decommissioning of the site office.

Target

- Effectively locate site office for optimum functionality.

Management and mitigation requirements

- a) The site layout must be planned to facilitate ready access for deliveries, facilitate works and to curtail any disturbance or security implications for the daily functions of the Arnot Power Station and that of the public using the area.
- b) The site layout plan as provided by Eskom in Figure 2 and 3 must be adhered to.

- c) The site office must include designated areas for prefabricated offices, ablution facilities, equipment, and stockpiles.
- d) Down-lighting will be used at night and the Contractor shall ensure that lighting on site does not interfere with road traffic or cause a reasonably avoidable disturbance to the surrounding community or other users of the area.
- e) No lodging facilities will be provided for on site. Those who are not local staff will be accommodated in suitable and established lodging facilities in close proximity to the proposed PV Plant.
- f) The development footprint must be fenced and access control measures implemented.
- g) The “no-go” areas must be demarcated to prevent workers from entering areas outside the construction domain.
- h) No washing of vehicles and equipment must be done on site unless a designated wash bay is on site.
- i) No servicing of vehicles must be done onsite, in the event of a breakdown or for emergency repairs suitable liner materials to protect the ground must be utilised, and the use of spill prevention measures must be adopted.
- j) Should a designated wash bay, fuel storage area, or vehicle servicing area be made available on site an oil/water separator must be installed to collect run-off and discharge. Oils collected in this manner will be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at licensed waste disposal facility to receive such waste.
- k) Water discharged from this oil/water separator will have to comply with the requirements of the National Water Act, specifically with the conditions set by the General Standard (Regulation 9225, Government Gazette, 18 May 1984) unless a licence is issued that sets specific standards for selected variables.

7.1.3 Ablution facilities

Objective

To ensure that ablution facilities that comply with norms and standards are provided.

Targets

- Sufficient ablution facilities supplied for the workforce;
- Ablution facilities are kept clean and in good working order;

Management and mitigation requirements

- a) An adequate number (as per the requirements of the OHSA at a preferred ratio of 1 toilet per 15 workers, but not less than 1 toilet per 30 workers) of portable toilets at the various work areas and site establishment area, including provision for security and access control personal.
- b) Toilets should not be located further than 100 m from the place of work.
- c) The Contractor shall make provision to have the toilets cleaned and maintained in a hygienic fashion and shall supply toilet paper.
- d) Toilets must be secured to the ground to ensure they are not blown over during high winds or bumped over.

- e) The Contractor shall also make available provisions for workers to wash their hands after using the toilets.
- f) Where portable toilets are located within view of the public or neighbouring residences or places of business, efforts should be taken to screen such facilities from view.
- g) The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are properly stored and removed from Site.
- h) Discharge of waste from toilets into the environment and burial of waste is strictly prohibited and must be treated at a registered waste water treatment works.
- i) The EO shall keep record, and provided such records upon request from the ECO, of the location and volumes of waste disposed.
- j) The use of pit latrines and soak-a-ways is prohibited.
- k) Washing, whether of the person or of personal effects and acts of excretion and urination are strictly prohibited other than at the facilities provided.
- l) The Contractor shall take disciplinary action and implement penalties against any staff member found in contravention of this requirement.

7.1.4 Eating Areas

Objective

The Contractor must ensure that there is a designated eating area that is protected from the elements and has adequate seating to accommodate the staff.

Target

- The workforce involved in the project are well informed and utilise the designated eating area.

Management and mitigation requirements

- a) The Contractor must ensure that a designated eating area within the construction laydown area is provided.
- b) The eating area must provide protection from the elements (rain, wind, sun).
- c) The eating areas should also be located away from construction noise, dust, waste storage areas, hazardous materials stores, fuel storage and dispensing areas and any other activity that may contaminate food or impair comfort.
- d) The eating areas shall provide adequate seating to accommodate the staff.
- e) An adequate number of rubbish bins shall be provided to contain the waste generated and emptied daily or as when required.
- f) The eating areas shall make provision for a smoking area, including seating and a fire proof sand filled container for extinguishing cigarettes. Smoking shall otherwise be prohibited across the site and in the work areas.
- g) The eating area must be kept clean and tidy.

7.1.5 Environmental Awareness

Objective

All personnel involved in the project (including sub-contractors, visitors, inspectors, casual workers, etc.) are aware of and familiar with the environmental requirements for the project.

Target

- To ensure that conditions of the EA and EMP that are relative to the day to day activities on site are included in the Safety Induction,
- All personnel undergo a safety and environmental induction before commencing with any activities on site;

Management and mitigation requirements

- a) The Contractor has the responsibility to provide the site foreman with environmental training and to ensure that he/she is capable of passing the information to all the construction staff. Training of the construction staff shall include:
 - How construction activities can impact on the environment and what can be done to mitigate such activities;
 - Construction staff shall be made aware of the appearance of possible archaeological or historical objects look and to notify the EO and ECO if such an object is found;
 - Management and minimising of waste;
 - Spill prevention and clean-up procedures;
 - Responsible handling of chemicals and spills;
 - Emergency procedures and incident reporting;
 - Making staff aware of the risk and dangers in regular tool box talks;
 - Code of Conduct;
- b) The ECO will monitor the performance of the construction staff to ensure that the points that were relayed during their training and induction have been understood and are being followed. If required, a translator may be requested to explain aspects of the environmental requirements or acceptable social behaviour that are unclear.
- c) The Contractor will ensure that construction staff are aware of the following rules:
 - Eskom lifesaving rules;
 - No firearms allowed on site;
 - Pets are not allowed on site;
 - Firewood may not be harvested from the site or from adjacent areas;
 - Trespassing on neighbouring properties is forbidden;
 - Fines shall be implemented for transgressions.
- d) Environmental awareness must be created through the use of signage, posters, and regular tool box talks.

7.1.6 Hazardous Material handling and storage

Objective

To ensure that hazardous materials handling and storage is effective and compliant with national, provincial and local regulatory requirements.

Target

- Ensure 100 % compliance to national, provincial, and local regulatory requirements.

Management and mitigation requirements

Hazardous materials include diesel, petroleum, oil, bituminous products, cement, solvent-based paints, lubricants, explosives, drilling fluids, pesticides, herbicides and Liquid Petroleum Gas. Material Safety Data Sheets (MSDSs) shall be available on site for all hazardous substances used on site.

- a) Ensure that all personnel (storeman) that use, handle and store hazardous materials are trained in the following:
 - In the use and potential dangers of materials;
 - Emergency response procedures;
 - The handling and storage practices, for all containers with which they will come into contact;
 - PPE requirements;
- b) An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment, the following minimum requirements must be implemented:
 - All hazardous substances must be stored in a designated area that is ventilated, surrounded by an impermeable bund and provided with a hard, impervious surface as well as sufficient roof cover to prevent the ingress of water;
 - Where applicable or as advised by the ECO all bunded areas will be provided with a catchment sump that drains to a separator unit and prevents runoff from entering and contaminating any adjacent areas;
 - Bund walls must be impervious and of sufficient height to contain at least 110% of the volume of any materials stored within the bunded area;
 - All hazardous materials storage area must be locked and access restricted to authorised personnel and must be clearly marked as such;
 - All relevant safety signage must be erected outside the hazardous storage area;
 - Firefighting equipment must be placed within range of the hazardous storage facility;
 - All hazardous material containers must be clearly labelled;
 - Storage of incompatible materials (acids bases, flammables, oxidizer reactive chemicals) into separate areas and with containment facilities separating materials;
 - Store acetylene, propane and oxygen cylinders in dedicated areas where they will be protected from collision or ignition sources.
- c) The following conditions must be implemented when storing, handling and dispensing of fuel:
 - The Contractor may not store, in above ground containers a combined volume of fuel equal to or greater than 30 m³ on the site without the appropriate Environmental Authorisation;
 - Fuel stored in 200 Litre drums must be stored in accordance to the minimum requirements highlighted above;

- Fuel bowsers must be stored in a well ventilated area, on a smooth impermeable surface, protected from the ingress of water and that also provides containment (bunded) if spillage has to occur;
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel;
- Where reasonably practical, plant shall be refuelled in a designated area, on an impermeable surface with appropriate containment to prevent contamination of the surrounding environment;
- If it is not reasonably practical then the ground surface must be protected by employing the use of appropriate drip trays to prevent contamination of soil and surrounding environment;
- The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb minor hydrocarbon spillage;
- The Contractor shall ensure that staff responsible for refuelling of plant are trained to clean up any fuel or oil spills as they occur.

7.1.7 Gates and fences

Objective

To ensure fencing and gates are maintained in good order.

Target

- To secure the site.
- To limit workers movement to neighbouring properties.
- To ensure that all construction activities remain within the development footprint and away from sensitive areas.

Management and mitigation requirements

- a) Erect fencing around the development footprint before site establishment.
- b) Ensure that fencing is maintained throughout the construction period.

7.2 NATURAL MATERIALS SOURCING AND EARTHWORKS

To ensure that materials are sourced from authorised operations and that potential impacts from stockpiled material on the environment are limited.

The plan is made up of the following components:

- a) Material Sourcing;
- b) Earthworks and Stockpiles.

7.2.1 Material Sourcing

Objectives

To ensure that materials used for construction are from authorised operations.

Targets

- A 100% record of the source of all materials.

Management and mitigation requirements

- a) The Contractor will prepare a source statement to indicate the sources of all materials (including topsoil, sand, natural gravel, stone, asphalt, etc.) and submit these to Eskom for approval.

7.2.2 Earthworks and Stockpiles

Objectives

To ensure that material stockpiled does not negatively impact on the surrounding environment and that topsoil is suitably stored for subsequent use in the rehabilitation and re-vegetation of the site

Targets

- Stockpiles are constructed and maintained appropriately.
- To ensure conservation of top soil for the rehabilitation of the site.

Management and mitigation requirements

- a) Prior to site establishment and any earthmoving operations, the Contractor will strip and stockpile all topsoil within the footprint of the construction activities.
- b) The following shall apply for the stripping, stockpiling and storage of topsoil:
 - Soil shall be stripped in a phased manner, so as to retain vegetation cover for as long as possible to avoid prolonged exposure of soils to wind and water erosion.
 - All topsoil shall be stockpiled separately from spoil material.
 - No imported topsoil will be used as the final backfill layer.
 - Topsoil stockpiles shall be convex and shall not exceed 2 metres in height.
- c) All stockpiles will be positioned and sloped to create the least visual impact.
- d) All stockpiles will not be allowed underneath trees or against the trunks of trees.
- e) All stockpiles will be constructed and maintained to avoid erosion of the material and contamination of the surrounding environment (including measures such as berms and hessian sheets to prevent erosion and sedimentation).

- f) The heights of stockpiles should be minimised as far as possible to reduce wind entrainment and stockpiles should be located as far away as possible from sensitive receptors.
- g) Weed control must be administered on all stockpiles
- h) If the stockpiles start to erode significantly or cause dust problems, they shall be covered with hessian this is to be determined by the ECO.
- i) Vehicles transporting spoil material must be covered before leaving site.

7.3 Noise Control Management and Mitigation Plan

There are several general noise mitigating measures/principles which must be applied during the construction phase in order to prevent/minimise impacts on the identified noise sensitive areas. These requirements apply to all of the construction areas of the project.

Objective

To minimise noise levels.

Target

- To ensure noisy operations are restricted to day time hours.
- To ensure compliance with requirements of the Occupational Health and Safety Act (Act No 85 of 1993).

Management and mitigation requirements

- a) Construction activities are to be contained to working hours during the day.
- b) Deliveries of material and any noisy offloading activities should be restricted to daytime.
- c) As construction workers operate in a very noisy environment, it must be ensured that their working conditions comply with the requirements of the Occupational Health and Safety Act (OHSA) (Act No 85 of 1993). Where necessary ear protection gear should be worn.
- d) No amplified music shall be allowed on site. The use of radios, tape recorders, compact disc players, television sets etc. shall not be permitted unless the volume is kept sufficiently low as to avoid any intrusion on members of the public within range. Sound amplification equipment is not to be used unless in emergency situations.
- e) All equipment shall be kept in good working order with immediate attention being paid to slipping fan belts, worn bearings and other sources of anomalous noise.
- f) Equipment shall be operated within specifications and capacity (e.g. no overloading of machines).
- g) Regular maintenance of equipment will be undertaken particularly with regards to lubrication.
- h) Equipment shall be operated with appropriate noise abatement accessories such as sound hoods which must be correctly maintained.
- i) Equipment shall be turned off when not in use.

7.4 Dust Abatement and Mitigation plan

To maintain the emissions of dust particulates and exhaust fumes to a minimum to minimize health hazards and nuisance to workers and persons in adjacent areas and preventing damage to natural vegetation and crops.

Objective

To minimise dust emissions from the construction sites.

Target

- No complaints received regarding dust nuisance.

Management and mitigation requirements

- a) Vehicles travelling along the access roads must adhere to speed limits to avoid creating dust.
- b) A maximum speed limit of 40 km/hr must be adhered to on all site roads.
- c) Dust abatement measures must be implemented.
- d) Visual dust monitoring must be undertaken by the EO and ECO, and dust abatement measures implemented immediately should excessive dust releases be noticed.
- e) Where dust is unavoidable, screening may be required.
- f) *The Contractor must submit an air quality (dust) management method statement that must include but is not limited to the following:*
 - *Identification of high dust generation activities.*
- g) *Techniques proposed for controlling dust. These may include water spraying and/or application of dust suppressants*
- h) *The Contractor must submit an air quality (dust) management method statement that must include but is not limited to the following:*
 - *Identification of high dust generation activities.*
 - *Techniques proposed for controlling dust. These may include water spraying and/or application of dust suppressants.*
 - *If water spraying is the chosen method of dust control adequate provision must be made for designated water trucks for the sole purpose of administering dust suppression (i.e. these are not to be used for production purposes). The method statement must detail the route/area that each water truck is designated for and how regularly dust suppression in these areas will be undertaken.*
 - *If the use of dust suppressants is the chosen method of dust control, the drivers of the truck must be adequately trained in mixing and applying this measure on routes/areas. The method statement must detail mixture requirements and route/area that each water truck is designated for and how regularly dust suppression in these areas will be undertaken.*

7.5 WASTE MANAGEMENT AND MITIGATION PLAN

The inappropriate handling and disposal of waste materials can impact on both human safety and risk contamination of the natural environment. This management and mitigation plan covers the handling and disposal of solid waste, including domestic, construction, and hazardous waste as well as waste water/contaminated water and old shutter oil, generated during construction.

The waste management principles of prevent, minimise, recycle or re-use, with disposal as a last option will apply. Only permitted/licensed, registered and municipal landfills will be considered as options for disposal of waste. The Contractor must compile a Waste Management Method Statement with minimum requirements:

- Classification/identification of waste streams as described but not limited to the sections that follow;
- Designate waste disposal facilities (bins, skips etc.) for each waste stream;
- Designate individuals responsible for waste management on site and train accordingly;
- Identify where and how to dispose of difference waste streams;
- Record keeping and maintaining waste manifest and safe disposal certificates to account for all waste removed off site for safe disposal.

The plan is made up of the following components:

- Domestic waste.
- Inert waste.
- Hazardous waste.
- Handling and disposal of contaminated waste water.

7.5.1 Domestic waste

Objective

To ensure that all domestic waste generated during construction is disposed of at a licensed municipal waste disposal facility.

Target

- Reduced the amount of waste produced.
- Re-use of material where possible.
- Recycle the material where possible.
- Disposal as the last resort.

Management and mitigation requirements

- a) Ensure segregation of hazardous wastes from non-hazardous waste.
- b) Segregation of waste must be maximised so that reuse and recycling are not compromised.
- c) Utilise lidded bins and/or covered skips to prevent windblown waste into neighbouring properties and limit rodent, pests and bad odours.
- d) Maintain Waste manifests for all waste streams and safe disposal certificates/waybills.

- e) Disposal of all waste must be done at a licensed disposal facility in accordance to all applicable legislation.
- f) The Contractor shall make available the time and resources needed to undertake routine housekeeping of the works areas and site establishment areas at a minimum of a weekly interval. Housekeeping shall include:
 - maintenance of barriers;
 - structures;
 - Signage;
 - Material stockpiles to ensure that they are safe and aesthetically acceptable and to the satisfaction of the ECO.
 - Construction materials shall be stacked in a safe, neat and orderly fashion and shall comply with the requirements of the OHSA.
 - Windblown litter construction debris and spoil shall be collected and removed for safe disposal.
- g) Littering will not be allowed on site.
- h) Dumping of waste will not be allowed.
- i) The excavation and use of rubbish pits on site is forbidden.
- j) Burning of rubbish is forbidden.

7.5.2 Inert waste

"Inert waste" means waste that:

- does not undergo any significant physical, chemical or biological transformation after disposal;
- does not burn, react physically or chemically biodegrade or otherwise adversely affect any other matter or environment with which it may come into contact; and
- does not impact negatively on the environment, because of its pollutant content and because the toxicity of its leachate is insignificant and which include discarded concrete, bricks, tiles and ceramics, discarded glass and discarded soil, stones and dredging spoil.

Objective

To ensure that inert waste is responsibly disposed of.

Targets

- Responsible reuse and/or disposal of inert material or waste.

Management and mitigation requirements

- a) Construction waste material will be recycled or re-used (e.g. for levelling or as cover material in landfill sites) in the construction process as far as possible.
- b) Regular clearing and disposal of spoil material.
- c) Where waste is to be transported by truck, it will be covered with a tarp appropriately when travelling through inhabited areas.

7.5.3 Hazardous waste

Objective

To ensure that hazardous waste is disposed at an appropriate registered waste disposal facility.

Target

- Hazardous waste will always be disposed of at a registered waste disposal facility for toxic/hazardous material.

Management and mitigation requirements

- a) Used oil, lubricants, and cleaning materials from the maintenance of vehicles and machinery shall be collected in a holding tank and stored as hazardous materials before being sent back to the supplier or recycled by a reputable registered/permitted company.
- b) An oil/water separator should be installed to collect run-off from designated wash bays and designated fuel areas (if provided on site by the contractor). Oils collected in this manner will be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at approved waste disposal sites for toxic/hazardous materials.
- c) Used spill material, filter materials shall be temporarily stored in a designated hazardous waste bin/skip for safe disposal off site to a licensed disposal facility to receive such waste.
- d) Contaminated soil must be unearthed to the point of infiltration, bagged, sealed and temporarily stored in a designated hazardous waste bin/skip for safe disposal off site to a licensed disposal facility to receive such waste.
- e) Dumping of hazardous waste will not be allowed.
- f) Empty cement bags are considered hazardous waste and must not be disposed of accordingly.
- g) Certificates of safe disposal must be provided for every load and must include the date and vehicle registration number.

7.5.4 Handling and disposal of contaminated waste water

Objective

To ensure the handling and disposal of contaminated water is done within the framework of applicable acts and regulations.

Targets

- No discharge of polluting elements to any Storm water drain and surrounding environment.
- A 100% compliance to relevant standards.

Management and mitigation requirements

- a) No discharge of pollutants such as cement, concrete, lime, chemicals, fuels, or oils will be allowed into any water resource and surrounding environment.
- b) Grey water from kitchens, showers, and/or sinks shall be discharged in accordance with NEMWA Waste Regulations and DWA General Discharge Standards.

- c) Runoff from fuel areas, workshop areas, wash bays, and concrete swills shall be treated as hazardous liquid waste in accordance with the NEMWA Norms and Standards.
- d) Wash areas shall be placed and constructed in such a manner so as to ensure that no pollution occurs, including groundwater pollution; and
- e) Contaminated water must be stored in accordance with NEMWA Norms and Standards and removed by tanker to a licensed facility.

7.6 EMERGENCY PREPAREDNESS PLAN

In the case of an incident as described in **Section 4** of this EMP, the Emergency preparedness plan will ensure that impacts are limited/and or addressed accordingly. Emergency preparedness and response plan must be compiled and detail the following:

- A telephone contact list of personal responsible for emergency prevention and response, (the relevant Eskom representative, and local emergency services).
- A list and description of the types of emergencies that may arise on site.
- Site evacuation procedures and emergency assembly point (drills to be conducted).
- Procedures to be followed in the event of an incident.
- Safeguard measures to prevent fire, with special reference to hazardous materials, fuels and lubricants and explosives stores.
- A layout plan showing the following:
 - The location and type of firefighting equipment;
 - Emergency assembly point;
 - Evacuation routes.

The Emergency Preparedness Plan must encompass Spill Management Plan and Fire Management Plan as follows:

7.6.1 Spill Management Plan

Objective

To prevent spills on site.

Target

- In the event of a spill, quick and effective remedial action must be taken to ensure little or no significant impact.
- Should a spill occur the correct reporting procedure is to be implemented.

Management and mitigation requirements

- a) In the event of a hydrocarbon spill, the source of the spillage shall be isolated, and the spillage contained. The contaminated area must be unearthed to the point of infiltration.
- b) All contaminated soil and materials must be treated as hazardous waste and disposed of at a licensed facility to receive such waste.

- c) The contractor is required to submit a method statement on spill prevention and detail how spills will be managed. The minimum requirements include:
- Spill prevention measures, such as drip trays, need to be made available on site and proper use communicated to the workforce;
 - All Spills must be reported to the EO for immediate remedial action;
 - All employees must be aware of the emergency procedure(s) to be followed in order to deal with spills and leaks;
 - Reporting procedure must be communicated as per **Section 4** of this EMP;
 - The Contractor shall ensure that the necessary materials and equipment for dealing with spills and leaks is available on Site at all times;
 - The quantity of such materials shall be able to handle a minimum of 200 ℓ;
 - Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the ECO/EO.

7.6.2 Fire Management Plan

Objective

To prevent fires on site.

Target

- In the event of a fire, quick and effective remedial action must be taken to eliminate the fire.
- Should a fire occur the correct reporting procedure is to be implemented.

Management and Mitigation

- a) Controlled fires maybe permitted on site in designated areas for recreational purposes.
- b) A designated smoking area within the camp laydown area must be provided, a fire proof sand filled container for extinguishing cigarettes. Smoking shall otherwise be prohibited across the site and in the works areas.
- c) Employees must be aware of the procedure to be followed in the event of a fire.
- d) Fire drills must be conducted every six months or as otherwise required by the OHSA.
- e) Adequate fire protection measures and firefighting equipment must be available at each work area and the camp laydown area to deal with the type and nature of fire that may arise.
- f) The Contractor shall prepare a Fire Prevention and Fire Emergency Method Statement. The Method Statement should include, but not limited to the following:
 - Fire Fighting training for designated site staff;
 - Sources of fire risk;
 - Measures to comply with any requirements of local authority fire departments;
 - Measures to minimise the risk of accidental fires;
 - Measures to control accidental fires.

7.7 SOIL PROTECTION AND EROSION MANAGEMENT AND MITIGATION PLAN

Excessive erosion can lead to land degradation and the reduction of the area's carrying capacity. It is important to implement an erosion management plan and also conserve the soil potential.

The plan is made up of the following components:

- Soil Erosion migratory measures;
- Groundwater and Soil Contamination mitigatory measures.

7.7.1 Soil Erosion Migratory Measures

Objective

To conserve soil potential.

Target

- To prevent soil erosion.

Management and Mitigation

- a) Vegetation shall be stripped in a sequential manner as the work proceeds so as to reduce the time that stripped areas are exposed to the elements.
- b) Top-soiling and re-vegetation shall start immediately after the completion works.
- c) Only existing access roads will be utilised to gain access to site.
- d) Storm water control shall be undertaken to prevent soil loss from the site.
- e) All embankments shall be protected by a cut off drain to prevent water from running down the face of the embankment, resulting in soil erosion.
- f) Areas around internal roads, stockpiles and PV panels shall be visually monitored during site inspections.
- g) A photographic record of the on-site conditions shall be kept by the EO to aid in the identification of erosion problems.
- h) Signs of rill and gully erosion shall be remediated immediately.
- i) Typical remediation techniques include:
 - silt fences,
 - hay bales,
 - Eco-Logs and
 - Jute mats

7.7.2 Groundwater and soil contamination mitigatory measures

Objective

To preserve soil and groundwater resources

Target

- To ensure no contamination of soil and groundwater resources.

Management and Mitigation

- a) Mixing / decanting of all chemicals and hazardous materials takes place on a drip tray or impermeable surface.
- b) Ensure all hazardous storage tanks/drums/stores are designed and managed in order to prevent pollution of rains, groundwater and soils.
- c) No batching/mixing of cement shall occur directly on unprotected ground.
- d) Empty cement bags shall be stored for safe disposal of site in weatherproof containers to prevent windblown cement dust or be affected by rain or runoff events.
- e) The Contractor shall take all reasonable measures to prevent the spillage of cement/ concrete during batching and construction operations. During pouring, the soil surface shall be protected using plastic and all visible remains of concrete shall be physically removed on completion of the cement/ concrete pour and appropriately disposed of. All spoiled and excess aggregate/ cement/ concrete shall be removed and disposed of via the solid waste management system.
- f) Where “readymix” concrete is used, the Contractor shall ensure that the delivery vehicles do not wash their chutes directly onto the ground.
- g) Any spillage resulting from the “readymix” delivery shall be immediately cleared and disposed of via the solid waste management system. Readymix trucks shall not be permitted to dump drum wash on site unless into designated contaminated water pond which is properly lined with impermeable materials and which must be fully rehabilitated at completion.

7.8 WATER MANAGEMENT AND MITIGATION PLAN

Construction activities inherently have the potential to impact on the water environment, specifically surface water. This management and mitigation plan ensures that construction activities are managed in such a manner that any negative impacts are mitigated or prevented.

The plan is made up of the following components:

- General;
- Storm water management;
- Water Abstraction;
- Pollution Control and discharge measures;
- Water conservation and recycling;
- Wetland Preservation.

7.8.1 General

The Contractor shall submit a Water Management Method Statement (WMMS), including measures for water conservation, for approval by Eskom and ECO, prior to the commencement of works.

The WMMS must include monitoring and reporting mechanisms that cover all water abstractions from the river or any other water source, waste discharge, soil erosion and water quality aspects.

The WMMS must include measures to prevent the pollution water course with grease, hydrocarbons, suspended solids or other contaminants emanating from construction activities. These measures shall include a site plan, approved by the Eskom.

The WMMS should include an indication of how water and wastewater/effluent will be managed at/with respect to (i) camps and associated facilities, (ii) excavations, (iii) pumping operations, (iv) cleaning and washing bays, (v) site drainage (silt and erosion control), and (vi) storm water.

7.8.2 Storm Water Management

Objectives

To ensure that Storm water runoff and discharge are effectively controlled.

Targets

- No flooding of the construction sites as a result of storm water control measures.
- No erosion as a result of storm water control measures.
- No silt pollution as a result of storm water control measures.

Management and mitigation requirements

- a) Storm water drainage lines must be constructed by the Contractor to divert runoff water around the construction site to prevent contamination of the water and ponding.
- b) All storm water drainage lines shall contain water flow arrestors to prevent erosive action on the sides of the drainage lines.
- c) The following measures must be implemented, both as erosion prevention and storm water control measures:
 - Straw barriers (replaced when needed) should be installed in drainage paths to reduce velocity, and as a sediment trap during construction. Suspended solids carried by overland flow would be intercepted. These erosion barriers must be placed at intervals of 25-50 m apart in the drainage paths which would intercept suspended solids from entering the natural drainage paths.
 - Rip-rap should be placed as liners for channel spines. These comprise packed stones with an average diameter of 100 mm, packed in the channels as lining material to control flow velocities and hence erosion.
 - Earth cut-off channels at boundaries of the facility. These would assist in directing flow away from the site and reduce the possibility of flooding from runoff origination from outside the site.
 - Provide erosion protection at channel outfalls and positions of high flow concentration. These comprise packed stones with an average diameter of 200 mm, packed in the drainage path to control flow velocities and hence erosion.
- d) The sediment and erosion control measures should remain in place until construction is complete. The above noted sediment traps would require regular monitoring during construction and reinstatement as necessary.

- e) Road drainage to deflect storm water off the road surface will be required. This can be achieved effectively by constructing drainage deflection humps diagonally across the road surface.
- f) The drainage hump will reduce velocity. The following should be considered:
 - Build the humps no more than 50m apart;
 - Drainage humps must be constructed with a solid core of either stones or coarse gravel covered with road surface material to form a gradual slope on both sides, and should extend well beyond the edge of the roadway on each side to prevent water from simply flowing around the hump and back into the road;
 - To prevent soil erosion the outflow area must be lined with tightly packed stones, to create a cobblestone effect. This acts as a silt trap and the water flow force is broken up and spread, preventing erosion.
- g) Any waste water and/or storm water that is discharged during the construction phase will have to comply with the requirements of the National Water Act, specifically with the conditions set by the General Standard (Regulation 9225, Government Gazette, 18 May 1984) unless a licence is issued that sets specific standards for selected variables.
- h) Any erosion channels which develop during the construction period must be suitably backfilled, compacted and restored to a proper condition (i.e. vegetated etc.).

7.8.3 Water abstraction

Objectives

Water abstraction will not be permitted unless authorisation is granted by DWS.

Targets

- Obtain all necessary authorisations in terms of Section 21 of the National Water Act (No.36 of 1998).

Management and mitigation requirements

- a) Any abstraction of water for construction purposes must be approved by DWS.

7.8.4 Pollution control and discharge measures

Objectives

To ensure no pollution of any river, stream and / or wetland with grease hydrocarbons, suspended solids.

Targets

- Implement measures to prevent pollution (solid wastes, oil spills, discharge of sewage)

Management and mitigation requirements

- a) Storage, handling and disposal of fuels, oils, lubricants and other potentially harmful chemicals (and their containers) will be undertaken as per section 6.1.6 of this EMP.
- b) Discharges of liquid waste will not be allowed.
- c) Any spillages of pollutants, irrespective of size, shall be contained and cleaned immediately as per established spill procedures.
- d) The Contractor shall implement measures to prevent, reduce and mitigate water contamination, including prevention of contamination by suspended sediments.
- e) The buffer zones as presented in **Figure 4** must be adhered to.
- f) The Contractor shall prevent discharge of any pollutants, such as cements, concrete, lime, chemicals and fuels into any water sources/course.
- g) Run-off from fuel storage areas / workshops / vehicle washing areas must be directed into an oil separator for safe disposal as described in section.
- h) Disposal of any waste water that is discharged during the construction phase will have to comply with the requirements of the National Water Act, specifically with the conditions set by the General Standard (Regulation 9225, Government Gazette, 18 May 1984) unless a licence is issued that sets specific standards for selected variables.

7.8.5 Water conservation and recycling

Objective

To minimise water use and maintain sustainability.

Targets

- To ensure regular maintenance of all pipes and taps.

Management and mitigation requirements

- a) The Contractor will take all practical measures to minimise water use on site and will immediately attend to any wastage. This will include but not limited to:
 - monitoring of pressure pipes for leaks,
 - closing taps when not in use,
 - efficient use of water for washing of plant, recycling water as much as possible;
 - The quantity of water used for construction purposes must be monitored.
- b) Water derived from or generated through construction related activities that becomes contaminated must be treated to ensure compliance with National Water Act, specifically with the conditions set by the General Standard (Regulation 9225, Government Gazette, 18 May 1984) before being released back into the environment.
- c) The Contractor shall re-use or recycle as much of this water as possible.

7.8.6 Wetland preservation

Objective

Wetlands surrounding the development will not be affected by construction activities.

Targets

- No impact on riparian vegetation.
- No impact on wetland vegetation.
- No silt pollution in rivers and stream as a result of construction activities.

Management and mitigation requirements

- a) Limit the footprint area of the construction activities within site boundaries.
- b) Construction vehicles must use existing roads and internal roads to access site.
- c) During construction all building materials should be kept out of the wetland areas as well as the associated buffer zones.
- d) Keep all demarcated sensitive zones outside of the construction area off limits during the construction and rehabilitation phases of the development.
- e) Appropriate sanitary facilities must be provided during the construction phase and all waste removed to an appropriate licensed waste facility.
- f) Limit vegetation clearance to the absolute minimum to avoid increased silt loads and runoff velocities and volumes which may affect the hydrology of downstream wetland areas.
- g) In the event of a breakdown, spill prevention measures must be implemented to prevent ingress of hydrocarbons
- h) All vehicles must be regularly inspected for leaks.
- i) It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage.
- j) Re-fuelling must take place on an impervious area to prevent ingress of hydrocarbons.
- k) All spills must be immediately removed to the point on infiltration. Contaminated soil must be disposed of at a licenced Hazardous waste disposal facility.
- l) Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the development footprint.
- m) Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation National Environmental Management: Biodiversity Act 2004 (Act No 10 of 2004) Alien and Invasive Species Regulations, 2014.
- n) Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used.
- o) Implement soil erosion prevention and control measures.
- p) Monitor all systems for erosion and incision.
- q) Upon rehabilitation, reseedling of indigenous grasses should be implemented in all impacted areas and strategic planting of grassland species should take place.
- r) As much vegetation growth as possible should be promoted surrounding the PV structures in order to protect soils. In this regard special mention is made of the need to use indigenous vegetation species where hydro-seeding, wetland and rehabilitation planting (where applicable) are to be implemented.

7.9 TRAFFIC AND TRANSPORTATION MANAGEMENT AND MITIGATION PLAN

Construction activities inherently have the potential to impact on traffic flow and patterns. Compliance to the road safety measures and recommendations would minimise disruptions and negative impacts to traffic flow and patterns.

The plan is made up of the following components:

- Construction signage.
- Traffic movement of construction vehicles.

7.9.1 Construction signage

Objective

The objective is to warn the general public of construction traffic, and to manage traffic on site.

Target

- To ensure road safety along the public roads and on site and to increase awareness of slow moving vehicles.

Management and mitigation requirements

- a) Where existing public roads are used to access the construction areas, adequate construction signage is in place to inform the public of increased construction activities in the affected areas by placing adequate signage.
- b) Traffic signs should warn community road users of the presence of construction vehicles.

7.9.2 Traffic movement of construction vehicles

Objective

Ensuring road safety for regular road users and construction vehicles.

Targets

- Regulation of construction traffic to minimise the impact on regular road users.
- Regulation of normal road traffic to minimise impact of construction activities on these road users and to ensure a safe passageway for both these road users as well as normal road users.

Management and mitigation requirements

- a) All vehicle drivers entering the construction camp must pass a Breathalyzer test.
- b) Random drug testing may be undertaken on site.
- c) The maximum speed limit for all vehicles on site shall be 40 km / hour.
- d) All parking must be reverse parking.
- e) Construction vehicles must only make use of approved demarcated roads in order to limit the ecological footprint of the proposed development activities, avoid encroaching into the wetland areas or their respective buffer zones and reduce the possibility of collisions.

7.10 FLORA, FAUNA AND AVIFAUNA MANAGEMENT AND MITIGATION PLAN

Construction activities inherently have the potential to impact on the environment, specifically flora and fauna. This management and mitigation plan ensures that construction activities are managed in such a manner that any negative impacts are mitigated or prevented.

The following components are included in the Flora, Fauna and Avifauna management plan

- Protection of ecologically sensitive areas/ habitats and endangered flora, fauna and avifauna;
- Weeds and alien vegetation;
- Flora, Avifauna and Flora rescue and relocation.

7.10.1 Protection of ecologically sensitive areas/habitats and endangered fauna and flora

Objective

To minimise fragmentation of habitat for flora, fauna and avifauna

Targets

- Maintenance of vegetation in its natural condition.
- Prevent unnecessary removal of vegetation.
- Ensure as little disruption to fauna and avifauna as possible.

Management and mitigation requirements

- a) All activities must be contained within the PV Plant footprint to minimise disturbance outside these areas.
- b) No activities are to infringe upon wetlands and associated 32 m buffer zone.
- c) All wetland areas must be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel.
- d) Vehicles must be restricted to travelling on designated roads to limit the ecological footprint of the proposed activity.
- e) Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation National Environmental Management: Biodiversity Act 2004 (Act No 10 of 2004) Alien and Invasive Species Regulations, 2014.
- f) Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used.
- g) A pollution control system/spill handling procedure must be implemented to limit impact of such occurrences and prevent discharge to the receiving environment.
- h) No trapping or hunting of fauna and avifauna is to take place;
- i) Edge effects of all construction activities, such as erosion and alien plant species proliferation which may affect floral habitat, need to be strictly managed.

7.10.2 Weeds and alien vegetation

Objective

To minimise invasion of alien plants in the areas affected by construction.

Targets

- Ensure that proliferation of Alien invasive does not occur

Management and mitigation requirements

- a) Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation National Environmental Management: Biodiversity Act 2004 (Act No 10 of 2004) Alien and Invasive Species Regulations, 2014.
- b) An alien vegetation control plan must be compiled by the Contractor and implemented within areas associated with the project, the following minimum requirements must be implemented:
 - Weed control must be administered every three months;
 - Classify weeds to determine the eradication measures to be implemented;
 - Appropriate PPE (gloves) should be used when removing weeds;
 - Weeds must be uprooted, bagged and disposed of. The correct disposal procedure is to be determined in consultation with the ECO.
- c) Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used.
- d) Removal of species should take place throughout the construction and operational phases.

7.10.3 Fauna, Avifauna and Flora rescue and relocation

Objective

To minimise loss of individuals belonging to indigenous faunal, avifaunal and floral species.

Target

- No impacts on indigenous threatened, endemic, rare and protected species.

Management and Mitigation Requirement

Faunal/Avifauna species

- a) Any animals or birds found in the development footprint area must not be harmed.
- b) The EO must be notified immediately of any animals, reptiles or bird nests found within the development footprint and ensure safe relocation to a similar habitat within the surrounding vicinity of the project.
- c) The assistance of a suitably qualified specialist should be sought in the absence of the EO and ECO not having the necessary expertise.
- d) No trapping or hunting of fauna and avifauna is to take place.

Floral species

- e) Should Red data species or species of conversational concern be identified within the development footprint, a floral species rescue and relocation operation must be implemented, targeting these floral species.
- f) A Floral rescue and relocation plan must be undertaken by a suitably qualified specialist and implemented. This plan must include the following but not limited to:
 - A thorough quadrant search of the footprint must be in order to rescue affected species.
 - Individual plants can be translocated to the outside of the footprint or removed to a suitable botanical garden for cultivation and protection.
 - This should only be done after consultation with provincial conservation authorities.

7.11 SOCIO-ECONOMIC MANAGEMENT PLAN

Construction activities have the potential to impact on the social environment to a fairly large extent. This social management and mitigation plan ensures that construction activities are managed in such a manner that the positive impacts may be enhanced and the negative impacts are minimised as far as possible.

The plan consists of the following components:

- Maximise new business sales, multiplier effects & economic stimulation.
- Maximise employment and skills transfer.
- Minimise in-migration and effect of temporary worker on social dynamic and pressure on socio-economic infrastructure and services.
- Minimise safety and security impacts
- Minimise nuisance, noise, and other disruptions and change in quality of living environment
- Minimise visual land use patterns alteration and change in sense of place and other spatial considerations

7.11.1 Maximise new business sales, multiplier effects and economic stimulation

Objective

Maximise new business sales, local economic multiplier effect, and economic stimulation during the construction phase

Targets

- Local procurement policy is adopted
- Local goods and services are purchased from local suppliers where available and feasible

Management and mitigation requirements

- a) Ensure that the appropriate procurement policies are put in place and monitored.
- b) Procurement policies should promote the use of local business, where applicable.

- c) Investigate the possibility of procurement of construction materials, goods and products from local suppliers where available/feasible, in order to source as much good and services as possible from the local area.
- d) Any contravention of the procurement policies must be swiftly, transparently and appropriately dealt with.

7.11.2 Maximum Employment and Skills transfer

Objective

Manage the impact that the influx of job seekers might have on composition and functioning of the local community, with particular concern for the impact that these job seekers might have on the local residents' sense of safety and security.

Targets

- Establish an employment strategy that is known and communicated to potential job seekers.
- Eskom should aim to employ as many unskilled, low-skilled and semi-skilled workers from the local area as possible so that labour intensiveness is maximised. Aim to employ a minimum of 75% of unskilled or low-skilled workers from the local area (if possible). This should be a requirement for all contractors and sub-contractors.
- Opportunities for training of workers should be maximised.
- Prevent loitering and the construction of informal dwellings in the vicinity of the construction camp and sites.
- No construction personnel accommodation will be allowed on site.

Management and mitigation requirements

- a) Draw up a recruitment policy in conjunction with Councillors of the area and ensure compliance with this policy.
- b) The recruitment policy and employment procedures must be communicated to local stakeholders and potential job seekers. The policy must include but not limited to the following:
 - Provide communication channels and mechanisms through which local communities and construction workers can address their expectations and concerns and where the limitations of opportunities created by the project are highlighted through Ward Councillors.
 - Women are to be given equal employment opportunities and encouraged to apply for positions.
 - A skills transfer plan should be put in place at an early stage and workers should be provided the opportunity to develop their skills which they can use to secure jobs elsewhere post-construction.
- c) No on site staff accommodation. Accommodation for construction workers must be in existing lodging facilities.

7.11.3 Minimise in-migration and effect of temporary workers on social dynamics and pressure on socio-economic infrastructure and services

Objective

Avoid or reduce the potential pressure on socio-economic infrastructure/services and potential social conflicts on family structures and social networks associated with the presence of in migration of temporary non-local workforce during the construction phase.

Targets

- To maximise use of local workforce
- To avoid/minimise the potential increased pressure on local infrastructure and services
- To avoid/minimise the potential impact on communities social dynamics
- Aim for 75% of unskilled and low-skilled workforce to be sourced from the local area

Management and mitigation requirements

- a) Where possible, make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for unskilled and low-skilled job categories. Include 75% target in tender documents. Employment criteria should be communicated to the community in advance (e.g. in newspapers, community forum notice boards, etc.).
- b) The contractor must keep a record of local (and non-local) recruitment which needs to be reported to Eskom.
- c) Accommodation for non-local members of the workforce, should as far as practically possible be arranged so that unskilled labourers are not left to their own device in which case non-local labourers are likely to accommodate themselves in the small community of Rietkuil.
- d) Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.
- e) Ensure that workers found guilty of breaching the Code of Conduct are dismissed or dealt with in accordance with labour legislation.
- f) The Contractor should make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by non-local construction workers to local family structures and social networks.

7.11.4 Minimise Health safety and security impacts

Objective

Avoid or reduce the possible increase in crime and safety and security issues as well as avoid or decrease the possible decline in health issues during the construction phase

Targets

- To maximise use of local workforce
- Aim for 75% of unskilled and low-skilled workforce to be sourced from the local area
- To avoid/minimise the potential impact on health, safety and security on local communities

Management and mitigation requirements

- a) Appoint as many locally unemployed unskilled or low-skilled labourers from Rietkuil and surrounds to lessen risk of unacceptable social behaviour and to minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce and influx of people.
- b) Screening prior to hiring should be undertaken, and proper monitoring procedures should be adhered to minimise the risk of crime and violent behaviour.
- c) Fence off the construction area to avoid unauthorised access. Access control and a method of identification of site personnel are required at all times. Security lighting should be implemented.
- d) Ensure that security personnel are on site on a permanent basis.
- e) Working hours should be kept between 7am and 5pm as to be agreed with surrounding landowners and occupiers
- f) Local community organisations, adjacent land owners, policing forums / neighbourhood watches must be informed of construction times and the duration of the construction phase. Liaise with existing forums to communicate information to the community and to assist in the monitoring of compliance.
- g) Ensure that open fires on the site for heating, smoking or cooking are not allowed except in designated areas
- h) Provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.
- i) A comprehensive employee induction programme should be developed to cover land access protocols, road safety, etc.
- j) All vehicles must be road worthy and drivers must be qualified and made aware of the potential road safety issues and follow the speed limits.
- k) Adequate signage along the road leading to the Power station and Rietkuil needs to be provided to warn motorists of the construction activities taking place.
- l) Ensure that proper safety gear are administered and safety precautions are taken.
- m) Design, implement and enforce an appropriate Safety, Health and Environment programme and code of conduct (with strict control measures) that includes the use of Personal Protective Equipment to ensure the well-being of workers.
- n) Ensure that construction workers are clearly identifiable. All workers should carry identification cards and wear identifiable clothing.
- o) Put procedures and regulations in place to control loitering and the construction of informal dwellings in the vicinity of the construction camp and sites.

7.11.5 Minimise nuisance noise and other disruptions and change in quality of living environment

Objective

To minimise the potential impacts of nuisance, noise and other disruptions and to minimise the change in quality of living environment during the construction phase

Targets

- To maximise use of local workforce.
- Aim for 75% of unskilled and low-skilled workforce to be sourced from the local area.
- To avoid/minimise the potential impact on health, safety and security on local communities.

Management and mitigation requirements

- a) Residents in close proximity (5 km) to the development site should be notified 24 hours prior to any planned activities that will be unusually noisy. This communication can take the form of an SMS/ telephone call/email.
- b) Construction related activities should be limited to work days (Monday to Friday daylight hours).
- c) Movement of abnormal loads, if required, should be timed to avoid times of the year when traffic volumes are likely to be higher, such as start and end of school holidays, long weekends and weekends in general, etc.
- d) Ensure that damage caused by construction repaired.
- e) Implement dust suppression measures.
- f) Ensure all vehicles are road worthy, drivers are qualified, made aware of the potential noise and dust issues, and adhere to speed limits.

7.11.6 Minimise visual land use patterns alteration and change in sense of place and other spatial considerations

Objective

To minimise visual intrusion, change in sense of place, and alteration of land use patterns.

Targets

- To reduce visual disturbances and to minimise the loss in sense of place.

Management and mitigation requirements

- a) Measures to reduce visual intrusion must be implemented during construction. These may include but not limited to:
 - Screening off site during construction with the use of shade cloth.
- b) Put measures in place to ensure that construction boundaries are demarcated, the areas of surface disturbance is minimised, the construction site is neat, tidy and contained.

7.11.7 Minimise impacts on Arnot Hostel residents

Objective

To avoid/minimise the potential impacts of nuisance, noise, dust, visual disturbance, safety of residents, quality of life, during the construction phase

Targets

- No complaints from Arnot Hostel residents regarding the construction activities.

Management and mitigation requirements

- a) Dust and noise generation should be minimised as much as possible through implementing dust and noise suppression measures.
- b) Traffic calming measures should be put in place to deter any unnecessary through-traffic through the surrounding residential areas.
- c) Residents should be notified days in advance prior to any planned activities that will be unusually noisy.

- d) Ensure all vehicles are road worthy, drivers are qualified, made aware of the potential noise and dust issues, and adhere to speed limits.
- e) Safety at and around the site should be ensured by limiting any fire risks, fencing off the site to avoid unauthorised access and employing permanent security personnel.
- f) Site 1 should be accessed for construction activities through the main road to the south of the site and not through the Arnot Power station.
- g) Establish a code of conduct to increase public safety for the site and surrounds which has a focussed section on ensuring safety for scholars/teachers, etc.

7.11.8 Complaints management

Objectives

- To establish and maintain a system of records which provide full documentation of complaints and how all complaints received are effectively addressed.
- To timeously inform affected parties of disruptive activities.

Targets

- Establish processes and procedures to effectively address all complaints received.
- All complaints will be acknowledged within 24 hours of receipt.
- Respond effectively to all complaints received within 48 hours, unless additional information and/or clarification are required.

Management and mitigation requirements

- a) A formal accessible grievance procedure should be implemented and communicated to communities.
- b) Address all grievances swiftly, in a fair and transparent manner.
- c) Develop a grievance procedure to specifically address gender matters.
- d) The EO shall open and maintain a Complaints Register and an Incidents Register in which all complaints or incidents received from the community must be recorded. The following information must be recorded in the Complaints Register:
 - The name and contact detail of the complainant (if not anonymous);
 - The date, time and nature of the complaint;
 - The response and investigation undertaken;
 - Which actions were taken and who the person responsible for the action was.
- e) The following must be recorded in the Incidents Register:
 - The name of the person/s involved in the incident;
 - The date, time and nature of the incident;
 - The response and reason for the incident;
 - The actions that were taken.
- f) If the construction staff is approached by the community they will be polite and courteous and assist them with locating the relevant personnel who will deal with the complaint.

7.12 Heritage Management and Mitigation Plan

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the development can be excavated/ recorded and a management plan can be developed for future action. No heritage resources were found when the Heritage Impact Assessment was conducted. However provision is made on this plan, if chance finds occur during excavation and/or other construction activities.

7.12.1 Chance heritage finds

Objective

To ensure heritage sites and graves discovered during construction are addressed in terms of legislation.

Target

- The preservation and appropriate management of new discoveries in accordance with the National Heritage Resources Act (Act No. 25 of 1999), should these be discovered during construction.

Management and mitigation requirements

- a) The Contractors and workers should be notified that archaeological sites and graves might be exposed during the construction work.
- b) Should any heritage artefacts or graves be exposed during excavation, work on the area where the artefacts or remains were discovered, shall cease immediately and the EO and ECO shall be notified as soon as possible.
- c) All discoveries shall be reported immediately to the archaeologist so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken;
- d) Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1).

7.13 Site Rehabilitation

The aim of site rehabilitation is to successfully restore areas disturbed by construction to their pre-construction state.

The plan consists of the following components:

- Disturbed areas to be rehabilitated.
- Re-vegetation of disturbed areas.
- Rehabilitation and reinstatement of borrow pits, quarries and blasting areas.
- Rehabilitation of wetland and riparian areas.

7.13.1 Disturbed areas to be rehabilitated

Objective

To ensure all areas disturbed during construction are rehabilitated to their natural state/pre-construction condition.

Target

- Achieve acceptable vegetation cover, meaning that not less than 75% of the area grassed or hydro-seeded shall be covered with grass and that no bare patches exceeding 0.25 m² in an area of 1 m x 1 m shall occur. In the case of sodding, acceptable cover shall mean that the entire areas shall be covered with live grass at the end of any period not less than three months after sodding.

Rehabilitation Management Plan and Method Statement

Prior to the commencement of Rehabilitation the Contractor shall prepare a Rehabilitation Plan and Method Statement for the acceptance of the Eskom/EO/ECO, which will include but will not be limited to the following:

- Sites for stockpiling and protection of topsoil recovered from cleared construction areas.
- Soil improvements and fertilisation plan for areas to be rehabilitated.
- Methods for planting grasses from seed, cuttings and sods.
- Sources and specifications for compost, manure and mulching material.
- Detail Method for preparing areas for rehabilitation, and for planting grass from seeds, from cuttings, by hydro-seeding and by sodding.
- Maintenance of the rehabilitated areas during the establishment period and up to the handover period.
- Plant and equipment to be used for the rehabilitation of disturbed areas.

Management and mitigation requirements

The Rehabilitation Plan and Method Statement will include, *inter alia*, the following requirements:

- a) Clear the site of all inert waste and rubble, including surplus rock and foundations. After the material has been removed, the site shall be re-instated and rehabilitated.
- b) Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers (or other approved method). If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- c) Re-vegetation must match the vegetation type, which previously existed, unless otherwise indicated by Eskom.
- d) Control invasive plant species and weeds by means of extraction, cutting or other approved methods.
- e) If planting of trees or shrubs are to be undertaken the following will be required:
 - All work to be done by suitably experienced personnel, making use of the appropriate equipment.
 - Planting should preferably be done just before or during the rainy season.
 - Where local soil has poor drainage, broken rock (approximately 75 mm in diameter) must be placed to a depth of 150 mm at the bottom of the planting

hole prior to planting trees/shrubs and backfilling with approved plant medium mixture.

- If impenetrable shale, rock, clay or a high water table is encountered, making the above hole sizes impossible, then seek advice from a qualified professional.
 - Backfill planting holes with excavated material/approved topsoil, thoroughly mixed with weed free manure or compost (per volume about one quarter of the plant hole), one cup of 2:3:2 fertiliser and an approved ant and termite poison.
 - As much of the soil from container plants as possible must be retained around the roots of the plant during planting.
 - The plant must be planted into the specified hole size with the approved soil, compost and fertiliser mix used to refill the plant hole and must cover all the roots and be well firmed down to a level equal to that of the surrounding in situ material.
 - After planting, each plant must be well watered, adding more soil upon settlement if necessary.
 - Add mulch to the surface area of the bermed basin.
 - Where necessary, protect newly planted trees against wind, frost and wild animals by means of fencing, sacking or frost nets.
 - Thoroughly water plants as required until the plants are able to survive independently (i.e. depending on the rainfall).
- f) Topsoil shall be spread evenly over the surface. The final prepared surface shall not be smooth, but furrowed to follow the natural contours of the land.
- g) Where sodding is required, light scarification shall be carried out to contain the sods.
- h) Re-vegetated areas showing less coverage than what is defined as acceptable after one growing season shall be prepared and re-vegetated from scratch.
- i) Repair any damage to re-vegetated areas to maintain coverage.
- j) Work areas will be rehabilitated as soon as possible after completion of construction activities in an area, to minimise the potential for erosion and maximise the established time after re-vegetation.
- k) Any runnels or erosion channels that develop during the construction period or during the vegetation establishment period shall be backfilled and compacted, and the areas restored by the Contractor and approved by Eskom.

8. MANAGEMENT AND MITIGATION PLANS FOR OPERATION

The operation phase of the Project will require a very small direct workforce, and it is probable that this could all be undertaken by existing Eskom staff. Routine and corrective maintenance on electrical infrastructure will be undertaken during the operational phase. Maintenance will need to be carried out throughout the lifetime of the Solar PV Plant. Typical activities during maintenance include washing solar panels and vegetation control.

It is important to note that this operational phase environmental programme has been compiled prior to authorisation of the proposed project and will be updated to include the conditions of the EA that will be issued by DEA as part of the EA.

The necessary plans to consider during operation is as follows:

8.1 WEEDS AND ALIEN VEGETATION

Objective

To minimise invasion of alien plants within the PV plant footprint.

Targets

- Ensure that proliferation of Alien invasive weeds does not occur

Management and mitigation requirements

- a) Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation National Environmental Management: Biodiversity Act 2004 (Act No 10 of 2004) Alien and Invasive Species Regulations, 2014.
- b) An alien vegetation control plan must be compiled by the Operator/Eskom and implemented within the PV Plant Footprint, the following minimum requirements must be implemented:
 - Weed control must be administered every three months;
 - Classify weeds to determine the eradication measures to be implemented;
 - Appropriate PPE (gloves) should be used when removing weeds;
 - Weeds must be uprooted, bagged and disposed of.
- c) Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used.
- d) Removal of species should take place throughout the operational phase.

8.2 STORM WATER CONTROL

Objectives

To ensure that Storm water runoff and discharge are effectively controlled.

Targets

- No flooding of the construction sites as a result of storm water control measures.

- No erosion as a result of storm water control measures.
- No silt pollution as a result of storm water control measures.

Management and mitigation requirements

- a) Storm water drainage lines must be maintained to divert runoff water around the PV Plant to prevent ponding.
- b) All storm water drainage lines shall contain water flow arrestors to prevent erosive action on the sides of the drainage lines.
- c) The following measures must be implemented, both as erosion prevention and storm water control measures:
 - Straw barriers (replaced when needed) should be installed in drainage paths to reduce velocity, and as a sediment trap during construction. Suspended solids carried by overland flow would be intercepted. These erosion barriers must be placed at intervals of 25-50 m apart in the drainage paths which would intercept suspended solids from entering the natural drainage paths.
 - Rip-rap should be placed as liners for channel spines. These comprise packed stones with an average diameter of 100 mm, packed in the channels as lining material to control flow velocities and hence erosion.
 - Earth cut-off channels at boundaries of the facility. These would assist in directing flow away from the site and reduce the possibility of flooding from runoff origination from outside the site.
 - Provide erosion protection at channel outfalls and positions of high flow concentration. These comprise packed stones with an average diameter of 200 mm, packed in the drainage path to control flow velocities and hence erosion.
- d) Road drainage to deflect storm water off the road surface will be required. This can be achieved effectively by constructing drainage deflection humps diagonally across the road surface. The drainage hump will reduce velocity.
- e) Any erosion channels which develop during the operation period must be suitably backfilled, compacted and restored to a proper condition (i.e. vegetated etc.).

8.3 VISUAL

Objective

To minimise visual intrusion.

Targets

- No Complaints visual disturbances

Management and mitigation requirements

- a) Measures to reduce visual intrusion must be implemented during operation. These may include but not limited to: Screening off the PV Plant during operation by planting trees.
- b) Access roads are to be kept clean, and measures taken to minimise dust from traffic.
- c) Site offices and structures shall be limited to a single storey which is sited carefully to reduce visual intrusion.

- d) All lighting shall be kept to a minimum within the requirements of safety and efficiency.
- e) Where such lighting is deemed necessary, low-level lighting, which is shielded to reduce light spillage and pollution, shall be used.
- f) No naked light sources shall be directly visible from a distance. Only reflected light shall be visible from outside the site.
- g) Install and maintain any necessary aircraft warning lights as per the relevant authority requirements.
- h) External lighting shall use down-lighters shielded in such a way as to minimise light spillage and pollution beyond the extent of the area that needs to be lit.
- i) Security and perimeter lighting shall be shielded so that no light falls outside the area needing to be lit.



9. MANAGEMENT AND MITIGATIONS FOR DECOMMISSIONING

Due to the PV Plant being developed for the station's own consumption, the PV Plant will be decommissioned at the same time as the Arnot Power Station between 2031 and 2035.

The PV Plant and infrastructure will be disconnected from the electricity network, the module components would be removed and recycled as far as possible. The structures would be dismantled and all underground cables would be excavated and removed. The buildings will be demolished and all rubble will be disposed of in accordance to legislation.

Roads which are no longer required after decommissioning should be scarified and the areas rehabilitated with the assistance of a rehabilitation specialist. Materials will be recycled where appropriate, and any hazardous substances shall be removed and disposed of in terms of the requirements of the relevant legislation (e.g. Hazardous Substances Act, No. 15 of 1973) and SANS specifications.

A detailed decommissioning plan shall be developed approximately 24 months before closure of the PV Plant. The construction phase EMP could be used as a guideline to facilitate the detailed decommission phase EMP.

Mitigation measures below are only provisional mitigation Measures.

- a) All PV structures, associated structures and fencing shall be removed and recycled.
- b) Unnecessary internal roads shall be ripped and then rehabilitated.
- c) All impacted footprint areas shall be rehabilitated and restored to indigenous, endemic vegetation as per the rehabilitation plan.
- d) Noise and disturbance associated with decommissioning activities shall be kept to the minimum.
- e) The rehabilitation of the disturbed areas will form part of the decommissioning phase. The aim of the rehabilitation is to bring back the work site to a stabilised condition, as close as possible to pre-construction conditions and to the satisfaction of Eskom.

The rehabilitation of the area would entail the following:

- Once area is clear of all structures and waste, the area will be ripped and a layer of topsoil (30 cm) will be placed over the disturbed areas;
- Application of fertilizers will be utilized to improve soil composition;
- Hand seeding of indigenous seed mix will be used to achieve acceptable grass cover.

10. CONCLUSION

In conclusion it should be noted that the EMPr should be regarded as a dynamic document and changes should be made to the EMPr as required by project evolution, while retaining the underlying principles and objectives on which the document is based.

The compilation of the EMPr has incorporated impacts and mitigation measures from the DEIAr as well as incorporating principles of best practice in terms of environmental management.



APPENDIX A
of DEIAr
PROJECT TEAM CURRICULA VITAE

