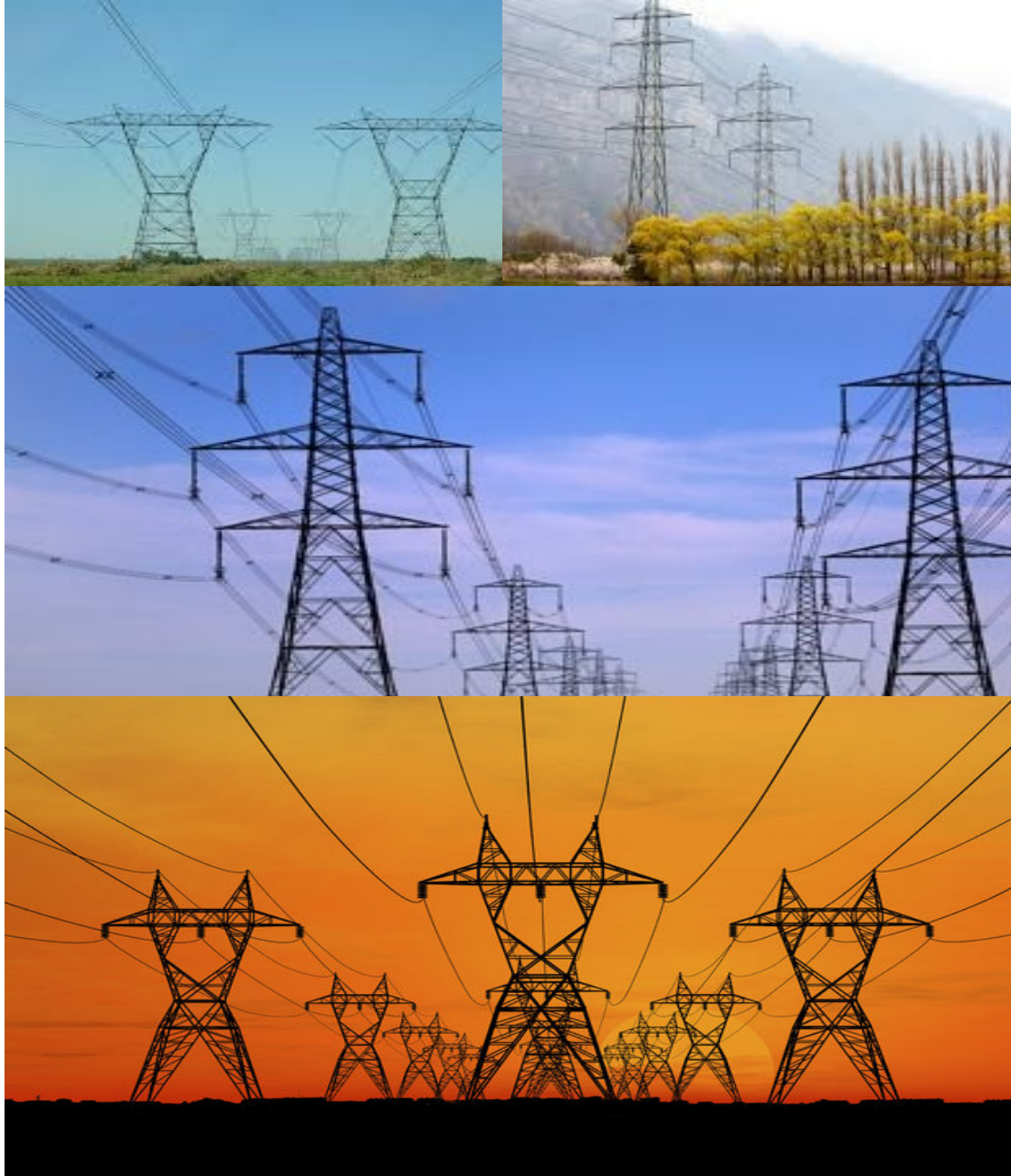


GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE  
DEVELOPMENT AND EXPANSION FOR OVERHEAD ELECTRICITY  
TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE

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**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

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## **INTRODUCTION**

### **1. Background**

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended, (EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice, that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the applicant and the competent authority (CA).

### **2. Purpose**

This document constitutes a generic EMPr relevant to applications for the development or expansion of overhead electricity transmission and distribution infrastructure, and all listed and specified activities necessary for the realisation of such infrastructure.

### **3. Objective**

The objective of this generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.

### **4. Scope**

The scope of this generic EMPr applies to the development or expansion of overhead electricity transmission and distribution infrastructure requiring EA in terms of NEMA, i.e. with a capacity of 33 kilovolts or more. This generic EMPr applies to activities requiring EA, mainly activity 11 and 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and activity 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended, and all associated listed or specified activities necessary for the realisation of such infrastructure.

**5. Structure of this document**

This document is structured in three parts with an Appendix as indicated in the table below:

Part	Section	Heading	Content
A		Provides general guidance and information and is <b>not legally binding</b>	Definitions, acronyms, roles & responsibilities and documentation and reporting.
B	1	Pre-approved generic EMPr template	<p>Contains generally accepted impact management outcomes and impact management actions required for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure, which are presented in the form of a template that has been pre-approved.</p> <p>The template in this section is to be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity.</p> <p>Where an impact management outcome is not relevant, the words “not applicable” can be inserted in the template under the “responsible persons” column.</p> <p>Once completed and signed, the template represents the EMPr for the activity approved by the CA and is legally binding. The template <b>is not required</b> to be submitted to the CA as once the generic EMPr is gazetted for implementation, it has been approved by the CA.</p> <p>To allow interested and affected parties access to the pre-approved EMPr template for consideration through the decision-making process, the EAP on behalf of the applicant /proponent must make the hard copy of this EMPr available at a public location and where the applicant has a website, the EMPr should also be made available on such publicly accessible website.</p>
	2	Site specific information	Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA will comply with the pre-approved generic EMPr

Part	Section	Heading	Content
			<p>template contained in <u>Part B: Section 1</u>, and understands that the impact management outcomes and impact management actions are <b>legally binding</b>. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and actions have been either pre-approved or approved in terms of <u>Part C</u>.</p> <p>This section <b>must be</b> submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of <u>Part B: section 2</u> not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding.</p>
C		Site specific sensitivities/ attributes	<p>If any specific environmental sensitivities/ attributes are present on the site which require site specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr, to manage impacts, these specific impact management outcomes and impact management actions must be included in this section. These specific environmental attributes must be referenced spatially and impact management outcomes and impact management actions must be provided. These specific impact management outcomes and impact management actions must be presented in the format of the pre-approved EMPr template (<u>Part B: section 1</u>)</p> <p>This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if <u>Part C</u> is applicable to the site, it <b>is required</b> to be submitted together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP, and must contain his/her name and expertise including a curriculum vitae. Once approved, Part C forms part of the EMPr for the site and is legally binding.</p>

Part	Section	Heading	Content
			This section applies only <b>to additional</b> impact management outcomes and impact management actions that are necessary for the avoidance, management and mitigation of impacts and risks associated with the specific development or expansion and which are not already included in <u>Part B: section 1</u> .
Appendix 1			Contains the method statements to be prepared prior to commencement of the activity. The method statements are <b>not required</b> to be submitted to the competent authority.

## 6. Completion of part B: section 1: the pre-approved generic EMPr template

The template is to be completed prior to commencement of the activity, by providing the following information for each environmental impact management action:

- For implementation
  - a 'responsible person',
  - a method for implementation,
  - a timeframe for implementation
- For monitoring
  - a responsible person
  - frequency
  - evidence of compliance.

The completed template must be signed and dated by the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must be signed and dated on each page by the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

## 7. Amendments of the impact management outcomes and impact management actions

Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the following manner:

- Amendment of the impact management outcomes: in line with the process contemplated in regulation 37 of the EIA Regulations; and
- Amendment of the impact management actions: in line with the process contemplated in regulation 36 of the EIA Regulations.



## **8. Documents to be submitted as part of part B: section 2 site specific information and declaration**

Part B: Section 2 has three distinct sub-sections. The first and third sub-sections are in a template format. Sub-section two requires a map to be produced.

Sub-section 1 contains the project name, the applicant's name and contact details, the site information, which includes coordinates of the corridor in which the proposed overhead electricity transmission and distribution infrastructure is proposed as well as the 21-digit Surveyor General code of each cadastral land parcel and, where available, the farm name.

Sub-section 2 is to be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout using the national web based environmental screening tool, when available for compulsory use at: <https://screening.environment.gov.za/screeningtool>. The sensitivity map shall identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc. Sensitivity maps must identify features both within the planned working area and any known sensitive features in the surrounding landscape within 50m from the development footprint. The overhead transmission and distribution profile must be illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of overhead transmission and distribution length is illustrated per page in A3 landscape format. Where considered appropriate, photographs of sensitive features in the context of tower positions must be used.

Sub-section 3 is the declaration that the applicant/proponent or holder of the EA in the case of a change of ownership must complete, which confirms that the applicant/EA holder will comply with the pre-approved generic EMPr template in Section 1 and understands that the impact management outcomes and actions are legally binding.

### **(a) Amendments to Part B: Section 2 – site specific information and declaration**

Should the EA be transferred, Part B: Section 2 must be completed by the new applicant/proponent and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted as part of such an application for an amendment to an EA will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

## PART A – GENERAL INFORMATION

### 1. DEFINITIONS

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, and unless the context requires otherwise –

**"clearing"** means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

**"construction camp"** is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

**"contractor"** - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

**"hazardous substance"** is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

**"method statement"** means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification;

The method statement must cover applicable details with regard to:

- (i) Construction procedures;
- (ii) Plant, materials and equipment to be used;
- (iii) Transporting the equipment to and from site;
- (iv) How the plant/ material/ equipment will be moved while on site;
- (v) How and where the plant/ material/ equipment will be stored;
- (vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- (vii) Timing and location of activities;
- (viii) Compliance/ non-compliance; and
- (ix) Any other information deemed necessary by the Project Manager.

**"slope"** means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units;

“**solid waste**” means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

“**spoil**” means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

“**topsoil**” means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil; and

“**works**” means the works to be executed in terms of the Contract

## 2. ACRONYMS and ABBREVIATIONS

<b>CA</b>	Competent Authority
<b>cEO</b>	Contractors Environmental Officer
<b>dEO</b>	Developer Environmental Officer
<b>DPM</b>	Developer Project Manager
<b>DSS</b>	Developer Site Supervisor
<b>EAR</b>	Environmental Audit Report
<b>ECA</b>	Environmental Conservation Act No. 73 of 1989
<b>ECO</b>	Environmental Control Officer
<b>EA</b>	Environmental Authorisation
<b>EIA</b>	Environmental Impact Assessment
<b>ERAP</b>	Emergency Response Action Plan
<b>EMPr</b>	Environmental Management Programme Report
<b>EAP</b>	Environmental Assessment Practitioner
<b>FPA</b>	Fire Protection Agency
<b>HCS</b>	Hazardous chemical Substance
<b>NEMA</b>	National Environmental Management Act, 1998 (Act No. 107 of 1998)
<b>NEMBA</b>	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
<b>NEMWA</b>	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
<b>MSDS</b>	Material Safety Data Sheet
<b>RI&amp;AP's</b>	Registered interested and affected parties

### 3. ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) IMPLEMENTATION

The effective implementation of this generic EMPr is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. This section of the EMPr gives guidance to the various environmental roles and reporting lines, however, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

**Table 1:** Guide to roles and responsibilities for implementation of an EMPr

Responsible Person (s)	Role and Responsibilities
Developer's Project Manager (DPM)	<p><u>Role</u></p> <p>The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent.</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> <li>- Be fully conversant with the conditions of the EA;</li> <li>- Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s);</li> <li>- Issuing of site instructions to the Contractor for corrective actions required;</li> <li>- Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and</li> <li>- Ensure that periodic environmental performance audits are undertaken on the project implementation.</li> </ul>
Developer Site Supervisor (DSS)	<p><u>Role</u></p> <p>The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS</p>

Responsible Person (s)	Role and Responsibilities
	<p>is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr.</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> <li>- Ensure that all contractors identify a contractor's Environmental Officer (cEO);</li> <li>- Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO;</li> <li>- Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO;</li> <li>- Issuing of site instructions to the Contractor for corrective actions required;</li> <li>- Will issue all non-compliances to contractors; and</li> <li>- Ratify the Monthly Environmental Report.</li> </ul>
Environmental Control Officer (ECO)	<p><u>Role</u></p> <p>The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr.</p> <p>The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &amp; Affected Parties' (RI&amp;AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required.</p>

Responsible Person (s)	Role and Responsibilities
	<p><u>Responsibilities</u></p> <p>The responsibilities of the ECO will include the following:</p> <ul style="list-style-type: none"> <li>- Be aware of the findings and conclusions of all EA related to the development;</li> <li>- Be familiar with the recommendations and mitigation measures of this EMPr;</li> <li>- Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them;</li> <li>- Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required;</li> <li>- Educate the construction team about the management measures contained in the EMPr and environmental licenses;</li> <li>- Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective;</li> <li>- Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements;</li> <li>- In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses;</li> <li>- Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns;</li> <li>- Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr;</li> <li>- Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO);</li> <li>- Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken;</li> <li>- Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken;</li> <li>- Assisting in the resolution of conflicts;</li> <li>- Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor;</li> <li>- In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance;</li> <li>- Maintenance, update and review of the EMPr;</li> <li>- Communication of all modifications to the EMPr to the relevant stakeholders.</li> </ul>

Responsible Person (s)	Role and Responsibilities
<p>developer Environmental Officer (dEO)</p>	<p><u>Role</u></p> <p>The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities.</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> <li>- Be fully conversant with the EMPr;</li> <li>- Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;</li> <li>- Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s);</li> <li>- Confine the development site to the demarcated area;</li> <li>- Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO);</li> <li>- Assist the contractors in addressing environmental challenges on site;</li> <li>- Assist in incident management:</li> <li>- Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared;</li> <li>- Assist the contractor in investigating environmental incidents and compile investigation reports;</li> <li>- Follow-up on pre-warnings, defects, non-conformance reports;</li> <li>- Measure and communicate environmental performance to the Contractor;</li> <li>- Conduct environmental awareness training on site together with ECO and cEO;</li> <li>- Ensure that the necessary legal permits and / or licenses are in place and up to date;</li> <li>- Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;</li> </ul>
<p>Contractor</p>	<p><u>Role</u></p> <p>The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where</p>

Responsible Person (s)	Role and Responsibilities
	<p>specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion for overhead electricity transmission and distribution infrastructure activities.</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> <li>- project delivery and quality control for the development services as per appointment;</li> <li>- employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period;</li> <li>- ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely;</li> <li>- attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones;</li> <li>- ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.</li> </ul>
contractor Environmental Officer (cEO)	<p><u>Role</u></p> <p>Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria:</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> <li>- Be on site throughout the duration of the project and be dedicated to the project;</li> <li>- Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site;</li> <li>- Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements;</li> </ul>



Responsible Person (s)	Role and Responsibilities
	<ul style="list-style-type: none"> <li>- Attend the Environmental Site Meeting;</li> <li>- Undertaking corrective actions where non-compliances are registered within the stipulated timeframes;</li> <li>- Report back formally on the completion of corrective actions;</li> <li>- Assist the ECO in maintaining all the site documentation;</li> <li>- Prepare the site inspection reports and corrective action reports for submission to the ECO;</li> <li>- Assist the ECO with the preparing of the monthly report; and</li> <li>- Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.</li> </ul>

#### **4. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE**

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms must be in place for all overhead electricity transmission and distribution infrastructure projects as a minimum requirement.

##### **4.1 Document control/Filing system**

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

##### **4.2 Documentation to be available**

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

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

##### **4.3 Weekly Environmental Checklist**

The ECOs are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.

The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA Regulations.

#### 4.4 Environmental site meetings

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

#### 4.5 Required Method Statements

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

The method statement must cover applicable details with regard to:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment/ material will be moved while on site;
- how and where material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities;
- compliance/ non-compliance with the EMPr; and
- any other information deemed necessary by the ECOs.

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

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

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

#### 4.6 Environmental Incident Log (Diary)

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

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

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

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

The Environmental Incident Log will be captured in the EAR.

#### 4.7 Non-compliance

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

- Time and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended / required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints

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

#### 4.8 Corrective action records

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

#### 4.9 Photographic record

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

The Contractor shall:

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

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

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

#### 4.10 Complaints register

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

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

#### 4.11 Claims for damages

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

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

#### 4.12 Interactions with affected parties

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

The ECOs shall:

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

#### 4.13 Environmental audits

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

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

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

#### 4.14 Final environmental audits

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

## **PART B: SECTION 1: Pre-approved generic EMPr template**

### **5. IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS**

This section provides a pre-approved generic EMPr template with aspects that are common to the development of overhead electricity transmission and distribution infrastructure. There is a list of aspects identified for the development or expansion of overhead electricity transmission and distribution infrastructure, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of overhead electricity transmission and distribution infrastructure.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contractor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.



**5.1 Environmental awareness training**

**Impact management outcome:** All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- All staff must receive environmental awareness training prior to commencement of the activities;</li> <li>- The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course;</li> <li>- Refresher environmental awareness training is available as and when required;</li> <li>- All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr;</li> <li>- The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum:               <ul style="list-style-type: none"> <li>a) Safety notifications; and</li> <li>b) No littering.</li> </ul> </li> <li>- Environmental awareness training must include as a minimum the following:               <ul style="list-style-type: none"> <li>a) Description of significant environmental impacts, actual or potential, related to their work activities;</li> <li>b) Mitigation measures to be implemented when carrying out specific activities;</li> <li>c) Emergency preparedness and response</li> </ul> </li> </ul>	<b>ECO and CEO</b>	<b>Environmental Induction training; Toolbox talks; other pertinent training aids</b>	<b>Initially prior to construction commencing ECO to induct Construction Management and CEO, and thereafter repeated for all new employees and yearly. Toolbox talks to be presented weekly</b>	<b>ECO</b>	<b>Monthly</b>	<b>Signed induction and toolbox talk, training registers</b>

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

<p><b>Impact management outcome:</b> Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.</p>						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<p>– A method statement must be provided by the contractor prior</p>	<b>Contractor</b>	<b>Method</b>	<b>Prior to</b>	<b>ECO</b>	<b>Monthly</b>	<b>Signed</b>

<p>to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;</p> <ul style="list-style-type: none"> <li>- Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through;</li> <li>- Sites must be located where possible on previously disturbed areas;</li> <li>- The camp must be fenced in accordance with <b>Section 5.5: Fencing and gate installation</b>; and</li> <li>- The use of existing accommodation for contractor staff, where possible, is encouraged.</li> </ul>		<p><b>Statement compilation and communication of Method Statements to employees. Use of Specialist Studies to locate site camps</b></p>	<p><b>construction</b></p>			<p><b>Method Statements; signed proof of communication register; Liaison with ECO regarding site camp placement</b></p>
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**5.3 Access restricted areas**

<p><b>Impact management outcome:</b> Access to restricted areas prevented.</p>						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any</li> </ul>	<p><b>Contractor</b></p>	<p><b>Use of Specialist Studies to locate</b></p>	<p><b>Prior to construction in</b></p>	<p><b>ECO</b></p>	<p><b>Monthly</b></p>	<p><b>Contractor compliance</b></p>

<p>additional areas identified during development;</p> <ul style="list-style-type: none"> <li>– Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and</li> <li>– Unauthorised access and development related activity inside access restricted areas is prohibited.</li> </ul>		<p><b>sensitive areas and 'no-go' areas</b></p>	<p><b>new area</b></p>			<p><b>with sensitive areas</b></p>
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#### 5.4 Access roads

<p><b>Impact management outcome:</b> Minimise impact to the environment through the planned and restricted movement of vehicles on site.</p>						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>– Access to the servitude and tower positions must be negotiated with the relevant landowner and must fall within the assessed and authorised area;</li> <li>– An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities;</li> <li>– The access roads to tower positions must be signposted after access has been negotiated and before the commencement of the activities;</li> <li>– All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition</li> <li>– All contractors must be made aware of all these access routes.</li> </ul>	<p><b>Contractor</b></p>	<p><b>Implementation of mitigation measures</b></p>	<p><b>Ongoing</b></p>	<p><b>ECO</b></p>	<p><b>Monthly</b></p>	<p><b>Signed access agreements and maintenance of access roads</b></p>

<ul style="list-style-type: none"> <li>- Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense;</li> <li>- Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads;</li> <li>- In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with <b>section 4.9: photographic record</b>; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor;</li> <li>- Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands</li> <li>- Access roads must only be developed on pre-planned and approved roads.</li> </ul>						
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**5.5 Fencing and Gate installation**

<p><b>Impact management outcome:</b> Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.</p>						
<p><b>Impact Management Actions</b></p>	<p><b>Implementation</b></p>			<p><b>Monitoring</b></p>		
	<p>Responsible person</p>	<p>Method of implementation</p>	<p>Timeframe for implementation</p>	<p>Responsible person</p>	<p>Frequency</p>	<p>Evidence of compliance</p>

<ul style="list-style-type: none"> <li>- Use existing gates provided to gain access to all parts of the area authorised for development, where possible;</li> <li>- Existing and new gates to be recorded and documented in accordance with <b>section 4.9: photographic record</b>;</li> <li>- All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner;</li> <li>- At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner;</li> <li>- Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground;</li> <li>- Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate;</li> <li>- Original tension must be maintained in the fence wires;</li> <li>- All gates installed in electrified fencing must be re-electrified;</li> <li>- All demarcation fencing and barriers must be maintained in good working order for the duration of overhead transmission and distribution electricity infrastructure development activities;</li> <li>- Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where appropriate and would not cause harm to the sensitive flora;</li> <li>- Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner.</li> <li>- All fencing must be developed of high quality material bearing the SABS mark;</li> <li>- The use of razor wire as fencing must be avoided;</li> </ul>	<b>Contractor and Applicant</b>	<b>Implementation of the mitigation measures</b>	<b>Ongoing</b>	<b>ECO</b>	<b>Monthly</b>	<b>Site observation; public complaints register</b>
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<ul style="list-style-type: none"> <li>- Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times;</li> <li>- On completion of the development phase all temporary fences are to be removed;</li> <li>- The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.</li> </ul>						
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**5.6 Water Supply Management**

<p><b>Impact management outcome:</b> Undertake responsible water usage.</p>						
<p><b>Impact Management Actions</b></p>	<p><b>Implementation</b></p>			<p><b>Monitoring</b></p>		
	<p>Responsible person</p>	<p>Method of implementation</p>	<p>Timeframe for implementation</p>	<p>Responsible person</p>	<p>Frequency</p>	<p>Evidence of compliance</p>
<ul style="list-style-type: none"> <li>- All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis;</li> <li>- The Contractor must ensure the following: <ul style="list-style-type: none"> <li>a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river;</li> <li>b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and</li> <li>c. All reasonable measures to limit pollution or</li> </ul> </li> </ul>	<p><b>Contractor and Applicant</b></p>	<p><b>Application to DWS where applicable. Implementation of mitigation measures</b></p>	<p><b>Construction</b></p>	<p><b>ECO</b></p>	<p><b>Monthly</b></p>	<p><b>Proof of water source used; submission of above proof to DWS</b></p>

<p>sedimentation of the downstream watercourse are implemented.</p> <ul style="list-style-type: none"> <li>- Ensure water conservation is being practiced by: <ul style="list-style-type: none"> <li>a. Minimising water use during cleaning of equipment;</li> <li>b. Undertaking regular audits of water systems; and</li> <li>c. Including a discussion on water usage and conservation during environmental awareness training.</li> <li>d. The use of grey water is encouraged.</li> </ul> </li> </ul>						
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**5.7 Storm and waste water management**

<b>Impact management outcome:</b> Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager;</li> <li>- All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility;</li> <li>- Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO;</li> </ul>	<b>Contractor</b>	<b>Employ methods to prevent water pollution</b>	<b>Construction</b>	<b>ECO</b>	<b>Weekly</b>	<b>Inspection of areas where construction takes place near watercourses</b>



<ul style="list-style-type: none"> <li>– Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.</li> </ul>					
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**5.8 Solid and hazardous waste management**

<p><b>Impact management outcome:</b> Waste is appropriately stored, handled and safely disposed of at a recognised waste facility.</p>						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>– All measures regarding waste management must be undertaken using an integrated waste management approach;</li> <li>– Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided;</li> <li>– A suitably positioned and clearly demarcated waste collection site must be identified and provided;</li> <li>– The waste collection site must be maintained in a clean and orderly manner;</li> <li>– Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal;</li> </ul>	<p><b>Contractor</b></p>	<p><b>Following good waste management practices outlined in approved method statement</b></p>	<p><b>Construction</b></p>	<p><b>ECO</b></p>	<p><b>Weekly</b></p>	<p><b>Waste Safe disposal slips; service level agreements</b></p>

<ul style="list-style-type: none"> <li>- Staff must be trained in waste segregation;</li> <li>- Bins must be emptied regularly;</li> <li>- General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company;</li> <li>- Hazardous waste must be disposed of at a registered waste disposal site;</li> <li>- Certificates of safe disposal for general, hazardous and recycled waste must be maintained.</li> </ul>						
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**5.9 Protection of watercourses and estuaries**

<b>Impact management outcome:</b> Pollution and contamination of the watercourse environment and or estuary erosion are prevented.						
<b>Impact Management Actions</b>	<b>Implementation</b>			<b>Monitoring</b>		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities;</li> <li>- In the event of a spill, prompt action must be taken to clear the polluted or affected areas;</li> <li>- Where possible, no development equipment must traverse any seasonal or permanent wetland</li> <li>- No return flow into the estuaries must be allowed and no disturbance of the Estuarine Functional Zone should occur;</li> </ul>	<b>Contractor</b>	<b>Method statements; Storm water Management Plan</b>	<b>Construction</b>	<b>ECO</b>	<b>Weekly</b>	<b>Method Statement compliance</b>

<ul style="list-style-type: none"> <li>- Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available;</li> <li>- There must not be any impact on the long term morphological dynamics of watercourses or estuaries;</li> <li>- Existing crossing points must be favored over the creation of new crossings (including temporary access)</li> <li>- When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: <ul style="list-style-type: none"> <li>a) Water levels during the period of construction; No altering of the bed, banks, course or characteristics of a watercourse</li> <li>b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained;</li> <li>c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and</li> <li>d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.</li> </ul> </li> </ul>						
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**5.10 Vegetation clearing**

**Impact management outcome:** Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<b>General:</b> <ul style="list-style-type: none"> <li>– Indigenous vegetation which does not interfere with the development must be left undisturbed;</li> <li>– Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species;</li> <li>– Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing;</li> <li>– Permits for removal must be obtained from the Department of Agriculture, Forestry and Fisheries prior to the cutting or clearing of the affected species, and they must be filed;</li> <li>– The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals;</li> <li>– Trees felled due to construction must be documented and form part of the Environmental Audit Report;</li> <li>– Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris;</li> <li>– Only a registered pest control operator may apply herbicides on a commercial basis and commercial</li> </ul>	<b>Contractor and Applicant</b>	<b>Specialist recommendations; Method statement; Search and Rescue Plan; Alien Vegetation Removal Plan (approved plans and strategies used by Eskom); site awareness</b>	<b>Pre-Construction and Construction and Operation</b>	<b>ECO</b>	<b>Pre-Construction and weekly during construction</b>	<b>Compliance to method statements and Search and Rescue Plan; Alien Vegetation Removal Plan (approved plans and strategies used by Eskom)</b>

<p>application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained;</p> <ul style="list-style-type: none"> <li>- A daily register must be kept of all relevant details of herbicide usage;</li> <li>- No herbicides must be used in estuaries;</li> <li>- All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to <b>Section 5.3: Access restricted areas.</b></li> </ul> <p><b>Servitude:</b></p> <ul style="list-style-type: none"> <li>- Vegetation that does not grow high enough to cause interference with overhead transmission and distribution infrastructures, or cause a fire hazard to any plantation, must not be cut or trimmed unless it is growing in the road access area, and then only at the discretion of the Project Manager;</li> <li>- Where clearing for access purposes is essential, the maximum width to be cleared within the servitude must be in accordance to distance as agreed between the land owner and the EA holder</li> <li>- Alien invasive vegetation must be removed according to a plan (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a recognised waste disposal facility;</li> <li>- Vegetation must be trimmed where it is likely to intrude on the minimum vegetation clearance distance (MVCD) or will intrude on this distance before the next scheduled clearance. MVCD is determined from SANS 10280;</li> <li>- Debris resulting from clearing and pruning must be disposed of at a recognised waste disposal facility, unless the landowners wish to retain the cut vegetation;</li> <li>- In the case of the development of new overhead</li> </ul>						
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transmission and distribution infrastructures, a one metre "trace-line" must be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along the "trace-line". Alternative methods of stringing which limit impact to the environment must always be considered.						
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### 5.11 Protection of fauna

<b>Impact management outcome:</b> Minimise disturbance to fauna.						
<b>Impact Management Actions</b>	<b>Implementation</b>			<b>Monitoring</b>		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present;</li> <li>- The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme;</li> <li>- Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present;</li> <li>- Nesting sites on existing parallel lines must documented;</li> <li>- Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds;</li> <li>- Bird guards and diverters must be installed on the new line as per the recommendations of the specialist;</li> </ul>	<b>Contractor</b>	<b>Method statement and adherence to exclusion/no-go zones; site awareness</b>	<b>Construction</b>	<b>ECO</b>	<b>Weekly</b>	<b>Public complaints register; adherence to exclusion/n o-go zones and method statements</b>

<ul style="list-style-type: none"> <li>- No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas;</li> <li>- No deliberate or intentional killing of fauna is allowed;</li> <li>- In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and</li> <li>- No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.</li> </ul>						
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**5.12 Protection of heritage resources**

<p><b>Impact management outcome:</b> Minimise impact to heritage resources.</p>						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in <b>Section 5.3: Access restricted areas</b>;</li> <li>- Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance;</li> <li>- All work must cease immediately, if any human remains</li> </ul>	<p><b>Contractor</b></p>	<p><b>Method Statement; Heritage Management Plan</b></p>	<p><b>Pre-construction and construction</b></p>	<p><b>ECO</b></p>	<p><b>Weekly and daily for zones highlighted by Heritage</b></p>	<p><b>Monitoring of construction areas; adherence to</b></p>

and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.					<b>Specialist where potsherds were found</b>	<b>management plan if chance finds found</b>
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### 5.13 Safety of the public

<b>Impact management outcome:</b> All precautions are taken to minimise the risk of injury, harm or complaints.						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.;</li> <li>- All unattended open excavations must be adequately fenced or demarcated;</li> <li>- Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding;</li> <li>- Ensure structures vulnerable to high winds are secured;</li> <li>- Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.</li> </ul>	<b>Contractor</b>	<b>Landowner agreements; Method Statement</b>	<b>Construction</b>	<b>ECO</b>	<b>Weekly</b>	<b>Site works barricaded; safe working site maintained; public complaints register</b>



**5.14 Sanitation**

**Impact management outcome:** Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Mobile chemical toilets are installed onsite if no other ablution facilities are available;</li> <li>- The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances;</li> <li>- Where mobile chemical toilets are required, the following must be ensured:               <ul style="list-style-type: none"> <li>a) Toilets are located no closer than 100 m to any watercourse or water body;</li> <li>b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause;</li> <li>c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr;</li> <li>d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out;</li> <li>e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours;</li> <li>f) Toilets are serviced regularly and the ECO must inspect</li> </ul> </li> </ul>	<b>Contractor</b>	<b>Service level agreement with service provider; Method statement; site awareness</b>	<b>Construction</b>	<b>ECO</b>	<b>Weekly</b>	<b>Service level agreement with service provider; proof of safe disposal of waste</b>

toilets to ensure compliance to health standards; – A copy of the waste disposal certificates must be maintained.						
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**5.15 Prevention of disease**

**Impact Management outcome:** All necessary precautions linked to the spread of disease are taken.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>– Undertake environmentally-friendly pest control in the camp area;</li> <li>– Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS;</li> <li>– The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area;</li> <li>– Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable;</li> <li>– Free condoms must be made available to all staff on site at central points;</li> <li>– Medical support must be made available;</li> <li>– Provide access to Voluntary HIV Testing and Counselling Services.</li> </ul>	<b>Contractor</b>	<b>Method statement; awareness training</b>	<b>Construction</b>	<b>ECO</b>	<b>Monthly</b>	<b>Method statement; proof of awareness training</b>

**5.16 Emergency procedures**

**Impact management outcome:** Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project;</li> <li>- The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation;</li> <li>- All staff must be made aware of emergency procedures as part of environmental awareness training;</li> <li>- The relevant local authority must be made aware of a fire as soon as it starts;</li> <li>- In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see <b>Hazardous Substances section 5.17</b>).</li> </ul>	<b>Contractor</b>	<b>Environmental Emergency Response Action Plan</b>	<b>Construction</b>	<b>ECO</b>	<b>Monthly</b>	<b>Adherence/compliance to ERAP</b>

**5.17 Hazardous substances**

**Impact management outcome:** Safe storage, handling, use and disposal of hazardous substances.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible;</li> <li>- All hazardous substances must be stored in suitable containers as defined in the Method Statement;</li> <li>- Containers must be clearly marked to indicate contents, quantities and safety requirements;</li> <li>- All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers;</li> <li>- Bunded areas to be suitably lined with a SABS approved liner;</li> <li>- An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis;</li> <li>- All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS);</li> <li>- All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet;</li> <li>- Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available;</li> <li>- The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks</li> </ul>	<b>Contractor</b>	<b>Method statement; OHS requirements; adequate and responsible use and storage of hazardous substances; hazardous substance storage register</b>	<b>Construction</b>	<b>ECO</b>	<b>Weekly</b>	<b>Hazardous substance storage register; MSDS; method statement</b>

<p>or in bowsers;</p> <ul style="list-style-type: none"> <li>- The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowsers (110% statutory requirement plus an allowance for rainfall);</li> <li>- The floor of the bund must be sloped, draining to an oil separator;</li> <li>- Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained;</li> <li>- All empty externally dirty drums must be stored on a drip tray or within a banded area;</li> <li>- No unauthorised access into the hazardous substances storage areas must be permitted;</li> <li>- No smoking must be allowed within the vicinity of the hazardous storage areas;</li> <li>- Adequate fire-fighting equipment must be made available at all hazardous storage areas;</li> <li>- Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used;</li> <li>- An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times;</li> <li>- The responsible operator must have the required training to make use of the spill kit in emergency situations;</li> <li>- An appropriate number of spill kits must be available and must be located in all areas where activities are being</li> </ul>						
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<p>undertaken;</p> <ul style="list-style-type: none"> <li>- In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to <b>Section 5.7</b> for procedures concerning <b>storm and waste water management</b> and <b>5.8</b> for <b>solid and hazardous waste management</b>.</li> </ul>						
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**5.18 Workshop, equipment maintenance and storage**

<p><b>Impact management outcome:</b> Soil, surface water and groundwater contamination is minimised.</p>						
<p><b>Impact Management Actions</b></p>	<p><b>Implementation</b></p>			<p><b>Monitoring</b></p>		
	<p>Responsible person</p>	<p>Method of implementation</p>	<p>Timeframe for implementation</p>	<p>Responsible person</p>	<p>Frequency</p>	<p>Evidence of compliance</p>
<ul style="list-style-type: none"> <li>- Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area;</li> <li>- During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts;</li> <li>- Leaking equipment must be repaired immediately or be removed from site to facilitate repair;</li> <li>- Workshop areas must be monitored for oil and fuel spills;</li> <li>- Appropriately sized spill kit kept onsite relevant to the scale</li> </ul>	<p><b>Contractor</b></p>	<p><b>Method statement; OHS requirements; hazardous substances storage register; vehicle daily checklist; vehicle service register</b></p>	<p><b>Construction</b></p>	<p><b>ECO</b></p>	<p><b>Weekly</b></p>	<p><b>Method statement; hazardous substances storage register; vehicle daily checklist; vehicle service</b></p>

<p>of the activity taking place must be available;</p> <ul style="list-style-type: none"> <li>- The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed;</li> <li>- Water drainage from the workshop must be contained and managed in accordance <b>Section 5.7: storm and waste water management</b>.</li> </ul>						<p><b>register</b></p>
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**5.19 Batching plants**

<p><b>Impact management outcome:</b> Minimise spillages and contamination of soil, surface water and groundwater.</p>						
<p><b>Impact Management Actions</b></p>	<p><b>Implementation</b></p>			<p><b>Monitoring</b></p>		
<ul style="list-style-type: none"> <li>- Concrete mixing must be carried out on an impermeable surface;</li> <li>- Batching plants areas must be fitted with a containment facility for the collection of cement laden water.</li> <li>- Dirty water from the batching plant must be contained to prevent soil and groundwater contamination</li> <li>- Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains;</li> <li>- A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted;</li> </ul>	<p>Responsible person</p> <p><b>Contractor</b></p>	<p>Method of implementation</p> <p><b>Method statement</b></p>	<p>Timeframe for implementation</p> <p><b>Construction</b></p>	<p>Responsible person</p> <p><b>ECO</b></p>	<p>Frequency</p> <p><b>Weekly</b></p>	<p>Evidence of compliance</p> <p><b>Compliance to mitigation and method statement</b></p>

<ul style="list-style-type: none"> <li>- Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility;</li> <li>- Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site;</li> <li>- Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to <b>Section 5.20: Dust emissions</b>)</li> <li>- Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility;</li> <li>- Temporary fencing must be erected around batching plants in accordance with <b>Section 5.5: Fencing and gate installation</b>.</li> </ul>						
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**5.20 Dust emissions**

<p><b>Impact management outcome:</b> Dust prevention measures are applied to minimise the generation of dust.</p>						
<p><b>Impact Management Actions</b></p>	<p><b>Implementation</b></p>			<p><b>Monitoring</b></p>		
	<p>Responsible person</p>	<p>Method of implementation</p>	<p>Timeframe for implementation</p>	<p>Responsible person</p>	<p>Frequency</p>	<p>Evidence of compliance</p>
<ul style="list-style-type: none"> <li>- Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO;</li> <li>- Removal of vegetation must be avoided until such time as</li> </ul>	<p><b>Contractor</b></p>	<p><b>Method statement; vehicle speed limit; dust</b></p>	<p><b>Construction</b></p>	<p><b>ECO</b></p>	<p><b>Monthly</b></p>	<p><b>Site observation; dust suppression</b></p>



<p>soil stripping is required and similarly exposed surfaces must be re- vegetated or stabilised as soon as is practically possible;</p> <ul style="list-style-type: none"> <li>- Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present;</li> <li>- During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level;</li> <li>- Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind;</li> <li>- Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO;</li> <li>- Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas;</li> <li>- Straw stabilisation must be applied at a rate of one bale/10 m<sup>2</sup> and harrowed into the top 100 mm of top material, for all completed earthworks;</li> <li>- For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.</li> </ul>		<b>suppression</b>				<b>register</b>
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**5.21 Blasting**

**Impact management outcome:** Impact to the environment is minimised through a safe blasting practice.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Any blasting activity must be conducted by a suitably licensed blasting contractor; and</li> <li>- Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.</li> </ul>	<b>Contractor</b>	<b>Relevant legislation and regulation</b>	<b>Construction</b>	<b>ECO</b>	<b>Monthly</b>	<b>Public complaints register; proof of registration of blasting contractor</b>

**5.22 Noise**

**Impact Management outcome:** Unnecessary noise is prevented by ensuring that noise from construction activities is mitigated.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

	person	implementation	implementation	person		compliance
<ul style="list-style-type: none"> <li>- The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only;</li> <li>- All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained;</li> <li>- Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers;</li> <li>- Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff.</li> <li>- Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.</li> </ul>	<b>Contractor</b>	<b>Restriction of site hours to working hours</b>	<b>Construction</b>	<b>ECO</b>	<b>Monthly</b>	<b>Public Complaints Register</b>

### 5.23 Fire prevention

<b>Impact management outcome:</b> Prevention of uncontrollable fires.						
<b>Impact Management Actions</b>	<b>Implementation</b>			<b>Monitoring</b>		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Designate smoking areas where the fire hazard could be regarded as insignificant;</li> <li>- Firefighting equipment must be available on all vehicles</li> </ul>	<b>Contractor</b>	<b>Emergency Response Action Plan; Method</b>	<b>Construction</b>	<b>ECO</b>	<b>Monthly</b>	<b>Public complaints register;</b>

located on site; – The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two-way swap of contact details between ECO and FPA.		<b>Statement</b>				<b>compliance to ERAP</b>
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#### 5.24 Stockpiling and stockpile areas

<b>Impact management outcome:</b> Erosion and sedimentation as a result of stockpiling are reduced.						
<b>Impact Management Actions</b>	<b>Implementation</b>			<b>Monitoring</b>		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies;</li> <li>– All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods;</li> <li>– Topsoil stockpiles must not exceed 2 m in height;</li> <li>– During periods of strong winds and heavy rain, the stockpiles</li> </ul>	<b>Contractor</b>	<b>Method Statement</b>	<b>Construction</b>	<b>ECO</b>	<b>Monthly</b>	<b>Method Statement and site observations</b>

<p>must be covered with appropriate material (e.g. cloth, tarpaulin etc.);</p> <ul style="list-style-type: none"> <li>– Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.</li> </ul>						
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**5.25 Finalising tower positions**

<p><b>Impact management outcome:</b> No environmental degradation occurs as a result of the survey and pegging operations.</p>						
<p><b>Impact Management Actions</b></p>	<p><b>Implementation</b></p>			<p><b>Monitoring</b></p>		
	<p>Responsible person</p>	<p>Method of implementation</p>	<p>Timeframe for implementation</p>	<p>Responsible person</p>	<p>Frequency</p>	<p>Evidence of compliance</p>
<ul style="list-style-type: none"> <li>– No vegetation clearing must occur during survey and pegging operations;</li> <li>– No new access roads must be developed to facilitate access for survey and pegging purposes;</li> <li>– Project manager, botanical specialist and contractor to agree on final tower positions based on survey within assessed and approved areas;</li> <li>– The surveyor is to demarcate (peg) access roads/tracks in consultation with ECO. No deviations will be allowed without the prior written consent from the ECO.</li> </ul>	<p><b>Applicant</b></p>	<p><b>Findings of the Specialist Studies</b></p>	<p><b>Pre-construction</b></p>	<p><b>ECO</b></p>	<p><b>Once off</b></p>	<p><b>Final pegging of tower positions</b></p>

**5.26 Excavation and Installation of foundations**

**Impact management outcome:** No environmental degradation occurs as a result of excavation or installation of foundations.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a recognised disposal site, if not used for backfilling purposes;</li> <li>- Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes;</li> <li>- Management of equipment for excavation purposes must be undertaken in accordance with <b>Section 5.18: Workshop equipment maintenance and storage</b>; and</li> <li>- Hazardous substances spills from equipment must be managed in accordance with <b>Section 5.17: Hazardous substances</b>.</li> <li>- Batching of cement to be undertaken in accordance with <b>Section 5.19: Batching plants</b>;</li> <li>- Residual cement must be disposed of in accordance with <b>Section 5.8: Solid and hazardous waste management</b>.</li> </ul>	<b>Contractor</b>	<b>Method Statement and Engineering Drawings</b>	<b>Construction</b>	<b>ECO</b>	<b>Weekly</b>	<b>Adherence to method statements</b>

**5.27 Assembly and erecting towers**

**Impact management outcome:** No environmental degradation occurs as a result of assembly and erecting of towers.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Prior to erection, assembled towers and tower sections must be stored on elevated surface (suggest wooden blocks) to minimise damage to the underlying vegetation;</li> <li>- In sensitive areas, tower assembly must take place off-site or away from sensitive positions;</li> <li>- The crane used for tower assembly must be operated in a manner which minimises impact to the environment;</li> <li>- The number of crane trips to each site must be minimised;</li> <li>- Wheeled cranes must be utilised in preference to tracked cranes;</li> <li>- Consideration must be given to erecting towers by helicopter or by hand where it is warranted to limit the extent of environmental impact;</li> <li>- Access to tower positions to be undertaken in accordance with access requirements in specified in Section 8.4: Access Roads;</li> <li>- Vegetation clearance to be undertaken in accordance with general vegetation clearance requirements specified in Section 8.10: Vegetation clearing;</li> <li>- No levelling at tower sites must be permitted unless</li> </ul>	<b>Contractor</b>	<b>Method Statement</b>	<b>Construction</b>	<b>ECO</b>	<b>Weekly</b>	<b>Site observations</b>

<p>approved by the Development Project Manager or Developer Site Supervisor;</p> <ul style="list-style-type: none"> <li>- Topsoil must be removed separately from subsoil material and stored for later use during rehabilitation of such tower sites;</li> <li>- Topsoil must be stored in heaps not higher than 1m to prevent destruction of the seed bank within the topsoil;</li> <li>- Excavated slopes must be no greater than 1:3, but where this is unavoidable, appropriate measures must be undertaken to stabilise the slopes;</li> <li>- Fly rock from blasting activity must be minimised and any pieces greater than 150 mm falling beyond the Working Area, must be collected and removed;</li> <li>- Only existing disturbed areas are utilised as spoil areas;</li> <li>- Drainage is provided to control groundwater exit gradient with the spill areas such that migration of fines is kept to a minimum;</li> <li>- Surface water runoff is appropriately channeled through or around spoil areas;</li> <li>- During backfilling operations, care must be taken not to dump the topsoil at the bottom of the foundation and then put spoil on top of that;</li> <li>- The surface of the spoil is appropriately rehabilitated in accordance with the requirements specified in Section 5.29: Landscaping and rehabilitation;</li> <li>- The retained topsoil must be spread evenly over areas to be rehabilitated and suitably compacted to effect re-vegetation of such areas to prevent erosion as soon as construction activities on the site is complete. Spreading of topsoil must not be undertaken at the beginning of the dry season.</li> </ul>						
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**5.28 Stringing**

**Impact management outcome:** No environmental degradation occurs as a result of stringing.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>- Where possible, previously disturbed areas must be used for the siting of winch and tensioner stations. In all other instances, the siting of the winch and tensioner must avoid Access restricted areas and other sensitive areas;</li> <li>- The winch and tensioner station must be equipped with drip trays in order to contain any fuel, hydraulic fuel or oil spills and leaks;</li> <li>- Refueling of the winch and tensioner stations must be undertaken in accordance with Section 5.17: Hazardous substances;</li> <li>- In the case of the development of overhead transmission and distribution infrastructure, a one metre "trace-line" may be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along "trace-lines". Vegetation clearing must be undertaken by hand, using chainsaws and hand held implements, with vegetation being cut off at ground level. No tracked or wheeled mechanised equipment must be used;</li> <li>- Alternative methods of stringing which limit impact to the environment must always be considered e.g. by hand or by</li> </ul>	<b>Contractor</b>	<b>Method Statement; adherence to exclusion zones</b>	<b>Construction</b>	<b>ECO</b>	<b>Weekly</b>	<b>Site observations</b>

<p>using a helicopter;</p> <ul style="list-style-type: none"> <li>- Where the stringing operation crosses a public or private road or railway line, the necessary scaffolding/ protection measures must be installed to facilitate access. If, for any reason, such access has to be closed for any period(s) during development, the persons affected must be given reasonable notice, in writing;</li> <li>- No services (electrical distribution lines, telephone lines, roads, railways lines, pipelines fences etc.) must be damaged because of stringing operations. Where disruption to services is unavoidable, persons affected must be given reasonable notice, in writing;</li> <li>- Where stringing operations cross cultivated land, damage to crops is restricted to the minimum required to conduct stringing operations, and reasonable notice (10 work days minimum), in writing, must be provided to the landowner;</li> <li>- Necessary scaffolding protection measures must be installed to prevent damage to the structures supporting certain high value agricultural areas such as vineyards, orchards, nurseries.</li> </ul>						
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**5.29 Socio-economic**

<p><b>Impact management outcome:</b> Socio-economic development is enhanced.</p>		
<p><b>Impact Management Actions</b></p>	<p><b>Implementation</b></p>	<p><b>Monitoring</b></p>

	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>– Develop and implement communication strategies to facilitate public participation;</li> <li>– Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process;</li> <li>– Sustain continuous communication and liaison with neighboring owners and residents</li> <li>– Create work and training opportunities for local stakeholders; and</li> <li>– Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.</li> </ul>	<b>Contractor</b>	<b>Landowner Agreements; Issues and Complaints Register</b>	<b>Construction</b>	<b>ECO</b>	<b>Monthly</b>	<b>Landowner Agreement; Issues and Complaints Register</b>

### 5.30 Temporary closure of site

**Impact management outcome:** Minimise the risk of environmental impact during periods of site closure greater than five days.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> <li>– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in <b>sections 5.17: management of hazardous substances</b> and <b>5.18 workshop, equipment maintenance and storage</b>;</li> <li>– Hazardous storage areas must be well ventilated;</li> </ul>	<b>Contractor</b>	<b>Method Statement</b>	<b>Construction – when applicable</b>	<b>ECO</b>	<b>Monthly – when applicable</b>	<b>Method Statement</b>

<ul style="list-style-type: none"> <li>- Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service;</li> <li>- Emergency and contact details displayed must be displayed;</li> <li>- Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel;</li> <li>- Night hazards such as reflectors, lighting, traffic signage etc. must have been checked;</li> <li>- Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.;</li> <li>- Structures vulnerable to high winds must be secured;</li> <li>- Wind and dust mitigation must be implemented;</li> <li>- Cement and materials stores must have been secured;</li> <li>- Toilets must have been emptied and secured;</li> <li>- Refuse bins must have been emptied and secured;</li> <li>- Drip trays must have been emptied and secured.</li> </ul>						
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**5.31 Landscaping and rehabilitation**

<p><b>Impact management outcome:</b> Areas disturbed during the development phase are returned to a state that approximates the original condition.</p>						
<p><b>Impact Management Actions</b></p>	<p><b>Implementation</b></p>			<p><b>Monitoring</b></p>		
	<p>Responsible person</p>	<p>Method of implementation</p>	<p>Timeframe for implementation</p>	<p>Responsible person</p>	<p>Frequency</p>	<p>Evidence of compliance</p>

<ul style="list-style-type: none"> <li>- All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed to a registered waste site and certificates of disposal provided;</li> <li>- All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983</li> <li>- All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983;</li> <li>- Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition;</li> <li>- Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners;</li> <li>- Rehabilitation of tower sites and access roads outside of farmland;</li> <li>- Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition;</li> <li>- Stockpiled topsoil must be used for rehabilitation (refer to Section <b>5.24: Stockpiling and stockpiled areas</b>);</li> <li>- Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion;</li> <li>- Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed;</li> <li>- Subsoil must be ripped before topsoil is placed;</li> <li>- The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment;</li> <li>- Where impacted through construction related activity, all</li> </ul>	<p><b>Contractor</b></p>	<p><b>Method Statements; erosion protection; alien eradication plan</b></p>	<p><b>Concurrent with Construction</b></p>	<p><b>ECO</b></p>	<p><b>Monthly</b></p>	<p><b>Adequately revegetated work areas; no erosion or invasive plant species</b></p>
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<p>sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled;</p> <ul style="list-style-type: none"> <li>- Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly;</li> <li>- Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil.</li> <li>- Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: <ul style="list-style-type: none"> <li>a) Annual and perennial plants are chosen;</li> <li>b) Pioneer species are included;</li> <li>c) Species chosen must be indigenous to the area with the seeds used coming from the area;</li> <li>d) Root systems must have a binding effect on the soil;</li> <li>e) The final product must not cause an ecological imbalance in the area</li> </ul> </li> </ul>						
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**6 ACCESS TO THE GENERIC EMPr**

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

## **PART B: SECTION 2**

### **7 SITE SPECIFIC INFORMATION AND DECLARATION**

#### **7.1 Sub-section 1: contact details and description of the project**

##### 7.1.1 Details of the applicant: **Wildebbeestkuil PV Generation (Pty) Ltd**

Name of applicant: **Mr. Emil Unger**

Tel No: **082 465 9825**

Fax No: **086 600 8622**

Postal Address: **.PO. Box 1171, Umhlanga Rocks, 4320**

Physical Address: **8 Farm Road, Fisherhaven, Western Cape, 7200**

##### 7.1.2 Details and expertise of the EAP:

Name of applicant: **SiVEST**

Tel No: **031 581 1573**

Fax No: N/A

E-mail address: [stephanj@sivest.co.za](mailto:stephanj@sivest.co.za)

Expertise of the EAP (Curriculum Vitae included): **Yes, included in the BA Application (Appendix A)**

##### 7.1.3 Project name:

**Proposed Development of the 9.9MW Wildebbeestkuil 2 Solar Photovoltaic (PV) Plant, 132kV Power line and associated infrastructure near Leeudoringstad in the North West Province, Maquassi Hills Local Municipality, Dr Kenneth Kaunda District Municipality:**

##### 7.1.4 Description of the project:

Wildebbeestkuil PV Generation (Pty) Ltd (hereafter referred to as 'Wildebbeestkuil PV Generation') is proposing to construct a solar photovoltaic (PV) plant, 132kV overhead power line and associated infrastructure on a number of properties, approximately 4km east of the town of Leeudoringstad in the Maquassi Hills Local Municipality, which falls within the Dr Kenneth Kaunda District Municipality in the North West Province of South Africa (hereafter referred to as the 'proposed development') (Department Ref No.: To be Allocated). The proposed development will have a total maximum generation capacity of up to approximately 9.9 megawatts (MW) and will be referred to as the Wildebbeestkuil 2 Solar PV Plant and 132kV Power Line.

SiVEST Environmental Division (hereafter referred to as 'SiVEST') has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (BA) process for the proposed construction of the Wildebbeestkuil 2 Solar PV Plant and 132kV Power Line (including associated infrastructure). The overall objective of the proposed development is to generate electricity (by capturing solar

energy) to feed into the national electricity grid and 'wheel' the power to customers based on a Power Purchase Agreement (PPA).

It should be noted that this proposed solar PV and power line development (this application) forms part of one (1) of four (4) solar PV plants and associated infrastructure (including switching substations and 132kV overhead power lines) that are being proposed as part of a greater PV project near the town of Leeudoringstad in the North West Province, namely the Leeudoringstad Solar PV Project. In addition, one (1) 132/11 kilovolt (kV) on-site substation (namely the Leeudoringstad Solar Plant Substation) is also being proposed as part of the greater Leeudoringstad Solar PV Project (**Error! Reference source not found.**).

The other proposed developments (solar PV, 132kV overhead power lines and 132/11kV on-site substation) which form part of the greater Leeudoringstad Solar PV Project include the following:

- 9.9MW Leeuwbosch 1 Solar PV Plant - Reference Number: To be Allocated (part of separate on-going BA process);
- 9.9MW Leeuwbosch 2 Solar PV Plant - Reference Number: To be Allocated (part of separate on-going BA process);
- 9.9MW Wildebeestkuil 1 Solar PV Plant and 132kV Power Line - Reference Number: To be Allocated (part of separate on-going BA process); and
- 132/11kV Leeudoringstad Solar Pant Substation - Reference Number: To be Allocated (part of separate on-going BA process).

The 132kV overhead power line and 132/11kV on-site substation (namely the Leeudoringstad Solar Plant Substation) are being proposed to feed the electricity generated by the proposed Wildebeestkuil 2 Solar PV Plant into the national electricity grid. The 132kV overhead power line will form part of the Wildebeestkuil 2 Solar PV Plant BA process and will be authorised under the Wildebeestkuil 2 Solar PV Plant Environmental Authorisation (EA), while the Leeudoringstad Substation will form part of a separate BA process and will be authorised under its own respective EA.

#### 7.1.5 Project location:

The proposed overhead power line infrastructure will affect the following properties:

The proposed development is located approximately 4 km east of the town of Leeudoringstad, within the Maquassi Hills Local Municipality in the Dr Kenneth Kaunda District Municipality of the North West Province of South Africa.

The development assessed as part of the BA process incorporates fifteen (15) properties / farm portions within the Maquassi Hills Local Municipality in the Dr Kenneth Kaunda District Municipality. However, only fourteen (14) properties / farm portions are affected by the solar PV plant and power line corridor route associated with the 'preferred' power line corridor alternative (namely Option 1). These include the following:

- Portion 13 of the Farm Wildebeestkuil No. 59
- Portion 14 of the Farm Wildebeestkuil No. 59;
- Remainder of Portion 22 of the Farm Wildebeestkuil No. 59
- Remainder of Portion 5 of the Farm Wildebeestkuil No. 59;
- Remainder of Portion 7 of the Farm Leeuwbosch No. 44;
- Portion 35 of the Farm Leeuwbosch No. 44;
- Portion 36 of the Farm Leeuwbosch No. 44;
- Portion 37 of the Farm Leeuwbosch No. 44;
- Portion 38 of the Farm Leeuwbosch No. 44;
- Portion 42 of the Farm Leeuwbosch No. 44\*;



- Portion 43 of the Farm Leeuwbosch No. 44\*;
- Portion 44 of the Farm Leeuwbosch No. 44\*;
- Portion 45 of the Farm Leeuwbosch No. 44\*;
- Portion 28 of the Farm Wildebeestkuil No. 59\*.

**\*Properties / farm portions are road / rail servitudes**

The total area of the application site for the solar PV plant which was assessed by the respective specialists as part of the BA process is approximately 115.540ha in extent and includes the following properties / farm portions:

- Portion 13 of the Farm Wildebeestkuil No. 59;
- Portion 14 of the Farm Wildebeestkuil No. 59; and
- Remainder of Portion 22 of the Farm Wildebeestkuil No. 59.

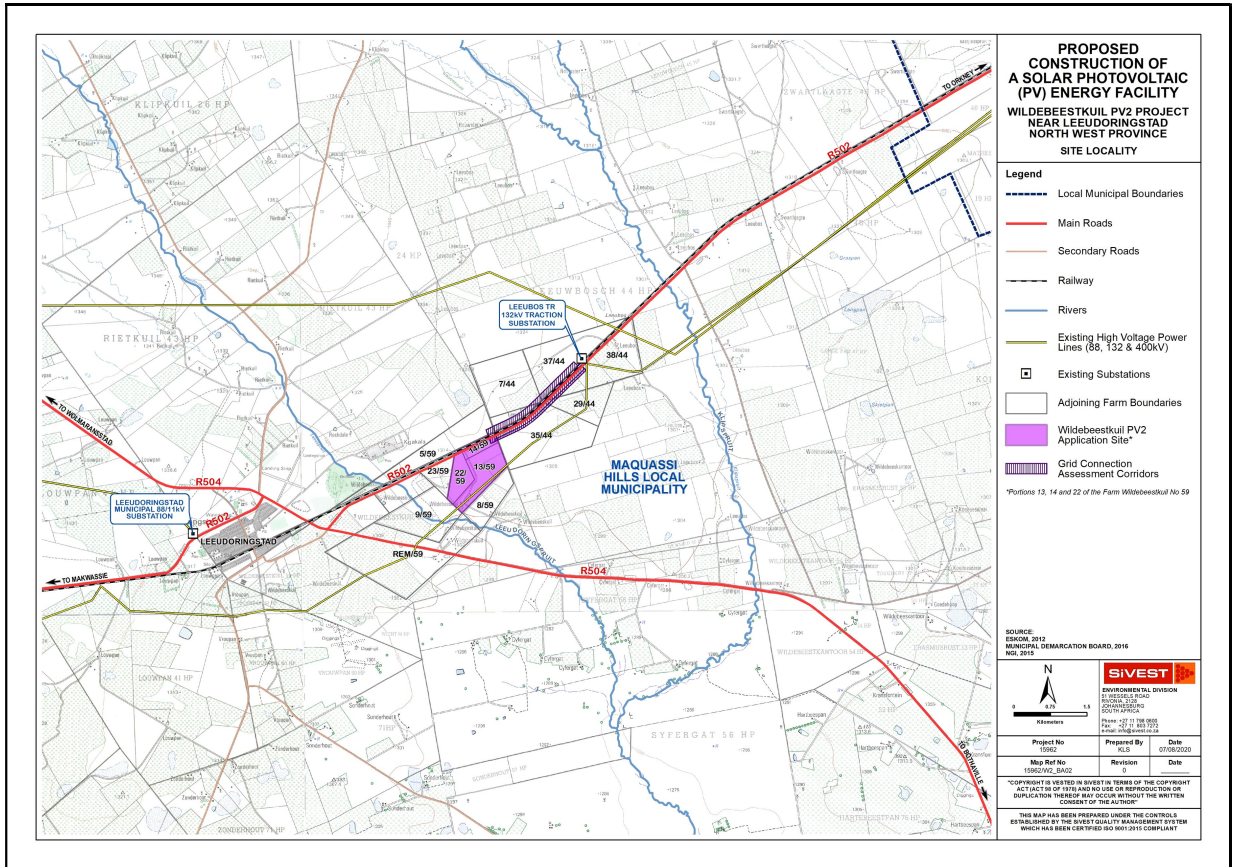


Figure 1: Locality Map

7.16 Preliminary technical specification of the overhead transmission and distribution:

- Length - **Length of approximately 2.49km for preferred power line (namely Option 1);**
- Tower parameters
  - Number and types of towers - **Type of power line towers being considered at this stage includes both lattice and monopole towers. Number of towers unknown at this stage. Type and number of power line towers will be determined during the final design stages of the proposed development, prior to construction commencing**

- Tower spacing (mean and maximum) - **At this stage it is anticipated that proposed power line towers will be located approximately 200m to 250m apart**
  - Tower height (lowest, mean and height) – **Height of power line towers will vary based on terrain, but will ensure minimum Overhead lines (OHL) line clearances with buildings and surrounding infrastructure**
- The exact height and location of towers will be confirmed during the final design stages of power line design process**
- Conductor attachment height (mean) - **Unknown at this stage. To be confirmed**
  - Minimum ground clearance - **Height of power line towers will vary based on terrain, but will ensure minimum Overhead lines (OHL) line clearances with buildings and surrounding infrastructure**

## 7.2 Sub-section 2: Development footprint site map

This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout. The sensitivity map must be prepared from the national web based environmental screening tool, when available for compulsory use at: <https://screening.environment.gov.za/screeningtool>. The sensitivity map shall identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features in the surrounding landscape. The overhead transmission and distribution profile shall be illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of overhead transmission and distribution length is illustrated per page in A3 landscape format. Where considered appropriate, photographs of sensitive features in the context of tower positions shall be used.

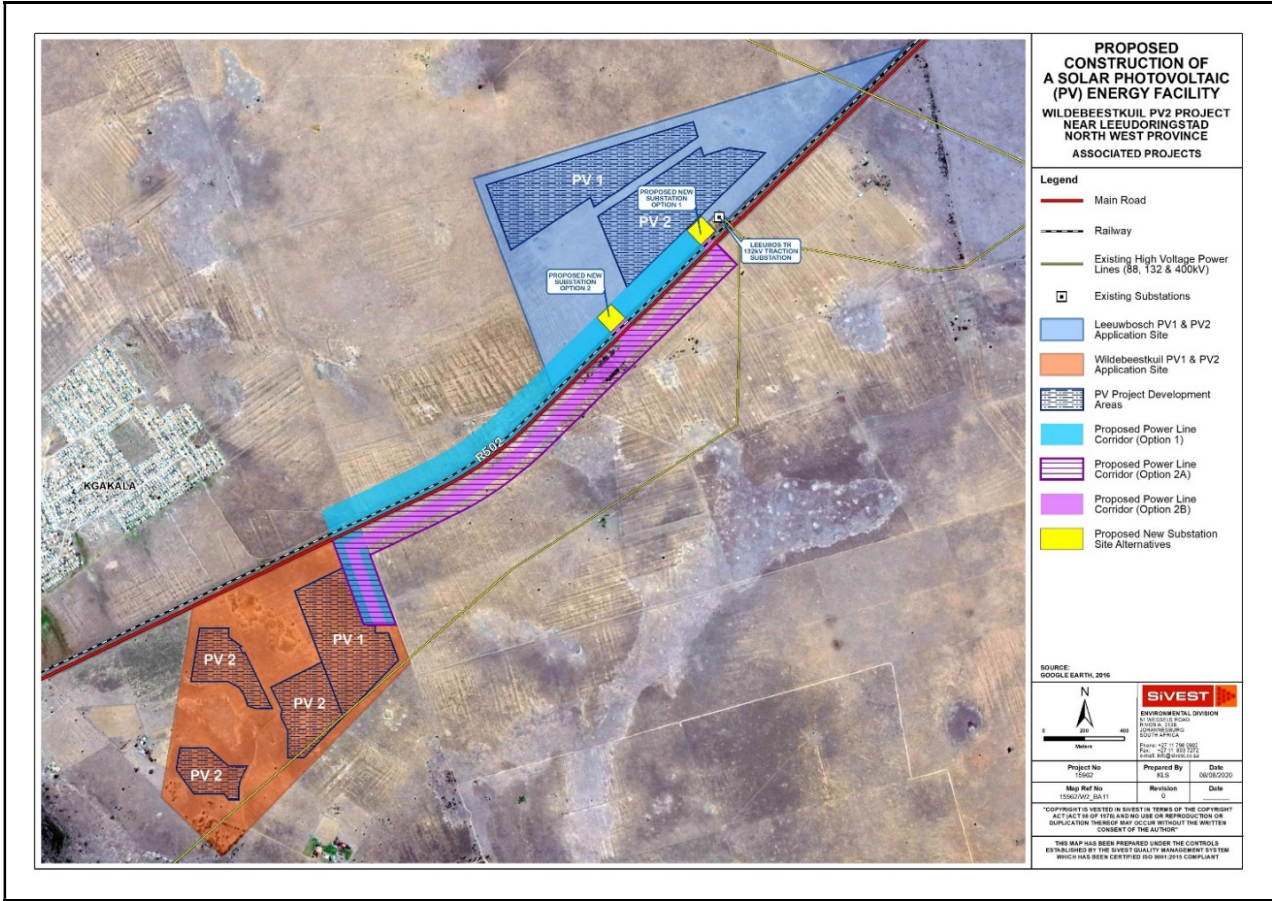


Figure 2: Regional context of the greater Leeudoringstad Solar PV Project

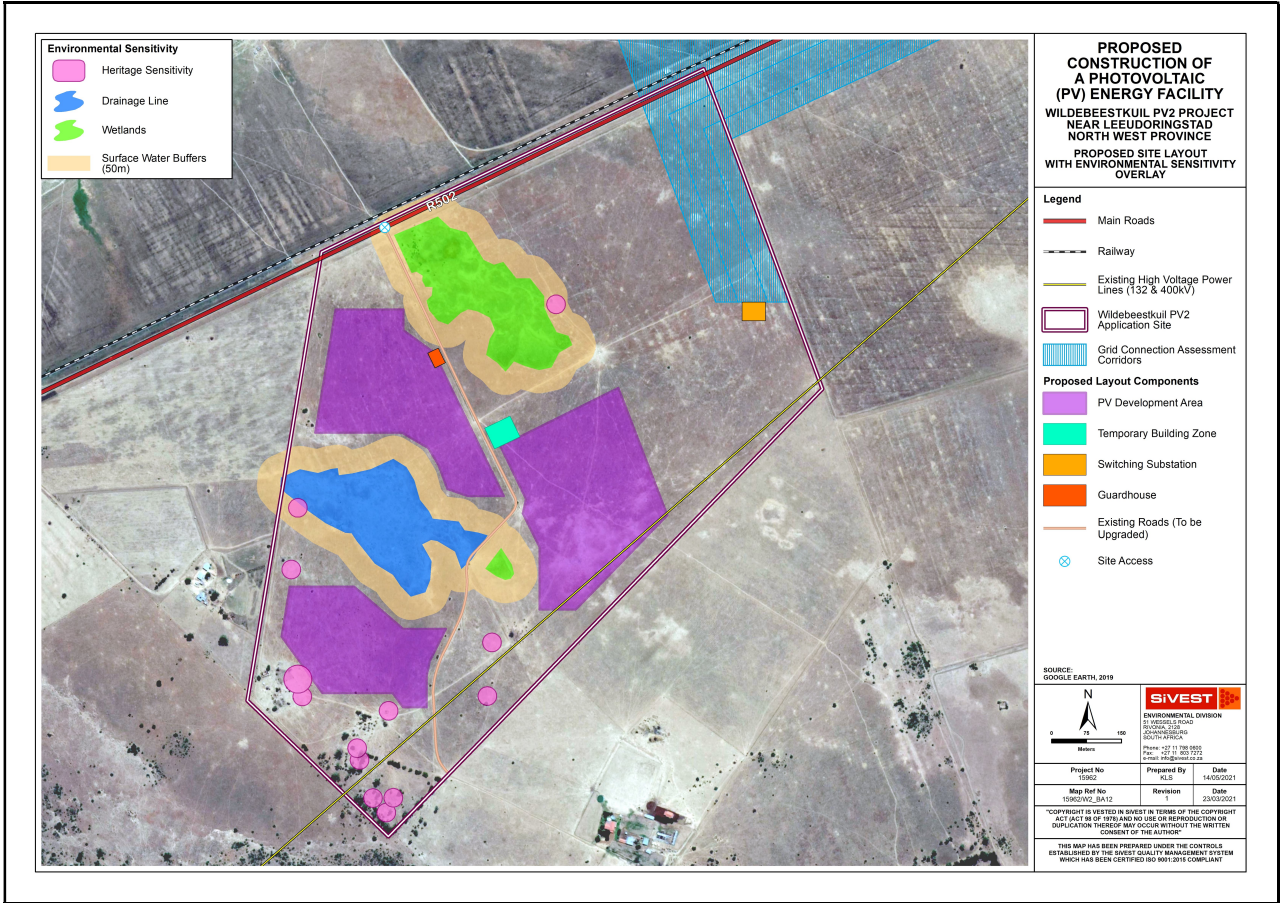


Figure 3: Preferred site layout in relation to identified environmental sensitive areas – Solar PV Plant

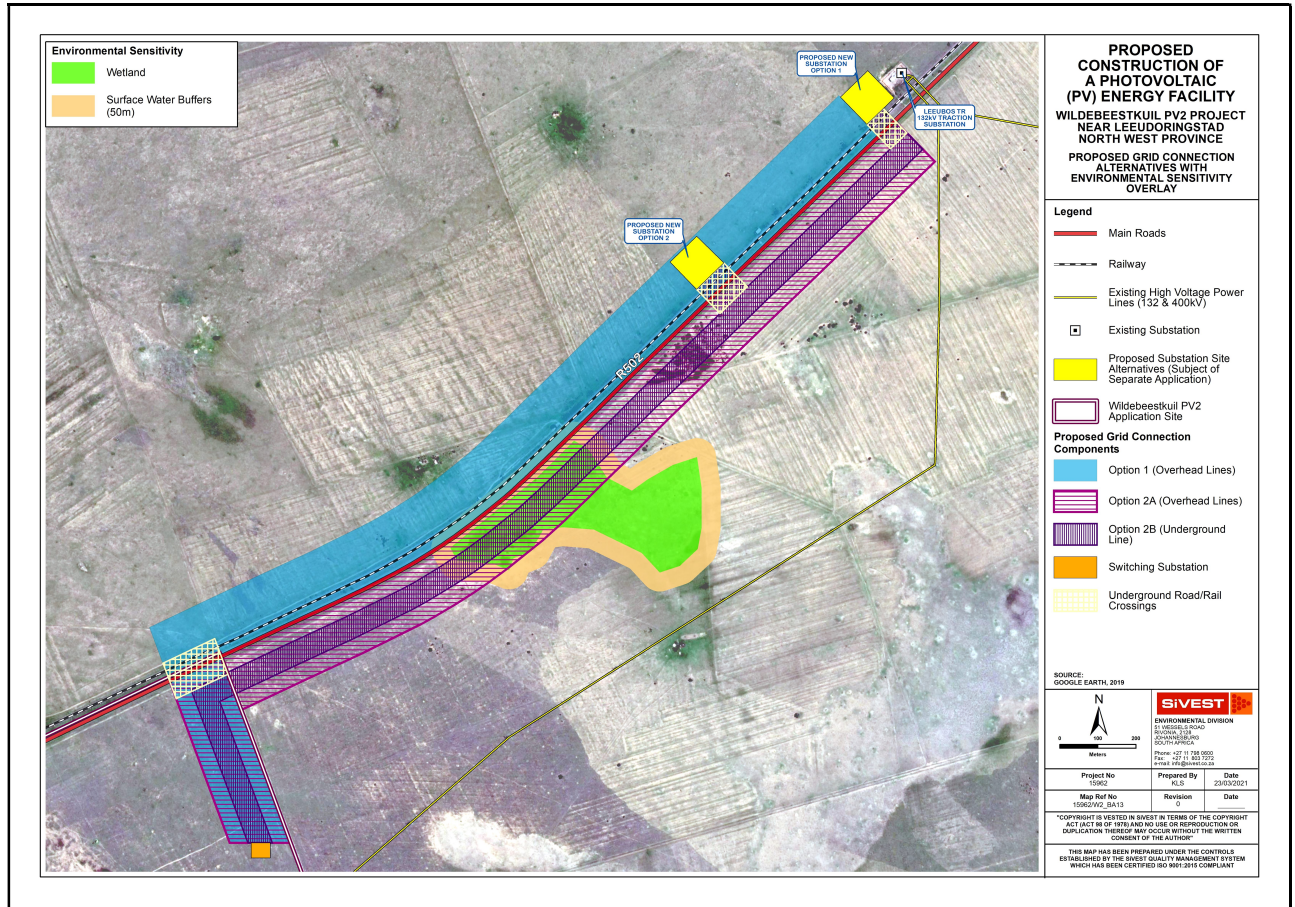


Figure 4: Preferred site layout in relation to identified environmental sensitive areas – 132kV Power Line

### 7.3 Sub-section 3: Declaration

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in part B: section 1 of the generic EMP and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 days prior to the date on which the activity will commence of commencement of construction to facilitate compliance inspections.

Signature Proponent/applicant/ holder of EA

Date:

#### 7.4 Sub-section 4: amendments to site specific information (Part B; section 2)

Should the EA be transferred to a new holder, Part B: Section 2 must be completed by the new holder and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted for an amendment to an environmental authorisation will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

### PART C

#### 8 SITE SPECIFIC ENVIRONMENTAL ATTRIBUTES

If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and actions must be included in this section. These specific management controls must be referenced spatially, and must include impact management outcomes and impact management actions. The management controls including impact management outcomes and impact management actions must be presented in the format of the pre-approved generic EMPr template. This applies only to additional impact management outcomes and impact management actions that are necessary.

If Part C is applicable to the development as authorised in the EA, it is required to be submitted to the CA together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and the name and expertise of the EAP, including the curriculum vitae are to be included. Once approved, Part C forms part of the EMPr for the site and is legally binding.

This section will **not be required** should the site contain no specific environmental sensitivities or attributes.

***In order to construct the proposed solar PV plant to the national electricity grid, an overhead 132kV power line (subject of this EMPr) will be required and thus forms part of the proposed solar PV plant. There will therefore be two (2) EMPrs governing the construction and operation of the proposed solar PV plant (including 132kV overhead power line), one (1) for the entire proposed project (namely the SiVEST Draft EMPr) and this Generic Power Line EMPr. The two (2) EMPrs must therefore be read in conjunction with each other. Where there are any discrepancies between this Generic EMPr and the SiVEST Draft EMPr on the construction and operation of the proposed development, then the SiVEST Draft EMPr shall prevail for the solar PV plant and the Generic Powerline EMPr with generic mitigation measures shall prevail for the power line component.***

**Please refer to the Draft EMPr which has been compiled by SiVEST and provided in Appendix 8 of the DBAR for specialist specific mitigation measures related to the proposed development.**

**APPENDIX 1: METHOD STATEMENTS**

To be prepared by the contractor prior to commencement of the activity. The method statements are **not required** to be submitted to the CA.

**Name** Stephan Hendrik Jacobs  
**Profession** Environmentalist  
**Name of Firm** SiVEST SA (Pty) Ltd  
**Present Appointment** Environmental Consultant  
**Years with Firm** 5 years  
**Date of Birth** 28 May 1991, Pretoria, South Africa  
**ID Number** 910528 5065 080  
**Nationality** South African



### Education

- Pretoria Boys High, Pretoria, South Africa, Matriculated 2009.

### Professional Qualification

- B.Sc. Hons Environmental Management and Analysis, (Post Graduate) University of Pretoria Honours (2014).
- B.Sc. Environmental Sciences (Undergraduate) University Of Pretoria (2012-2013)

### Employment Record

Jan 2019 – Current SiVEST SA (Pty) Ltd - Environmental Consultant  
 Aug 2018 – Dec 2018 Marang Environmental and Associates (Pty) Ltd – Environmental Consultant  
 May 2015 – Aug 2018 SiVEST SA (Pty) Ltd – Graduate Environmental Consultant  
 Nov 2014 – Feb 2015 Sodwana Bay Fishing Charters – Assistant Manager  
 Oct 2014 – Mar 2015 Ufudu Turtle Tours – Tour Guide

### Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Excellent	Excellent	Excellent
Afrikaans	Good	Good	Good

**Years of Working Experience:** 5 Years

### Countries of Working Experience

- South Africa

### Fields of Specialisation

- Environmental Management

### Overview

Stephan originally joined SiVEST in May 2015 and held the position of Graduate Environmental Consultant in the Johannesburg office. After leaving SiVEST in August 2018, and being employed for a brief period at another environmental consulting company, Stephan re-joined SiVEST in January 2019 and currently holds the position of Environmental Consultant in the Gauteng region (Pretoria and Johannesburg).



Stephan has been extensively involved in Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes for various types of projects / developments, in particular renewable energy projects / developments which form part of South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). As such, Stephan has vast experience with regards to the compilation of Environmental Impact Assessments (EIAs) and Basic Assessments (BAs). Additionally, Stephan has extensive experience in undertaking public participation and stakeholder engagement processes. Stephan has also assisted extensively in the undertaking of field work and the compilation of reports for specialist studies such as Surface Water and Visual Impact Assessments. Stephan also has considerable experience in Environmental Compliance and Auditing and has acted as an Environmental Control Officer (ECO) for several infrastructure projects.

**Skills:**

- Strong computer skills (Word, excel, PowerPoint etc.);
- Strong Proposal and report writing skills;
- Report compilation skills for Environmental Impact Assessments (EIAs) and Basic Assessments (BAs);
- Report compilation skills for Environmental Management Plans/Programmes (EMPr);
- Compilation and conducting Visual Impact Assessments;
- Assisting in Surface Water / Wetland Delineations and Assessments.

**Key experience:**

- Environmental Impact Assessment (EIA) of small, medium and large-scale infrastructure projects,
- Basic Assessment (BA), of small, medium and large-scale infrastructure projects,
- Environmental Management Plans (EMPr), of small, medium and large-scale infrastructure projects,
- Undertaking of Public Participation and Stakeholder Engagement Processes
- Proposal and tender compilation,
- Environmental Compliance and Auditing (ECO);
- Various site inspections, and
- Visual Impact Assessments (Field work and report compilation).

**Projects Experience (by Sector)**

Stephan is responsible for the following activities: report writing, proposal writing, assisting in specialist surface water delineation and functional assessments, assisting in visual impact assessments and environmental compliance and auditing procedures. Current and completed projects / activities, along with a description of the role played in each project / activity, are outlined in detail below:

**ENVIRONMENTAL CONTROL OFFICER (ECO) MONITORING / AUDITING PROJECTS: -**

- Environmental Control Officer (ECO) for the Polokwane Integrated Rapid Public Transport System (IRPTS), Limpopo Province.
- Environmental Control Officer (ECO) for Phase 1 and Phase 2 of the Newmarket Retail Development, Gauteng Province.
- Environmental Control Officer (ECO) for the proposed NuPay Office Block development at the Newmarket Retail Development, Gauteng Province.
- Environmental Control Officer (ECO) for the proposed Construction of the Decathlon Building at the Newmarket Retail Development, Gauteng Province.
- Environmental Control Officer (ECO) for the External Road Upgrades at the Newmarket Retail Development, Gauteng Province.

- Environmental Control Officer (ECO) for the Netcare Alberton Hospital Development as part of the Greater Newmarket Development, Gauteng Province.

#### BASIC ASSESSMENTS (BAS) FOR INFRASTRUCTURE PROJECTS:

- Basic Assessment (BA) for the construction of a Non-Motorised Transport (NMT) Training and Recreational Park adjacent to the Peter Mokaba Stadium in Polokwane, Limpopo Province.
- Basic Assessment (BA) for the Proposed Expansion of the Tissue Manufacturing Capacity at the Twinsaver Kliprivier Operations Base, Gauteng Province.
- Basic Assessment (BA) for the Proposed Construction of a New SPAR Distribution Centre on Erf 1092 at Redhouse in Port Elizabeth, Eastern Cape Province.

#### BASIC ASSESSMENTS (BAs) FOR RENEWABLE ENERGY PROJECTS:

- Basic Assessment (BA) for the Proposed Construction of the Graskoppies Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Basic Assessment (BA) for the Proposed Construction of the Hartebeest Leegte Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Basic Assessment (BA) for the Proposed Construction of the Ithemba Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Basic Assessment (BA) for the Proposed Construction of the !Xha Boom Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Basic Assessment (BA) for the Proposed Development of the Tooverberg Wind Energy Facility (WEF) near Touws River, Western Cape Province.
- Basic Assessment (BA) for the Proposed Development of the Tooverberg On-site Eskom Substation and 132kV Power Line for the proposed Tooverberg Wind Energy Facility (WEF) near Touws River, Western Cape Province.

#### ENVIRONMENTAL IMPACT ASSESSMENTS (EIAs) FOR RENEWABLE ENERGY PROJECTS: -

- Environmental Impact Assessment (EIA) for the Proposed Construction of the Graskoppies Wind Farm near Loeriefontein, Northern Cape Province.
- Environmental Impact Assessment (EIA) for the Proposed Construction of the Hartebeest Leegte Wind Farm near Loeriefontein, Northern Cape Province.
- Environmental Impact Assessment (EIA) for the Proposed Construction of the Ithemba Wind Farm near Loeriefontein, Northern Cape Province.
- Environmental Impact Assessment (EIA) for the Proposed Construction of the !Xha Boom Wind Farm near Loeriefontein, Northern Cape Province.
- Environmental Impact Assessment (EIA) for the Proposed Construction of the 325MW Rondekop Wind Energy Facility between Matjiesfontein and Sutherland, Northern Cape Province.
- Environmental Impact Assessment (EIA) for the Proposed Construction of the Mooi Plaats Solar Photovoltaic (PV) Energy Facility near Noupoort, Northern Cape Province.

- Environmental Impact Assessment (EIA) for the Proposed Construction of the Wonderheuvel Solar Photovoltaic (PV) Energy Facility near Noupoort, Northern Cape Province.
- Environmental Impact Assessment (EIA) for the Proposed Construction of the Paarde Valley Solar Photovoltaic (PV) Energy Facility near Middelburg, Eastern Cape Province.

#### PART 2 ENVIRONMENTAL AUTHORISATION (EA) AMENDMENT PROCESSES FOR RENEWABLE ENERGY PROJECTS:

- Part 2 Environmental Authorisation (EA) Amendment Process for the Proposed Development of the Aletta 140MW Wind Energy Facility (WEF) and Associated Infrastructure near Copperton, Northern Cape Province.
- Part 2 Environmental Authorisation (EA) Amendment Process for the Proposed Development of the 140 MW Beaufort West Wind Farm in the Prince Albert Local Municipality, Western Cape Province.
- Part 2 Environmental Authorisation (EA) Amendment Process for the Proposed Development of the 140MW Trakas West Wind Farm in the Prince Albert Local Municipality, Western Cape Province.
- Part 2 Environmental Authorisation (EA) Amendment Process for the Proposed Construction of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
- Part 2 Environmental Authorisation (EA) Amendment Process for the Proposed Construction of the 235MW Graskoppies Wind Farm near Loeriefontein, Northern Cape Province.
- Part 2 Environmental Authorisation (EA) Amendment Process for the Proposed Construction of the 235MW Hartebeest Leegte Wind Farm near Loeriefontein, Northern Cape Province.
- Part 2 Environmental Authorisation (EA) Amendment Process for the Proposed Construction of the 235MW Ithemba Wind Farm near Loeriefontein, Northern Cape Province.
- Part 2 Environmental Authorisation (EA) Amendment Process for the Proposed Construction of the 235MW !Xha Boom Wind Farm near Loeriefontein, Northern Cape Province.

#### VISUAL IMPACT ASSESSMENTS (VIAs) FOR INFRASTRUCTURE PROJECTS

- Visual Impact Assessment for the Nsoko Msele Integrated Sugar Project, Swaziland.
- Visual Impact Assessment for the Proposed Tinley Manor South Banks Beach Enhancement Solution, KwaZulu-Natal Province.
- Visual Impact Assessment for the Proposed Tinley Manor South Banks Beach Enhancement Solution, KwaZulu-Natal Province.
- Visual Impact Assessment for the proposed Mlonzi Hotel and Golf Estate Development, Near Lusikisiki, Eastern Cape Province
- Visual Impact Assessment for the Proposed Assagay Valley Development, KwaZulu-Natal Province.
- Visual Impact Assessment for the Proposed Kassier Road North Development, KwaZulu-Natal Province.

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**VISUAL IMPACT ASSESSMENTS (VIAs) FOR RENEWABLE ENERGY PROJECTS: -**

- Visual Impact Assessment for the Helena Solar PV Plant, Northern Cape Province.
- Visual Impact Assessments for the proposed construction of the Sendawo Solar 1, Sendawo Solar 2 and Sendawo Solar 3 Photovoltaic (PV) Energy Facilities near Vryburg, North West Province.
- Visual Impact Assessments for the proposed construction of the Sendawo Substation and Associated 400kV Power Line near Vryburg, North West Province.
- Visual Impact Assessments for the proposed construction of the Tlisitseng Solar 1 and Tlisitseng Solar 2 Photovoltaic (PV) Energy Facilities near Lichtenburg, North West Province.
- Visual Impact Assessment for the proposed construction of the Tlisitseng 1 132kV Substation and associated 132kV Power Line near Lichtenburg, North West Province.
- Visual Impact Assessment for the proposed construction of the Tlisitseng 2 132kV Substation and associated 132kV Power Line near Lichtenburg, North West Province.
- Visual Impact Assessment for the proposed construction of the 3000MW PhilCo Green Energy Wind Farm and Associated Infrastructure near Richmond, Northern Cape Province.
- Visual Impact Assessment for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.
- Visual Impact Assessment for the proposed construction of the Aletta 132kV Substation and associated 132kV Power Line near Copperton, Northern Cape Province.
- Visual Impact Assessment for the proposed construction of the Eureka 140MW Wind Energy Facility and associated Infrastructure near Copperton, Northern Cape Province.
- Visual Impact Assessment for the proposed construction of the Eureka 400kV Substation and 400kV Power Line near Copperton, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the Graskoppies Wind Farm near Loeriesfontein, Northern Cape Province.
- Basic Visual Impact Assessment for the Proposed Construction of the Graskoppies Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province.
- Basic Visual Impact Assessment for the Proposed Construction of the Hartebeest Leegte Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province.
- Basic Visual Impact Assessment for the Proposed Construction of the Ithemba Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the !Xha Boom Wind Farm near Loeriesfontein, Northern Cape Province.

- Basic Visual Impact Assessment for the Proposed Construction of the !Xha Boom Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the 315MW Phezukomoya Wind Energy Facility near Noupoot, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the 390MW Sankraal Wind Energy Facility near Noupoot, Northern Cape Province.
- Visual Impact Assessment for the proposed development of the Phase 1 Kuruman Wind Energy Facility, Kuruman, Northern Cape Province.
- Visual Impact Assessment for the proposed development of the Phase 2 Kuruman Wind Energy Facility, Kuruman, Northern Cape Province.
- Basic Visual Impact Assessment for the proposed development of Supporting Electrical Infrastructure to the Phase 1 and Phase 2 Kuruman Wind Energy Facilities, Kuruman, Northern Cape Province.
- Visual Impact Assessment for the proposed development of the 325MW Kudusberg Wind Energy Facility (WEF) located between Matjiesfontein and Sutherland in the Northern and Western Cape Provinces.
- Basic Visual Impact Assessment for the proposed construction of up to a 132kV Power Line and Associated Infrastructure for the Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province.
- Basic Visual Impact Assessment for the proposed construction of up to a 132kV Power Line and Associated Infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberly, Free State and Northern Cape Provinces.

#### ENVIRONMENTAL SCREENING / ENVIRONMENTAL REVIEW / ENVIRONMENTAL DUE DILIGENCE PROJECTS

- Environmental Review of the Xakwa Coal Operations, adjacent to the proposed Eastside Junction Development.
- Environmental Due Diligence for the Woodlands and Harrowdene Office Parks in Woodmead, Gauteng Province.

#### SURFACE WATER ASSESSMENTS FOR INFRASTRUCTURE PROJECTS

- Surface Water Assessment for the Steve Thswete Local Municipality, Mpumalanga Province.
- Surface Water Delineation and Assessment for the proposed coal Railway Siding at the Welgedacht Marshalling Yard and associated Milner Road Upgrade near Springs, Ekurhuleni Metropolitan Municipality.

## CURRICULUM VITAE

Michelle Nevette

<b>Name</b>	Michelle Nevette
<b>Profession</b>	Environmentalist
<b>Name of Firm</b>	SiVEST SA (Pty) Ltd
<b>Present Appointment</b>	Divisional Manager: SiVEST Environmental Division
<b>Years with Firm</b>	21 Years
<b>Date of Birth</b>	18 March 1975
<b>ID No.</b>	7503180357085
<b>Nationality</b>	South African



### Professional Qualifications

- BA (Economics), Honours in Environmental Management
- MEnvMgt. (Environmental Management) - University of South Africa
- ISO 14001:2015 Introduction and Implementation of an EMS (03/2018)
- Cert.Nat.Sci. reg. No. 120356 (July 2020)

### Membership to Professional Societies

- South African Council for Natural Scientific Professions
- International Association for Impact Assessment South Africa (IAIASa)
- Environmental Assessment Practitioners Association of South Africa (EAPSA) No.2019/1560

### Employment Record

Aug 2009 – to date	SiVEST SA (Pty) Ltd Environmental Division: Divisional Manager
April. 1999 – Aug 2009	SiVEST Environmental Division: Senior Environmental Project Manager

### Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent
Afrikaans	Good	Good	Good

**Years of Working Experience:** 21 years

### Countries of Working Experience

- South Africa
- Zimbabwe

### Fields of Specialisation

- Environmental Project Management
- Environmental Impact Assessment
- Environmental Management and Auditing
- Environmental Planning including ISO14001:2015

## CURRICULUM VITAE

Michelle Nevette

### Overview

Michelle's strong managerial skills have been extensively used in setting up and running projects and in establishing and monitoring documentation systems. Responsible for the management of a team of environmental impact assessment practitioners, including financial management of the division in conjunction with the Managing Director, and ongoing responsibilities on various environmental projects.

Michelle has a keen interest in strategic planning and has been responsible for undertaking Strategic Environmental Assessments and for preparing Integrated Environmental Management Programs and Environmental Management Frameworks for various municipalities and private developers. Extensive experience in following the Basic Assessment and Environmental Impact procedure, as well as in preparing Environmental Management Plans, consulting with authorities and conducting Audits.

Expertise gained in a variety of environmental issues relating to municipal planning, mixed use development, agro-industrial developments, business parks, petrol filling stations, the housing sector, and infrastructural projects.

### Projects Experience (by Sector)

#### ENVIRONMENTAL PLANNING /STRATEGIC PROJECTS

- Appointed by the Cato Ridge Logistical Hub Consortium (Pty) Ltd for the Cato Ridge Pilot Intermodal Project in Cato Ridge, KwaZulu-Natal (planning, BA/EIA and WULA).
- Appointed by Royal Shaka Estate (Pty) Ltd to project manage and obtain the necessary town planning and environmental rights the proposed 2155ha Royal Shaka Estate, North Coast.
- Port of Richards Bay – Strategic Environmental Assessment for Transnet National Ports Authority, (Aug 2018 – May 2019).
- Appointed by SMEC, on behalf of KZN COGTA, to undertake a High-level Environmental Status Quo & Recommendations Report for the Strategic Corridor Plan – Strategic Infrastructure Projects 2: Durban – Free State – Gauteng Development Region (June 2014 – present).
- Appointed by Finningley to assist with finalising the EIA and post authorisation work (including bulk servicing to the site on a mixed use development) which included provision for an Autobody Supply Park.
- Advised Toyota SA on the EIA requirement for a proposed site for a Toyota Autobody
- Preparation of a Strategic Environmental Assessment (SEA) for the Airports Company South Africa (ACSA) for a portion of property known as the Eastern Precinct.
- Appointed by ACSA to undertake an EIA for a portion of property known as the Eastern Precinct to house an automotive park.
- Appointed by Crookes Brothers Limited to prepare an EMF and subsequently an EIA for two properties comprising 1800ha in extent.
- Appointed by the KwaDukuza Municipality to undertake an SEA for KwaDukuza.
- Appointed by the uThungulu District Municipality to prepare an Integrated Environmental Management Plan (IEMP) for the District

#### Pre-feasibility Studies/Screening

- Appointed by Process Projects to undertake an environmental screening of Site Selection for Lithium ION NMC Precursor Materials Production (IDC project).
- Edgewood New Teaching and Learning Building. University of KwaZulu Natal. Desktop Environmental Screening Assessment and Mapping.
- Izotsha Hub Development, Izotsha. LDM. Desktop Environmental Prefeasibility Assessment and Mapping.
- Cato Ridge Development Project. SMEC. Desktop Biophysical Prefeasibility Assessment.
- Hammarsdale Link Road Project. SMEC. Desktop Environmental Screening Assessment.
- Msinga Cwaka New Town Centre – Appointed by LDM Consulting to undertake an Environmental Pre-feasibility Study for the Cwaka New Town Centre in Msinga Municipality, KwaZulu-Natal (Dec 2014).
- Avondale Forest Estate – Appointed by Trencon to undertake an Environmental Pre-feasibility Study for the Residential Eco-Estate adjacent Zimbali in Ballito, KwaZulu-Natal (Sep 2014).

## CURRICULUM VITAE

Michelle Nevette

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### Climate Change

- Durban Climate Change Strategy – Appointed by eThekweni Municipality Environmental Planning and Climate Protection Department to establish a city status quo and recommendations to facilitate the implementation of climate change work within the city (May – Sep 2018).

### Natural Resource Management (Environmental Rehabilitation)

- Renishaw Estate – Appointed by the Department of Environmental Affairs: Natural Resource Management Directorate to undertake the rehabilitation of the 1,833ha Mpambanyoni Conservation Development and Renishaw Estate (a mixed-use estate development with a strong conservation ethic) near Scottburgh, South Coast, KwaZulu-Natal (Dec 2017 – present).

## POLICY & LEGISLATION

### Review of Section 22 ECA Applications

- Appointed by DEAT to review and assess the pending Environmental Impact Assessment Applications for KZN submitted in terms of Section 22 of Environmental Conservation Act, Act 73 OF 1989.

### Alien Vegetation

- Appointed to develop an auditing framework and to audit the eThekweni Municipality Production and Display Nurseries to determine their compliance with the Conservation of Agriculture Resources Act, 1983 (ACT No. 43 OF 1983) (CARA)

### Coastal Zone Management

- Environmental Impact of the Alleged Illegal Cottages along the Wild Coast (former Transkei)

### Telecommunication Policy for Urban Areas in KwaZulu-Natal

- Prepared on behalf of the Town and Regional Planning Commission. This policy involved extensive stakeholder consultation and included extensive research on the impact of telecommunication towers and associated infrastructure in urban areas. Assisted in the collection and preparation of data.

### Training

- Appointed by uThungulu District Municipality to prepare training manuals and operational procedures manuals on EIA's which provided guidelines and principles for the District and Local Municipalities.

### Advisory Services

- Appointed by Oxygen to provide environmental advisory services and assistance to municipal projects that have become 'stuck' on behalf of KZN PROV TREASURY for MUNICIPAL INFRASTRUCTURE

## BUSINESS/INDUSTRY PROJECTS

- Audit of AMR to review their waste management practice and EMPr on behalf of Hillside Aluminium South 32
- ISO14001:2015 Internal Audit of Hillside Aluminium South 32
- ISO14001: 2015 Compilation of Legal Compliance Register and Aspects and Impacts Register for Technipaint (Pty) Ltd
- Appointed by Richards Bay Minerals (RBM) to conduct a performance assessment of RBM's approved EMPr and compile a legal liability report
- Permit/license external compliance audit for Bayside Aluminium
- Permit/license external compliance audit for Hillside Aluminium
- Permit/license external compliance audit for Metalloys Manganese Smelter in Meyerton



## CURRICULUM VITAE

Michelle Nevette

### Ports/Marine Infrastructure:

- Basic Assessment Report and EMP for the construction of marine infrastructure required for a floating dry dock in the Port of Richards Bay (Operation Phakisa)
- Preparation of a Sustainability Report and Environmental/Community Interface Report for new CO1 Conveyor for Transet Capital Project as FEL3 phase of Project Life Cycle process.

### Petrol Filling Stations:

- Appointed by Engen Petroleum Limited to undertake BAs for the following Service Stations: Engen Ottawa, Engen Tongaat and Engen Galleira
- Appointed by Engen Petroleum Limited to undertake EIAs for the following Service Stations: Engen Umhlali; Engen Riverhorse 1; Engen Riverhorse 2; Engen CBD Downs and Engen Stapleton,;
- Appointed by Shell SA Marketing (PTY) Ltd to undertake EIAs for a petrol filling station, convenience stores and ATM at Mkuze, Phoenix and Hans Dettman.
- Appointed by Shell SA Marketing (Pty) Ltd to undertake the scoping process for a petrol filling station, convenience stores and ATM at Chatsworth, Marionhill, Verulam, Hannaford, Northcroft, Eastbury and Brookdale within Durban.
- Appointed by Shell SA Marketing (Pty) Ltd to undertake application for Exemptions for the upgrade of existing petrol filling stations at Bayhead and Gateway, Durban.
- Appointed by Caltex Oil South Africa (Pty) Ltd to prepare a Scoping Report and EMP for a petrol filling station, convenience stores and ATM at Brackenheim, Richards Bay
- Preparation of Scoping Report and EMP for Philani Valley Petrol Station and Commercial Centre
- Preparation of Scoping Report and EMP for Umlazi Valley Petrol Station and Commercial Centre

### Crude storage:

- Preparation for the Airports Company South Africa (ACSA) of an EIA for a proposed subdivision and rezoning of a portion of their property for future use by NATCOS (crude storage facility).

### Mixed use/Business Park/Logistics/Shopping Centre:

- Appointed by the Cato Ridge Logistic Hub Consortium (Pty) Ltd for the Cato Ridge Pilot Intermodal Project in Cato Ridge, KwaZulu-Natal (planning, BA/EIA and WULA).
- Preparation of an EIA for a mixed use development at Renishaw
- Appointed by Finningley to assist with finalising the EIA and post authorisation work (including bulks servicing to the site on a mixed use development) which included provision for an autosupply park.
- Advised Toyota SA on the EIA requirement for a proposed site for a Toyota Autobody
- Appointed by Barkomotive (Pty) Ltd, a wholly-owned subsidiary of Ellingham Estate (Pty) Ltd, to undertake an EIA Report for the proposed mixed-use Rorqual Estate Development near Park Rynie, South Coast, KwaZulu-Natal (October 2012).
- Appointed by the Passenger Rail Association of South Africa for the construction of an Intersite. Precinct in Scottburgh, located on the KwaZulu-Natal South Coast.
- Preparation of Duty of Care, Basic Assessment and EMP for Shoprite Distribution Center in Canelands.
- Preparation of a Basic Assessment for Sakhisizwe Holdings (Pty) Ltd for the proposed Warwick Mall as part of the 2010 World Cup Initiatives.
- Preparation of a Basic Assessment Prime Spot Trading 9 (Pty) Limited for the proposed Sithole Mall Shopping Centre in Osizweni
- Basic Assessment Report for a warehouse in Alton, Richards Bay, Briardale Trading
- Basic Assessment Report and EMP for a convenience centre in Gingindlovu
- Basic Assessment Report for the Amangwane Shopping Centre in Ulundi
- Preparation of an EIA for the Airports Company South Africa (ACSA) for a proposed Business Park on a portion of property known as the Eastern Precinct to house an automotive park.
- Preparation of an application for exemption for the Airports Company South Africa (ACSA) to lease a portion of their property to Shoprite-Checkers

## CURRICULUM VITAE

Michelle Nevette

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### Waste License Applications

- Appointed by Richards Bay Minerals to undertake the waste license application for the salvage yard and ZN4.
- Appointed by Richards Bay Coal Terminal to undertake the waste license application for their existing operations.

### COMMUNITY UPLIFTMENT PROJECTS

- Appointed by Renishaw Property Development (Pty) Ltd for the construction of a school containing sporting facilities, parking areas and engineering services in Scottburgh.
- Appointed by Industrial Development Corporation (IDC) to undertake an EIA Report for the proposed Nonoti Beach Tourism Development near Blythedale, North Coast, KwaZulu-Nata
- Basic Assessment Report and EMP for the uMhlathuze Multi-Purpose Sport Stadium in Richards Bay, uThungulu District Municipality
- Appointed by the Department of Works to prepare a Scoping Report and EMP for the rezoning of an “open space” area in Port Shepstone to “public administration”
- Appointed by the Department of Works to prepare an Application for Exemption for a police station and community hall in Khenani, Richards Bay.

### RESIDENTIAL PROJECTS

#### Low Cost Housing

- Greater Amaoti Housing Project – Appointed by the Department of Human Settlements to undertake the EIA process for the development of 20 000 housing units in Amaoti. eThekweni Municipality.
- Shayamoya Phase 3 Housing Development – Appointed by the Greater Kokstad Local Municipality to undertake the EIA process for the housing development.
- Appointed by Oxygen Infrastructure Solutions for development of the Marianridge Housing Development in Marianridge, KwaZulu-Natal.
- Appointed by eThekweni to undertake an EIA for Madimeni, Lower Langefontein and Molweni Low Cost Housing.
- Appointed by eThekweni to undertake an EIA for Trenance Park 2B and Redcliffe Low Cost Housing
- Appointed by eThekweni to undertake a Basic Assessment for Philani Valley Phase 17-25 Low Cost Housing
- Appointed by the Ethekeeni Housing Department to prepare Environmental Scoping Reports, EMPs and to undertake auditing for the following low cost housing projects:
  - Africa, Inanda
  - Stop 8/Nambia, Emtshabeni
  - Kwamashu Newland
  - Mshayazafe
  - Kwadabeka C
  - Verulam: Trenance Park 2B and Redcliffe
  - Lamontville North West
- Appointed to undertake an Environmental Considerations report for Vulemehlo Low cost Housing

#### Medium – High Income Housing:

- Appointed by Canboria Developments to prepare a Scoping Report for the proposed medium income housing project at Broadlands.
- Appointed by Midnight Storm Investors to prepare an Environmental Considerations Report for the development of a new multi-storey residential development on Lots 739 – 744, Tongaat.
- Appointed by Midnight Storm Investors to prepare an EMP and undertake auditing for Simbhiti Eco-Estate

## CURRICULUM VITAE

Michelle Nevette

### LINEAR DEVELOPMENT / INFRASTRUCTURE PROJECTS

- Project management and preparation of a range of Environmental Applications for the uMhlathuze Municipality Engineering Department for the financial year 2003/2004: This included environmental applications and auditing for road, water, canal, subdivisions and informal trading facilities projects.

#### Water Supply Schemes:

- Northern Aqueduct Augmentation Pipeline: Appointed by Aurecon Consulting Engineers for the construction of a pipeline from Ntuzuma to Ogunjini.
- Appointed by VGC to provide environmental services (environmental application, EMP and auditing) for a range of water supply projects, e.g. Mhlana, Madlebe, Khoza Water Supply Projects.
- Witz Road Water Reticulation for Ethekwini Municipality – Basic Assessment and monthly auditing for a 6500m of 160mm diameter pipeline.
- Appointed by uThungulu to undertake a scoping process for Middledrift water supply
- Mtamvuna River Irrigation Potential Investigation, Izingolweni Sub-region, KwaZulu-Natal.

#### Roads and Bridges:

- Integrated Rapid Public Transport Network (IRPTN) – Appointed by the Ethekwini Transport Authority, responsible for the planning, implementation and operations of public transport in the City, to undertake an EIA report for the IRPTN Corridor 1, Bridge City to Durban CBD, and Corridor 9, Bridge City to Umhlanga
- Integrated Rapid Public Transport Network (IRPTN) – Appointed by the Ethekwini Transport Authority, responsible for the planning, implementation and operations of public transport in the City, to undertake a BA report for the IRPTN Corridor 3, Bridge City to Pinetown.
- Appointed by eThekweni to undertake a Basic Assessment for the proposed Warwick Flyover (inbound and outbound) in Warwick Precinct as part of the 2010 World Cup Initiative.
- Appointed by eThekweni to undertake a Basic Assessment for the proposed Inwabi Road I Umlazi.
- Appointed by Umhlathuze Municipality to undertake an application for Exemption for the upgrade of a 1,5km gravel road (including a proper river crossing) within the existing alignment of the road in Ngwelezane.
- Appointed to undertake an application for Exemption for the Greytown Road Upgrade, KwaZulu-Natal
- Appointed to undertake a scoping process (including EMP) for the upgrading of Broadway, Durban North on behalf of the eThekweni Municipality Appointed to undertake an application for Exemption, EMP and auditing for the upgrading of the Wick/Todd Street in Verulam

#### Electricity/ Power lines

- Appointed by appointed by TRANS-AFRICA PROJECTS to manage the environmental process for the proposed Spoornet Coalink Upgrade Project. The project consists of the upgrade of existing infrastructure and three new transmission sub-stations, in order to increase the supply of electricity for new locomotives that Spoornet have ordered to add to the export capacity of coal. The proposed project crosses provincial borders starting in Empangeni (Natal) and extends across Newcastle to Ermelo (Mpumalanga)
- Appointed by uMhlathuze Municipality to undertake an EIA for the proposed Cygnus Electricity Substation project.
- Appointed by Eskom to undertake the scoping process (including the preparation of an EMP) for a substation and associated powerlines in Mtunzini
- Electricity Supply through Mhlanga Forest Estate Development EMP, KwaZulu-Natal, South Africa

#### Pipelines

- Sezela Marine Outfall Pipeline, Scoping Report & Environmental Management Plan, KZN
- Petronet Re-Routing of existing DJP Pipeline around Pietermaritzburg EIA Scoping Report & Environmental Management Plan, KwaZulu-Natal

## CURRICULUM VITAE

Michelle Nevette

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### WATER USE LICENSES

- Cato Ridge Pilot Intermodal Project in Cato Ridge (Zone 1), KwaZulu-Natal. Appointed by the Cato Ridge Logistics Hub Consortium (Pty) Ltd. Compilation and Submission of Water Use License.
- Malandela Crossroads Water Use License. Ethekewini Municipality. Compilation and Submission of Water Use license.
- Bridge City Depot Water Use License. Ethekewini Municipality. Compilation and Submission of Water Use license.
- Zamani 1B Phase B1 and B2 Water use License. Ethekewini Municipality. Compilation and Submission of Water Use license.

### AMENDMENT APPLICATIONS

- Malandela Crossroads Development – Appointed by eThekewini Municipality to amend the Environmental Authorisation to include an amended layout.
- Northern Aqueduct Augmentation Pipeline – Appointed by Aurecon Consulting Engineers to amend the Environmental Authorisation for changes in the pipeline alignment from Ntuzuma to Ogunjini.
- Bridge City Depot – Appointed by the eThekewini Municipality to amend the Environmental Authorisation to extend the footprint of the development and apply for construction within wetland buffers.
- Zamani Low Cost Housing Development – Appointed by the eThekewini Municipality Housing Department to amend/extend the validity of the Environmental Authorisation
- Malandela Crossroads Development – Appointed by eThekewini Municipality to amend the Environmental Authorisation to exclude certain parties from a condition of the EA.
- Integrated Rapid Public Transport Network (IRPTN) C3B – Appointed by eThekewini Transport Authority to amend the Environmental Authorisation to include a deviation in the transport route as well as to add an additional depot site to the authorisation.

### **Courses Attended**

- 2018: ISO 14001:2015 Introduction and Implementation of an EMS
- 2018: Risk ZA
- 2017: Amendments to the EIA Regulations
- 2017: NEC 3 Course

**Name** Mark Summers  
**Profession** Environmental Scientist  
**Name of Firm** SiVEST SA (Pty) Ltd  
**Present Appointment** Environmental Consultant  
**Years with Firm** 2 Years  
**Date of Birth** 15 December 1990, Pietermaritzburg, South Africa  
**Nationality** South African  
**I.D. No.** 9012155010081



### Education

- National Senior Certificate, Maritzburg College, 2004-2008

### Professional Qualifications

- B.Sc. (Ecological Sciences), University of KwaZulu-Natal PMB, KZN (2013)
- B.Sc. Honours (Zoology), University of KwaZulu-Natal PMB, KZN (2014)
- M.Sc. (Ecological Sciences), University of KwaZulu-Natal PMB, KZN (2016)

### Membership to Professional Societies

- South African Council for Natural Scientific Professions (SACNASP) Can.Sci.Nat. Reg No. 120309 (2019)
- International Association for Impact Assessment South Africa (IAIASa)

### Employment Record

Jan 2018 – date SiVEST SA (Pty) Ltd: Trainee Environmental Consultant  
 Oct 2016 – Dec 2017 JG Afrika (Pty) Ltd: Environmental Consultant  
 Feb 2016 – Jun 2016 SAEON: Plant community data entry and GIS analyst  
 Jan 2011 Ezemvelo KZN Wildlife: GIS Groundtruthing in Northern KZN

### Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent
Afrikaans	Good	Good	Good

**Years of Working Experience :** 4 years

### Countries of Work Experience

- South Africa

### Fields of Specialisation

- Basic Assessments
- Environmental Compliance Monitoring
- Water Use Licence Applications
- Faunal Identification
- Avifaunal Identification

- Grass Identification
- Tree Identification
- GIS analysis (QGIS and ARCGIS)
- Statistical Analysis (SPSS, STATISTICA)

## Overview

Mark has completed a Bachelor of Science Degree in Ecological Science (UKZN, PMB), a Bachelor of Science (Honours) Degree in Zoology (UKZN, PMB) and a Master of Science Degree (PMB) in Ecological Sciences with a focus on Population and Nesting Ecology of Nile crocodiles in Pongolapoort Dam. Additionally, Mark has been involved in plant community data capture and GIS analysis in the Drakensburg region of KwaZulu-Natal. He has attended the SASS 5 Aquatic Biomonitoring Course held by Groundtruth. Mark has been involved in Consulting since October 2016, with a focus on Environmental Compliance and Basic Assessments in the Eastern Cape Province and KwaZulu-Natal. He has conducted assessments in the Biodiversity sector, with hopes of specialising in this field.

## Projects Experience (by Sector)

### ENVIRONMENTAL AUDITING / ENVIRONMENTAL CONTROL OFFICER

- Nongoma TVET Campus ECO : Aveng Grinaker c/o MSW Consulting (*Current*)
- Kwagqikazai TVET Campus ECO : Fikile Construction c/o MSW Consulting (*Current*)
- Msinga TVET Campus ECO : Base Major Construction c/o MSW Consulting (*Current*)
- Greytown TVET Campus ECO : Motheo Construction c/o MSW Consulting (*Current*)
- Driefontein Water Pipeline ECO: WRK Consulting (*Current*)
- Trustfeeds Waste Water Treatment Works ECO: Umgeni Water (*Current*)
- Construction of the Kokstad Stadium Sports Complex ECO: Greater Kokstad Municipality (*Current*)
- Middledrift SSA 5 – 3 Water Supply Scheme ECO: King Cetshwayo District Municipality c/o SiVEST Civil Engineering (*Current*)
- Middledrift SSA 5 (Emergency Line) Water Supply Scheme ECO: King Cetshwayo District Municipality c/o SiVEST Civil Engineering (*Current*)
- Sumitomo Rubber Rehabilitation Close Out Report: Sumitomo Rubber (*Completed October 2018*)
- Fitty Park Community Water Supply Scheme ECO: Uthukela District Municipality c/o SiVEST Civil Engineering (*Completed August 2018*)

### BASIC ASSESSMENTS / ENVIRONMENTAL IMPACT ASSESSMENTS

- Dannhauser Bulk Water Supply Scheme: SiVEST Consulting Engineers (*Completed June 2019*)
- Chansbury Poultry Houses Basic Assessment: Chansbury Farming Trust (*Completed January 2020*)
- Gluckstaadt Water Supply Scheme Basic Assessment: Zululand District Municipality c/o SiVEST Civil Engineering (*Current*)

### WATER USE LICENCE APPLICATIONS

- Menlyn Main WULA: Growthpoint Properties (*Current*)
- 50 Wierda Road WULA: Growthpoint Properties (*Current*)
- 151 on 5<sup>th</sup> WULA: Growthpoint Properties (*Current*)
- Riviera Office Park WULA: Growthpoint Properties (*Current*)
- 8 Rivonia Road WULA: Growthpoint Properties (*Current*)
- Dannhauser Bulk Water Supply Scheme, Amajuba District Municipality (*Current*)
- Growthpoint Properties Borehole Registration WULA: Growthpoint Properties (*May 2019*)
- Gluckstaadt Water Supply Scheme WULA: Zululand District Municipality c/o SiVEST Civil Engineering (*Current*)
- Manyoni WULA Audit: Manyoni Private Game Reserve (*Completed January 2020*)
- Zuka Properties WULA: Mun-Ya-Wana Conservancy (*Current*)

### ECOLOGICAL ASSESSMENTS

- Ntunjambili Biodiversity Studies: Black Cubans Consulting (*Completed October 2018*)
- Middleburg Biodiversity Studies: Steve Tshwete Local Municipality (*Completed July 2018*)
- N3 New England Road Upgrade Faunal Study: KSEMS Environmental Consulting (*Completed October 2019*)
- Umlaas Gate Development Faunal Study: EcoPulse Consulting (*Completed January 2019*)
- Richards Bay Port Biodiversity Assessment: Transnet National Ports Authority (*Completed July 2018*)
- Underberg Dairy S24G Faunal Assessment: Underberg Dairy (Pty) Ltd (*Completed October 2019*)
- Babanango Faunal Species List: Nature Stamp (*Completed November 2019*).
- Gluckstaadt Water Supply Scheme Faunal Assessment: Zululand District Municipality c/o SiVEST Civil Engineering (*Current*)
- Shayamoya Housing Development Vegetation Assessment: Greater Kokstad Municipality (*Current*)

### VISUAL ASSESSMENTS

- Pofadder Wind Energy Farm Visual Impact Assessment: Arcus Consulting Services SA (*Completed November 2018*)
- Rondekop Wind Energy Farm Visual Impact Assessment: G7 Energies (*Completed October 2018*)

### OTHER APPLICATIONS/ASSESSMENTS

- Glen Arum Farm 24G Application: Glen Arum Farm (Pty) Ltd (*Current*)
- Phinda Nature Reserve Maintenance Management Plan: Mun-Ya-Wana Conservancy (*Current*)
- Bishopstowe Strategic Environmental Assessment: Msunduzi Municipality (*Completed September 2018*)
- DTP State of Environment Report: Dube TradePort Corporation (*Completed May 2018*)
- Maphumulo Weir Amendment: Umgeni Water (*Current*)

### **Other Experience**

- Reconstruction of the Sand River Bridge, St Francis Bay: BVi Consulting Engineers.
- Driftsands Expansion of the Waste Water Treatment works: Bosch Holdings.
- Proposed Upgrade of the Grassridge – Sunnyside – Melkhout 132kV Powerline, Eastern Cape Province: ESKOM SOC Ltd.
- Construction of the Tombo – Mafini 132kV Powerline, Port St Johns: ESKOM SOC Ltd.
- GIS and data input of plant community data in the Drakensberg region of KwaZulu-Natal: South African Environmental Observation Network (SAEON)
- Groundtruthing of Roads and Assets in EKZN Wildlife protected areas: Ezemvelo KZN Wildlife



## **WILDERBEESTKUIL PV GENERATION (PTY) LTD**

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# **Proposed Construction of Solar Photovoltaic (PV) Energy Facilities (PV 1 & PV2) on the Farm Wildebeestkuil No. 59 near Leeudoringstad, North West Province**

## **Wetland Rehabilitation Plan**

**Issue Date:** January 2021  
**Revision No.:** 1  
**Project No.:** 15962



<b>Date:</b>	January 2021
<b>Document Title:</b>	Proposed Construction of Solar Photovoltaic (PV) Energy Facilities (PV1 & PV2) on the Farm Wildebeestkuil No. 59 near Leeudoringstad, North West Province – Wetland Rehabilitation Plan
<b>Author:</b>	Stephen Burton
<b>Revision Number:</b>	1
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<b>Approved:</b>	John Richardson
<b>Signature:</b>	
<b>For:</b>	Wildebeestkuil PV Generation (Pty) Ltd

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**WILDERBEESTKUIL PV GENERATION (PTY) LTD**

**PROPOSED CONSTRUCTION OF SOLAR PHOTOVOLTAIC (PV)  
ENERGY FACILITIES (PV 1 & PV2) ON THE FARM WILDEBEESTKUIL  
NO. 59 NEAR LEEUDORINGSTAD, NORTH WEST PROVINCE**

**WETLAND REHABILITATION PLAN**

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# WILDERBEESTKUIL PV GENERATION (PTY) LTD

## PROPOSED CONSTRUCTION OF SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITIES (PV 1 & PV2) ON THE FARM WILDEBEESTKUIL NO. 59 NEAR LEEUDORINGSTAD, NORTH WEST PROVINCE

### WETLAND REHABILITATION PLAN

#### 1 REHABILITATION MANAGEMENT PLAN

This Wetland Rehabilitation Plan is designed to manage, maintain and improve the PES and EIS of the riparian and wetland areas and surrounding terrestrial areas within the study area, with particular emphasis on the impacts that the development of a drainage line crossing within the study area may have on the drainage line and wetland areas.

##### 1.1 Rehabilitation objectives

The objectives of this plan are to:

- Ensure as far as is practicable that the measures contained in the report are implemented;
- Manage activities within the study area in order to maintain and/ or improve ecological integrity of the study area;
- Minimise adverse impacts on the receiving environment;
- Maximise the service provision and ecological functioning of the watercourse and wetland areas;
- Maximise the ecological functioning of the watercourse and wetland system and;
- Monitor the impact of the project on the receiving environment.

##### 1.2 Rehabilitation context

The rehabilitation and management plan fits into the overall planning process of the development activities and should be implemented by the proponent as soon as possible once construction on the road has reached a stage where rehabilitation activities become viable. This document serves as a rehabilitation and management plan to manage the ecological characteristics of the study area during the design, construction/implementation and post-rehabilitation/operational phases of the development.

##### 1.3 Monitoring of the rehabilitation works

During implementation/construction, the monitoring of the rehabilitation works will form part of the activities of the Environmental Control Officer (ECO). Monitoring should include, but not be limited to, the following parameters:

- Determining if the final landforms of backfilled and reprofiled areas are in line with the natural surroundings;
- Assessment of surface and slope stability;
- Assessment of adequate functioning of rehabilitation structures;
- Measuring the depth of topsoil replaced within rehabilitated areas;
- Determining erosion levels;
- Calculating ground cover percentages within revegetated areas including vegetation basal cover, litter and rock; and
- Determining plant community composition and structure of rehabilitated areas.

Upon completion of rehabilitation works on site, the ECO or a suitably qualified specialist should continue to monitor the rehabilitation works for three months on a monthly basis. Thereafter, one monitoring site visit is recommended after 6 months from completion of rehabilitation works and final sign-off of rehabilitation works should take place after one year.

#### **1.4 Roles and responsibilities**

The construction contractor or consulting engineers will be responsible for the appointment of the ECO and relevant specialists and contractors to perform rehabilitation and monitoring activities as well as alien vegetation removal and control.

##### Implementation/Construction Phase

- The ECO will ensure that the contractor and all subcontractors are aware of all the specifications pertaining to the project;
- Any damage to the environment will be repaired as soon as possible after consultation between the ECO, Consulting Engineer and Contractor;
- The ECO will ensure that the project staff and/or contractor are adhering to all stipulations of the Rehabilitation Management Plan;
- The ECO will be responsible for monitoring the rehabilitation works throughout the project by means of site visits and meetings. All site visits and meetings will be documented as part of the site meeting minutes which will be made available for inspection at any time;
- The ECO will ensure that all clean up and rehabilitation or any remedial actions required are completed swiftly as and when required.
- The contractor should not be permitted to leave site until the rehabilitation works have been signed off by a suitably qualified ECO.

##### Post-rehabilitation/Operational Phase

- During the operational phase, the body that presides over the administration of the development will be responsible for the maintenance of the rehabilitation plan and management thereof. This is particularly pertinent with reference to the two year monitoring of alien vegetation, as well as

erosion and incision control for the operational life of the development as defined in this rehabilitation plan.

## **1.5 Mitigation and management**

The section below will define and describe the various environmental impacts affecting the integrity of the wetland areas associated with the development activities and proposed management and mitigation measures related to each impact will be presented.

The table below serves to describe and explain the rehabilitation and management measures deemed necessary to effectively manage, maintain, rehabilitate and improve the ecological characteristics and functioning of the study area.

## 2 WETLAND REHABILITATION PLAN

**Table 1: Mitigation and Rehabilitation Measures**

Impact	Activity resulting in impact	Mitigation and Rehabilitation Measures
Sedimentation during construction.	Clearance of Vegetation and Levelling in the Local Catchment for PV array, Operation and Maintenance Buildings	<p>- Vegetation clearing must take place in a phased manner, only clearing areas where construction will take place and not additional areas where construction will only take place in the future.</p> <p>- Adequate structures must be put into place (temporary or permanent where necessary in extreme cases) to deal with increased/accelerated run-off and sediment volumes. The use of silt fencing and potentially sandbags or hessian “sausage” nets or other appropriate measures along the boundaries of the PV array bases are to be used where necessary to prevent run-off containing sediment entering the watercourse as well as potential erosion in susceptible areas near to the watercourse and the associated buffer zone.</p> <p>- An appropriate construction storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with increased run-off in the designated construction areas.</p>
Change in flow rate during construction	Clearance of Vegetation and Levelling in the Local Catchment for PV array, Operation and Maintenance Buildings	<p>- Adequate structures must be put into place (temporary or permanent where necessary in extreme cases) to deal with increased/accelerated run-off and sediment volumes. The use of silt fencing and potentially sandbags or hessian “sausage” nets or other appropriate measures along the boundaries of the PV array bases can be used where necessary to prevent run-off containing sediment entering the watercourses as well as potential erosion in susceptible areas near to the watercourses and the associated buffer zones.</p>

Impact	Activity resulting in impact	Mitigation and Rehabilitation Measures
<p>Vehicles and machinery may leak oil</p>	<p>Vehicles and machinery may leak oil which can accumulate in storm water run-off generated on the construction site and enter the watercourse downstream. Additionally, stored fuels, oils and other hazardous substances may leak from storage areas and enter the downstream watercourse via storm water run-off.</p>	<p>-All oils, fuels and hazardous substances or liquids must not be stored within 100m from the full extent of the watercourses and the associated buffer zones, unless such storage is unavoidable and approved by the ECO. Where these items are stored within 100m from the full extent of the watercourse, the storage area must be adequately bunded to contain any spillage from containers. Emergency spill kits must be available to clean up and remove spills.</p> <p>-All vehicles and machinery operating on the study site are to be checked for oil, fuel or any other fluid leaks before entering the construction areas. All vehicles and machinery must be regularly serviced and maintained before being allowed to enter the construction areas. No fuelling, re-fuelling, vehicle and machinery servicing or maintenance is to take place within 100m of the watercourses and the associated buffer zones.</p> <p>-The study site is to contain sufficient safety measures throughout the construction process. Safety measures include (but are not limited to) oil spill kits and the availability of fire extinguishers. Additionally, fuel, oil or hazardous substances storage areas must be bunded to 110% capacity to prevent oil or fuel contamination of the ground and / or nearby watercourses and the associated buffer zones.</p> <p>-No cement mixing is to take place in the watercourse or the associated buffer zones. In general, any cement mixing should take place over a bin lined (impermeable) surface or alternatively in the load bin of a vehicle to prevent the mixing of cement with the ground. Cement / concrete can also be trucked in readymix vehicles. Importantly, no mixing of cement or concrete directly within the watercourse and associated buffer zone.</p>

Impact	Activity resulting in impact	Mitigation and Rehabilitation Measures
Sedimentation during operation.	Increased Hardened Surfaces in the Local Catchment due to PV array bases	<ul style="list-style-type: none"> <li>- Adequate structures, where required, must be put into place to deal with increased/accelerated run-off and associated sediment volumes. The use of energy dissipating structures where required to prevent increased run-off and sediments contained in the run-off entering the watercourse can be used.</li> <li>- An appropriate operational storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation and increased run-off on site.</li> </ul>
Change in flow rate during operation.	Increased Hardened Surfaces in the Local Catchment due to PV array bases	<ul style="list-style-type: none"> <li>- Adequate structures, where required, must be put into place to deal with increased/accelerated run-off and associated sediment volumes. The use of energy dissipating structures where required (preferably surrounding the PV array bases and access roads) to prevent increased run-off and sediments contained in the run-off entering the watercourse can be used.</li> <li>- An appropriate operational storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation and increased run-off on site.</li> <li>- An appropriate operational storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation and increased run-off on site.</li> </ul>

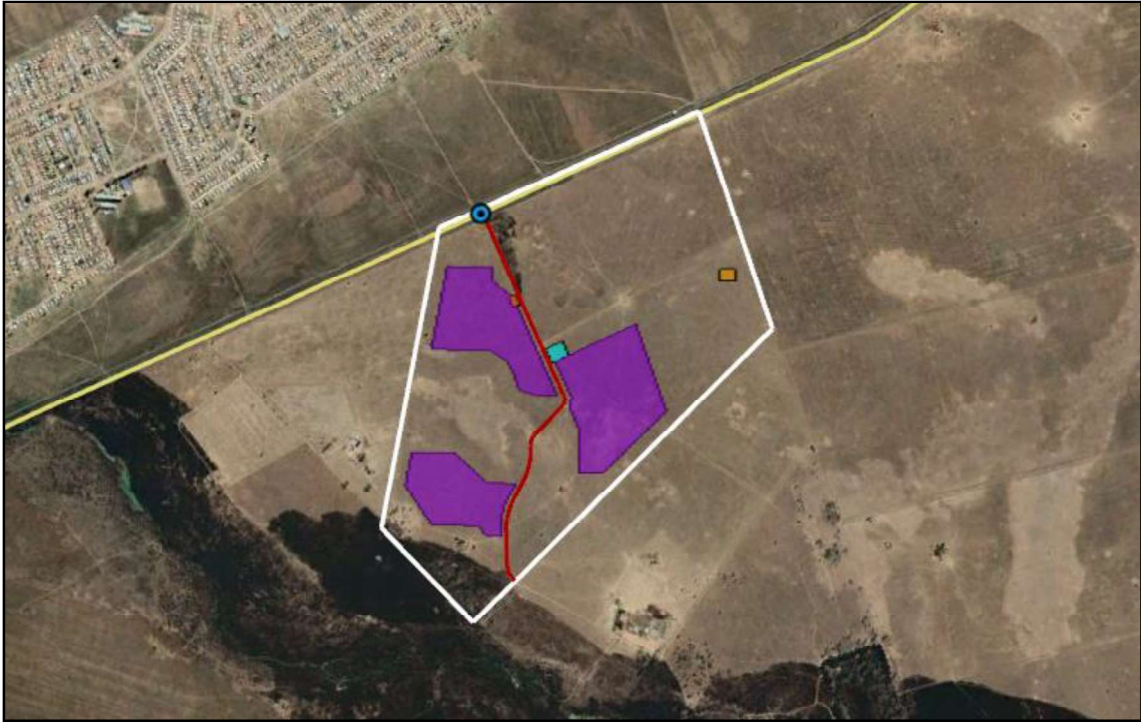


### 3 CONCLUSIONS

A number of impacts including invasion of the watercourse and wetland areas by alien plant species, further erosion, siltation, loss of bank stability and an increase in soil compaction have been identified, which may occur as a result of the proposed development and therefore requires suitable management during the implementation/construction and post-rehabilitation/operational phases thereof.

A Riparian and Wetland Rehabilitation Plan including management measures was developed to effectively manage, maintain and improve the ecological characteristics of the study area.

The measures as set out in the Riparian and Wetland Rehabilitation Plan are deemed sufficient for the conservation of ecological processes and provide a tool for managing and improving the current ecological state of the area. If the measures as set out in the rehabilitation plan are adhered to, ecological processes within the area will not only re-establish, but also allow for the continued improvement of the functionality of the wetland



**UPGRADE ENERGY (PTY) LTD**

## **Wildebekkuil PV2 SWMP**

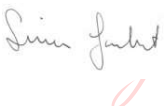
### Stormwater Management Plan

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Client:	Upgrade Energy (Pty) Ltd

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Annexure A:	Calculations
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# UPGRADE ENERGY (PTY) LTD

## WILDEBEESTKUIL PV2 SWMP

### 1. INTRODUCTION & BACKGROUND

Upgrade Energy (Pty) Ltd propose to construct four 5MW Photovoltaic (PV) facilities and associated infrastructure on Farm Wildebeestkuil 59 and Farm Leeuwbosch 44, approximately 6-8km east of Leeudoringstad in the North West Province. The proposed sites are located within the Maquassi Hills Local Municipality which falls within the Dr Kenneth Kaunda District Municipality.

SiVEST SA (Pty) Ltd (SiVEST) were appointed to undertake the Basic Assessment Process which requires various specialist studies. SiVEST's Civil Engineering Division was appointed as the specialist consultant to develop a conceptual stormwater management plan (SWMP) for each of the proposed sites.

This SWMP focuses on the Wildebeestkuil PV2 site which is located on Farm Wildebeestkuil No 59 (Portions 13, 14, 22). This report serves to provide a broad guideline for the developers, owners and professional teams to manage the stormwater and comply with the necessary rules and regulations of the relevant authorities and should not be viewed as a detailed design report.

The locality of the project and the PV site is shown in Figure 3-1 and Figure 3-2.

### 2. OBJECTIVES & SCOPE OF WORK

The main objective of the study is to develop a conceptual stormwater management plan for Site PV2. The scope of works comprises the following:

- Data collection;
- Liaison with the client;
- Site inspection to confirm topographical conditions;
- Hydrological assessment of the site;
- Development of conceptual drawings and design guidelines; and Compilation of the SWMP in the form of report.

### 3. DATA COLLECTION

The following data was collected and used to undertake this study:

- 5m contour data from Planet GIS;
- Proposed development footprint from SiVEST Environmental;
- Climate information from South African Weather Services;
- Design Rainfall data (JC Smithers & RE Schulze);
- Aerial Imagery from Google Earth and ESRI online base maps.

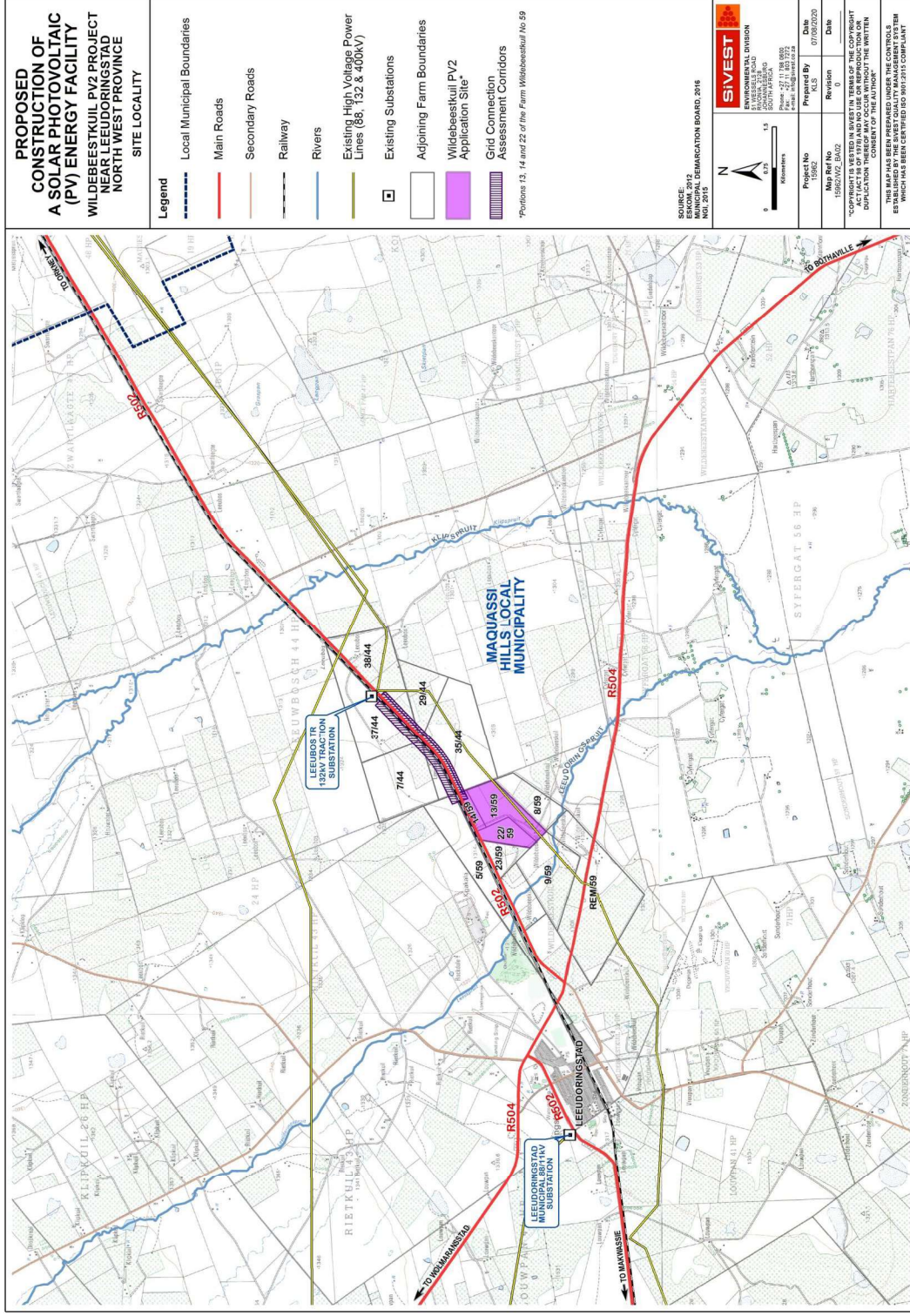


Figure 3-1: Site Locality

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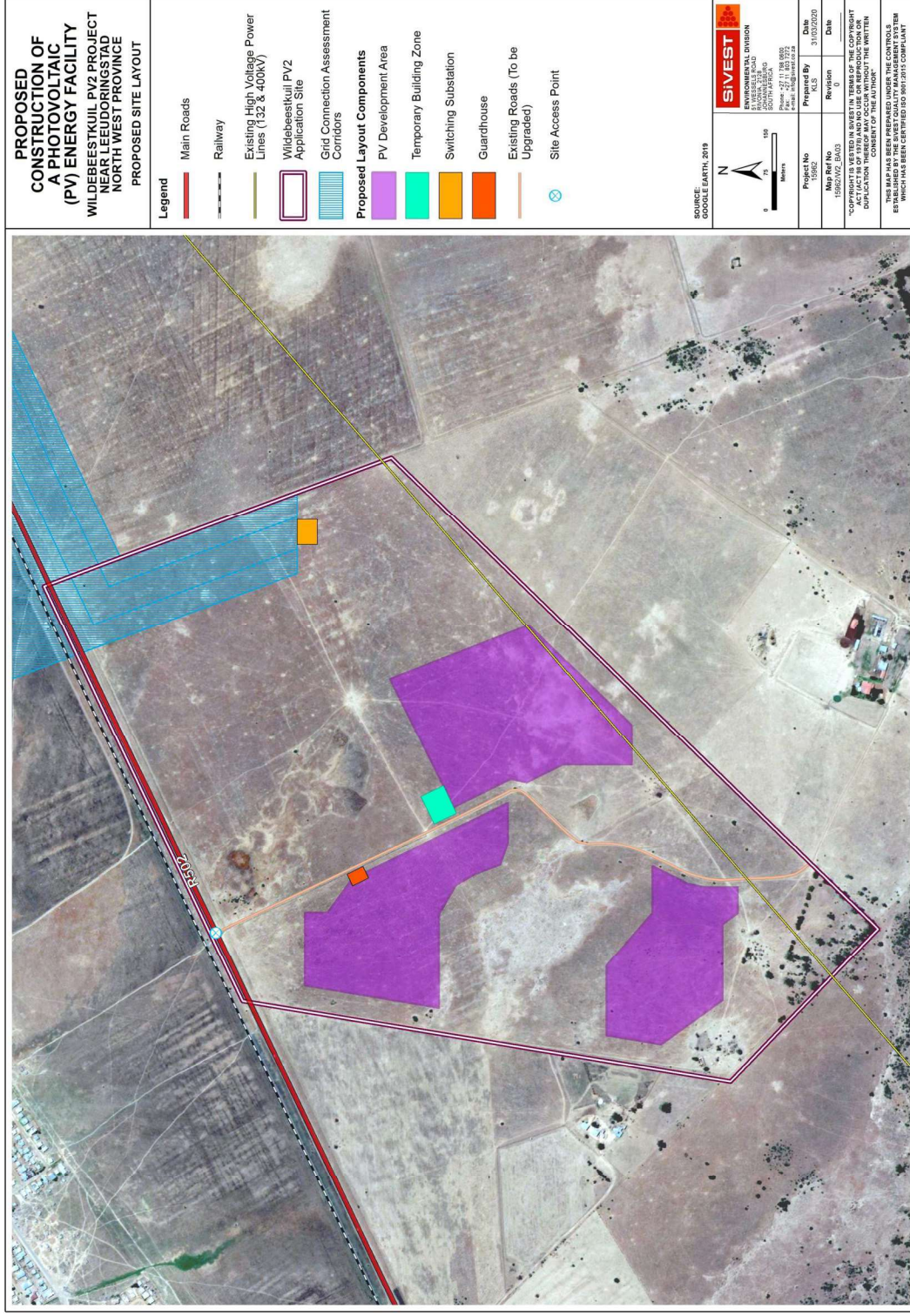


Figure 3-2: Wildebeestkuil PV2 Site Layout

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## 4. STORMWATER MANAGEMENT PHILOSOPHY

Development is a process of change or growth that usually involves the construction of buildings, roads and infrastructure which leads to a change in the hydraulic properties of an area. Permeable layers become less permeable or impermeable resulting in increased surface runoff and flood volumes. Conduits are constructed to drain runoff more efficiently resulting in shorter catchment response times and increased peak flows. Natural vegetation is often removed, reducing interception and transpiration and exposing soil to the impact of rain which may lead to increased erosion.

In order to lessen the negative impacts and enhance the positive impacts on the environment as a result of development, responsible management of stormwater is required. This can be achieved through the implementation of various mitigation measures in accordance with drainage requirements and guidelines as set out by the local authority.

Stormwater Management policies require that, for storms of similar recurrence intervals, the post-development runoff from an area may not exceed the runoff generated under the pre-development condition. The study area falls within The Maquassi Hills Local Municipality and, in the absence of site specific design guidelines, the stormwater drainage system should be designed in accordance with the criteria given in the "Red Book"<sup>1</sup> as well as the Drainage Manual<sup>2</sup>. This drainage system can be divided into minor and major stormwater systems.

The minor stormwater system comprises elements that aid in conveying stormwater runoff from within the development and road reserves to the major stormwater system. These elements include catch pits inlet structures, gutters, berms, canals, road verges, pipes and culverts.

The major stormwater system comprises elements of the minor system, road surfaces, natural low points, streams, rivers, wetlands, dams and flood attenuation structures necessary to control and drain stormwater or larger storms without damage and loss of life.

Stormwater runoff shall not be concentrated to an extent that would result in any damage to the downstream riverine ecology and/or built environment during storms with a recurrence interval exceeding 1:10 years and would result in only minor, repairable damage during storms with a recurrence interval exceeding 1:50 years.

To this end, the minor and major stormwater systems shall be designed to convey and withstand the 1:10 and 1:50 year flood events respectively. This is a guideline and the onus is on the design engineer to determine the risks associated with a storm with a specific recurrence interval. For areas where the risk of loss is unacceptably high, a higher recurrence interval and a higher level of service may need to be considered. For larger structures such as bridges and major culverts, the Department of Transport's specific requirements shall be considered.

Drainage systems must be maintained in a clean state, free of any rubbish, debris and matter likely to restrict the flow of stormwater or pose a pollution threat regulated by the departments of Water Affairs & Forestry, Environmental Affairs & Tourism and Health.

The Stormwater Management Philosophy for the development encourages the developer, the professional teams and contractors to do the following:

- Maintain adequate ground cover in all areas at all times to reduce the risk of erosion by wind, water and all forms of traffic;
- Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion. Where unavoidable, adequate protection of the ground must be provided;
- Reduce stormwater flows as much as possible by providing effective attenuation measures;

<sup>1</sup> Guidelines for Human Settlement Planning and Design compiled by CSIR Building and Construction Technology

<sup>2</sup> Drainage Manual 6th Edition, Published by The South African National Roads Agency SOC Ltd, 2013

- Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point;
- Ensure that all stormwater control works are constructed in a safe and aesthetic manner in keeping with the overall development;
- Prevent pollution of waterways and water features;
- Contain soil erosion by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction; and
- Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.

The main stormwater management objectives and criteria that are considered to be relevant to the design and planning of stormwater drainage systems include:

- Minimising the threat of flooding;
- Minimising public inconvenience caused by frequent storms;
- Protecting the public and preventing the loss of life due to severe storms and/or malfunctioning drainage systems;
- Preventing erosion and siltation;
- Protection of receiving water bodies;
- Minimising costs;
- Sustainability of stormwater management systems; and
- Environmental and water pollution considerations.

## 5. HYDROLOGICAL ASSESSMENT

The methods described in the Drainage Manual were used to carry out hydrological assessments of the catchments and site.

### 5.1. CATCHMENT DESCRIPTION

The catchment is small (4.3km<sup>2</sup>) and flat (<1%) and falls within the C25A quaternary catchment. It is long and elongated with no evidence of clearly defined watercourses. Overland sheet flow occurs in a southerly direction through the site. The catchment runoff will eventually discharge into the Leeudoringspruit.

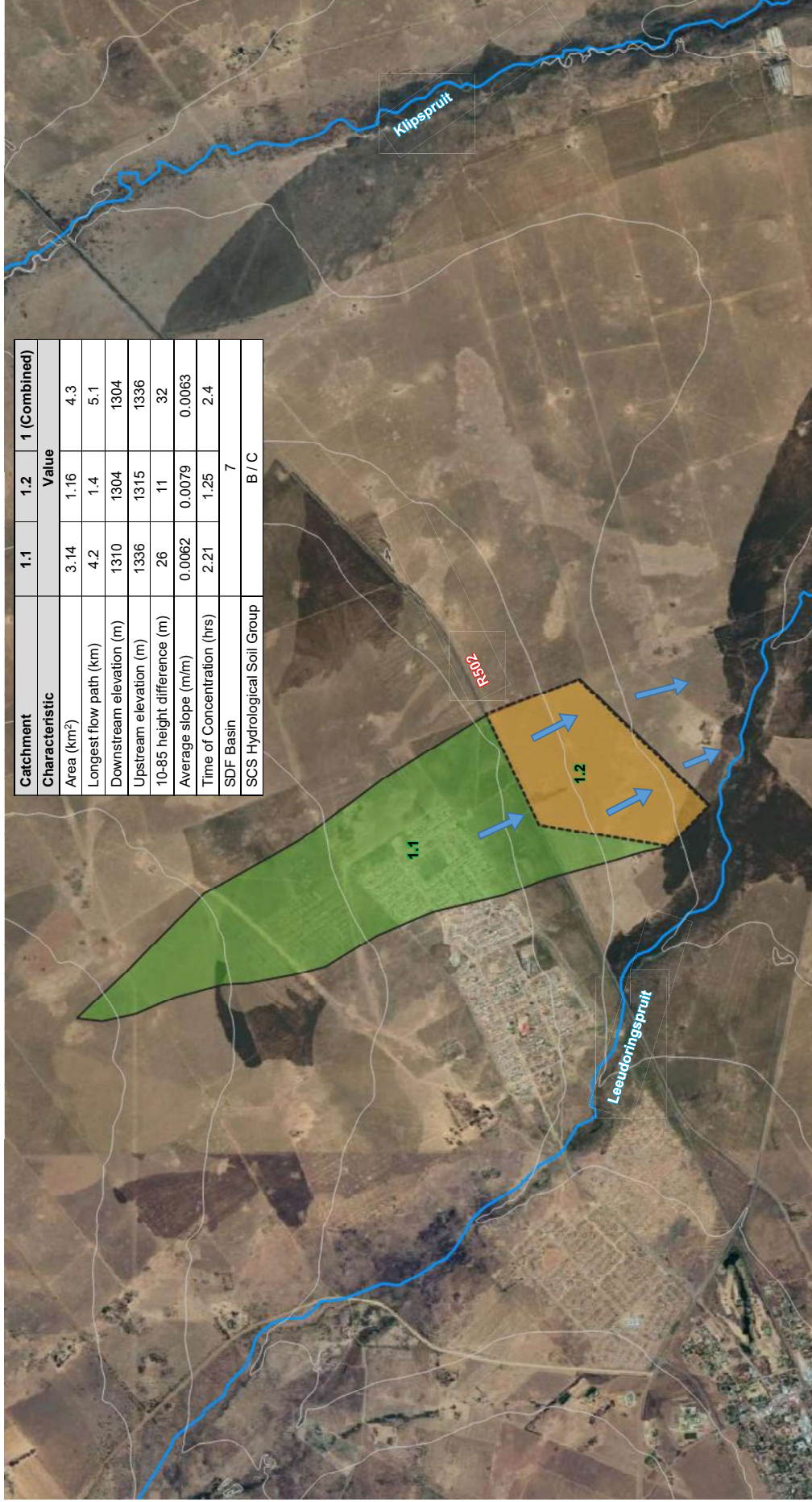
The landuse is predominantly rural grasslands and grazing fields. A small portion is made up of residential and commercial farming. Soils were classed under the SCS hydrological soil groups and found to be a mix of groups B and C. Group B soils have a moderately low stormflow potential (moderate infiltration rates, soil depths and slightly restricted permeability). Group C soils have a moderately high stormflow potential (slow infiltration rates, shallow soil depths and restricted permeability).

The catchment was subdivided to separate the application site from the upper catchment. This would help determine the runoff entering and leaving the site which may be used in the design of mitigation measures if/where needed.

The site is located safely away from any rivers or floodplains and will therefore not impact on or be impacted by a floodline.

### 5.2. CATCHMENT CHARACTERISTICS

The contributing catchments and their characteristics were determined using the existing 5m contours and aerial imagery. The catchment characteristics and delineations are illustrated in Figure 5-1 below.



**Figure 5-1: Catchments**

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Description: Wildebeestkull PV2 SWMP

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### 5.3. CLIMATE

According to the Köppen-Geiger map updated by the CSIR to quantify the current South African climatic conditions, the site is given a BSk classification. This is indicative of a semi-arid climate, with cool, dry winters and warm to hot summers.

December and January are the hottest months of the year with an average temperature of approximately 30°C. June and July are the coldest months of the year with an average temperature of approximately 17°C.

The mean annual precipitation is approximately 550mm with most rainfall occurring mainly during summer. The Design Rainfall Estimation<sup>3</sup> software was used to obtain the rainfall data (tabulated below) required for the runoff calculations.

**Table 5-1: Design Rainfall**

Return Period		2yr	5yr	10yr	20yr	50yr	100yr	200yr
Duration		Rainfall Depth (mm)						
5	m	9.40	12.70	14.90	17.20	20.30	22.70	25.10
10	m	13.90	18.80	22.20	25.55	30.10	33.70	37.30
15	m	17.55	23.70	28.00	32.20	37.95	42.45	47.05
30	m	22.20	30.00	35.40	40.80	48.05	53.75	59.55
45	m	25.50	34.45	40.65	46.80	55.15	61.70	68.35
60	m	28.10	38.00	44.85	51.65	60.85	68.05	75.40
90	m	32.30	43.60	51.45	59.30	69.85	78.10	86.55
120	m	35.60	48.10	56.75	65.40	77.05	86.15	95.45
240	m	41.65	56.25	66.40	76.45	90.15	100.75	111.65
360	m	45.65	61.65	72.75	83.85	98.75	110.45	122.40
480	m	48.70	65.85	77.65	89.45	105.40	117.85	130.65
600	m	51.25	69.25	81.65	94.10	110.85	123.95	137.40
720	m	53.40	72.15	85.15	98.05	115.55	129.15	143.20
960	m	57.00	76.95	90.85	104.65	123.30	137.80	152.80
1200	m	59.95	80.95	95.55	110.05	129.70	145.00	160.70
1440	m	62.45	84.35	99.55	114.70	135.10	151.10	167.50
1	d	51.95	70.15	82.80	95.40	112.40	125.60	139.30
2	d	63.85	86.35	101.85	117.35	138.20	154.55	171.30
3	d	72.15	97.45	115.00	132.45	156.05	174.45	193.40
4	d	78.25	105.70	124.80	143.70	169.35	189.30	209.85
5	d	83.40	112.65	132.90	153.10	180.45	201.65	223.60
6	d	87.80	118.60	140.00	161.25	190.05	212.40	235.50
7	d	91.75	123.90	146.25	168.50	198.55	221.90	246.00

<sup>3</sup> Design Rainfall Estimation in South Africa Version 3 developed by MJ Gorven, JC Smithers and RE Schulze

## 5.4. PEAK RUNOFF FLOWS

The runoff peak values were calculated using the widely-used Rational Method, which is considered appropriate for catchments less than 15km<sup>2</sup>. The Rational Method is based on a simplified representation of the law of conservation of mass and the hypothesis that the flow rate is directly proportional to the size of the contributing area and the rainfall intensity, with the latter a function of the return period. It is a method of estimating the runoff in a drainage basin at a specific point in time by means of the rational formula,

$$Q = \frac{CIA}{3.6}$$

Where, C is a runoff coefficient based on the type of surface,  
I is the rainfall intensity in mm per hour, and  
A is the area in km<sup>2</sup>.

Three phases of the project were considered and assessed. These included the pre-development, construction and post-development scenarios.

### 5.4.1. Pre-Development

The adopted peak flows are tabulated below with the detailed calculations included in Appendix A

**Table 5-2: Adopted Pre-Development Peak Runoff Flows**

Return Period	1:2	1:5	1:10	1:20	1:50	1:100
<b>Catchment</b>	<b>Peak Runoff (m<sup>3</sup>/s)</b>					
1.1	6.02	8.12	9.58	11.04	13.01	14.54
1.2	2.57	3.47	4.10	4.72	5.56	6.22
1	7.33	9.89	11.69	13.46	15.87	17.74

### 5.4.2. Construction Phase

During construction the site will be highly susceptible to erosion and other stormwater-related impacts. Activities such as site clearance, topsoil removal, excavation and compaction of soils due to plant and vehicular traffic all contribute towards reducing infiltration and permeability and increasing stormwater runoff. The construction site will be deemed to be highly impermeable during this phase.

The allowance for the PV2 site amounts to just under a 30Ha footprint which is roughly 25% of the area of Catchment 1.2.

The adopted peak flows are tabulated below with the detailed calculations included in Appendix A

**Table 5-3: Adopted Construction Phase Peak Runoff Flows**

Return Period	1:2	1:5	1:10	1:20	1:50	1:100
<b>Catchment</b>	<b>Peak Runoff (m<sup>3</sup>/s)</b>					
1.1	6.02	8.12	9.58	11.04	13.01	14.54
1.2	3.66	4.94	5.84	6.72	7.92	8.86
1	7.88	10.64	12.56	14.47	17.06	19.07

### 5.4.3. Post-Development

As there are no design plans or details available at this stage of the project, research on similar facilities was undertaken in order to make reasonable assumptions regarding the design of the PV facility. The final detailed design will influence the layout and arrangement of the PV arrays and therefore its footprint. The client has advised that approximately 10Ha will be required to construct a 5MW PV Facility.

It may comprise the following infrastructure:

- Photovoltaic (PV) Panels
- PV mounting structures
- Switching substation
- Transformers
- Internal underground electrical reticulation
- Auxiliary buildings (guardhouse, office etc.)
- Temporary laydown area for the construction phase
- Internal roads (gravel) and perimeter fencing
- Access road off the R502

The estimated portion of land each component will typically occupy is summarised below.

**Table 5-4: Typical Landuse Proportions for PV Facility**

Component	% of footprint	Area (Ha)	% of Farm (116Ha)
PV Arrays	90%	9	7.8%
Buildings Substations Transformers	5%	0.5	0.4%
Internal and Access Roads	5%	0.5	0.4%

The layout of the PV facility and associated infrastructure will impact on the runoff distribution patterns. It is assumed that the facilities orientation and configuration will be designed to minimise the impact on the natural drainage patterns.

Whilst the PV panels are impervious and occupy the majority of the site area, they will not significantly impact on the runoff volume. They will be mounted on a structure (typically a modular frame or vertical poles) which will keep them elevated above and off the ground. The structure will either be pile driven or require concrete strip footings depending on the soil conditions. The impact of these mounting structures on the effective pervious area is deemed to be negligible.

The hardened (impervious) area of the site amounts to approximately 1Ha which is less than 1% of the total farm portion area, therefore there will be no significant change in the runoff volume post-development.

The adopted peak flows are tabulated below with the detailed calculations included in Appendix A.

**Table 5-5: Adopted Post-Development Peak Runoff Flows**

Return Period	1:2	1:5	1:10	1:20	1:50	1:100
Catchment	Peak Runoff (m <sup>3</sup> /s)					
1.1	6.02	8.12	9.58	11.04	13.01	14.54
1.2	2.57	3.47	4.10	4.72	5.56	6.22
1	7.33	9.89	11.69	13.46	15.87	17.74

## 6. STORMWATER MANGEMENT POLICY

The following rules are to be observed by the owner, developer, professional team, contractors and sub-contractors:

- Development designs must include measures for attenuating the concentration of and, increase in stormwater runoff. The post-development peak flows are to be attenuated back to pre-development conditions;
- Before the commencement of any construction activities, a plan must be agreed upon which details the measures to be implemented to control and prevent erosion during and after construction;

- On-site stormwater control systems, such as swales, berms and attenuation ponds are to be constructed before any other construction commences. These systems are to be monitored and appropriately adjusted as construction progresses to ensure complete stormwater, erosion and pollution control at all times;
- All embankments to be formed must be adequately stabilized;
- Stormwater must not be allowed to pond in close proximity to building foundations;
- An approved landscaping and re-vegetation plan must be implemented immediately after building works have reached a stage where newly established ground cover is not at risk from the construction works;
- No work is to commence without an approved Stormwater Control Plan (SCP). The SCP must describe what stormwater control measures are to be implemented before, during and after construction. Plans must indicate all persons responsible for the design and on-site monitoring during each stage of the implementation of the control measures;
- The SCP must show that all the provisions, regulations and guidelines contained in this document have been considered;
- In the event of a failure to adequately implement the approved SCP, the contractor shall be responsible for making good all consequential damage at his own cost. The developer is therefore advised to ensure that all members of the professional team and contractors are competent to undertake the development work and are adequately insured;
- The management of stormwater run-off during construction will be controlled by the Environmental Management Plan (EMP) as produced by the Environmental Control Officer (ECO). All construction activities within the development must comply with the EMP. This document is supplementary to the EMP and the control measures set out herein are not to be considered all-encompassing as the contractor will also have to adapt his control measures to the varying onsite conditions;
- All elements of the minor stormwater system shall be designed to safely accommodate and convey the 1:10 year storm event to the major stormwater system elements, which will be designed to accommodate the 1:50 year storm event. Exceptions to these capacities are to be made by the design engineer after assessing the risks;
- Attenuation/Detention facilities will be located at appropriately selected sites based on geotechnical, environmental and topographical conditions, including wetland conservation;
- Where conditions permit, open ditches, drains and channels will be used instead of pipes. On steeper slopes, where high flow velocities are anticipated, appropriate linings for all channels must be provided to withstand erosion. Such linings will vary from vegetated earthen to stone pitching and reinforced concrete;
- Flow velocities must be reduced wherever possible to reduce the erosion potential in channels, natural ground and points of flow concentration (typically at outlets);
- Silt, trash and oil traps must be strategically provided to ensure water quality is not compromised and to prevent blockages in the drainage systems;
- Areas within the proposed development that bound on stormwater attenuation areas, near road crossings, watercourse confluences and water features might be subject to flooding. In these situations, all development should take place above the outfall levels with an appropriate freeboard allowance;
- For areas flowing into the development area, potential future development in these sub-catchments should be considered and any stormwater attenuation requirements should be identified. Likewise, consideration must be given to the stormwater flowing out of the development which may impact on the downstream areas and watercourses. Appropriate measures must be taken to ensure any upstream development does not result in an increased flood damage risk downstream; and
- All natural and unlined channels should be inspected for adequate binding of soil by sustainable ground cover. Stone pitching should be used to reinforce channel inverters on steep slopes. Existing wetlands and stormwater attenuation areas should be protected from encroachment by the development.

## 7. GUIDELINES FOR OWNERS AND DEVELOPERS

The buildings/structures within the development will be required to control stormwater runoff in accordance with the stormwater management philosophy and policies of the local authority / municipality. The following guidelines are intended to assist in the design of the major and minor stormwater systems infrastructure, and to ensure that the objectives of this SWMP are met during the planning, design, construction and operational phases of all developments.

### 7.1. BUILDINGS

Any building will inevitably result in some degree of flow concentration, or deflection of flow around the building. The developer/owner shall ensure that all stormwater flow paths are protected against erosion. Discharge from the site must be attenuated back to the pre-development state.

Any inlet to a piped system shall be fitted with a screen, or grating to prevent debris and refuse from entering the stormwater system. This must be installed immediately on installation of the infrastructure.

No building works, earthworks, walls or fences may obstruct or encroach on a watercourse inside or outside the site without approved plans that do not compromise the objectives of the Stormwater Management Plan.

### 7.2. ROOF DRAINAGE

Building designs must ensure that rainfall runoff from roofing and other areas, not subjected to excessive pollution, be efficiently captured for re-use where possible for on-site irrigation and non-potable water uses.

Where storage for re-use and where ground conditions permit, rainwater runoff should be connected to detention areas to maximize groundwater recharge. These detention areas must be designed to contain at least the first hour of a minor storm's runoff without before overflowing.

### 7.3. PARKING AND PAVED AREAS

Parking or paved areas should be designed to attenuate stormwater runoff to an acceptable degree by allowing ponding or infiltration. Stormwater from such areas must be discharged in a controlled manner either as overland sheet flow or to larger attenuation facilities.

### 7.4. ROADS

Roads should be designed and graded to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the major stormwater system should be taken, with the provision of attenuation storage facilities at suitable points.

Culverts must be designed to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point and attenuation storage should be provided on the upstream side of the road crossing.

Outlet and culvert discharge points into the natural watercourse must be designed to dissipate flow energy and any unlined downstream channel must be adequately protected against soil erosion.

### 7.5. SUBSURFACE DISPOSAL OF STORMWATER

Any construction providing for the subsurface disposal of stormwater should be designed to ensure that such disposal does not cause slope instability, or areas of concentrated saturation or inundation. Infiltration structures should be integrated into the terrain so as to be unobtrusive and in keeping with the natural surroundings.

### 7.6. CHANNELS

Channels may be constructed to convey stormwater directly to a natural watercourse where deemed necessary and unavoidable. The channels must be suitably lined to prevent erosion and scour and provide



maximum possible energy dissipation of the flow. Such linings will vary from vegetated earthen to stone pitching and reinforced concrete.

### 7.7. ENERGY DISSIPATION

Measures should be taken to dissipate flow energy wherever concentrated stormwater flow is discharged down an embankment or erodible slope.

### 7.8. OPEN TRENCHES

Open trenches should not be left open and unprotected for extended periods and should be progressively backfilled as construction proceeds. Excavated material to be used as backfill must be placed close to the trench on the upstream side to avoid loose material from washing away.

### 7.9. STOCKPILES

Material is to be stockpiled away from drainage paths. Loose material such as stone, sand or gravel must be covered or kept damp to minimise dust. Temporary silt screens are to be positioned immediately downstream of stockpiles to intercept loose material which may be washed away.

### 7.10. PHOTOVOLTAIC PANELS

Orientation of panels shall be considered with respect to drainage pattern, flow concentration, drainage area and velocity. Rows perpendicular to the contours may result in higher runoff concentrations, therefore the configuration should be designed and constructed such that the runoff remains as sheet flow across the entire site.

The panels shall be designed and constructed in such a manner as to allow vegetative growth and maintenance beneath and between panels. If the lowest vertical clearance of the panels above the ground is greater than 3m, non-vegetative control measures will be required to prevent/control erosion and scour along the drip line or otherwise provide energy dissipation from the water running off the panels.

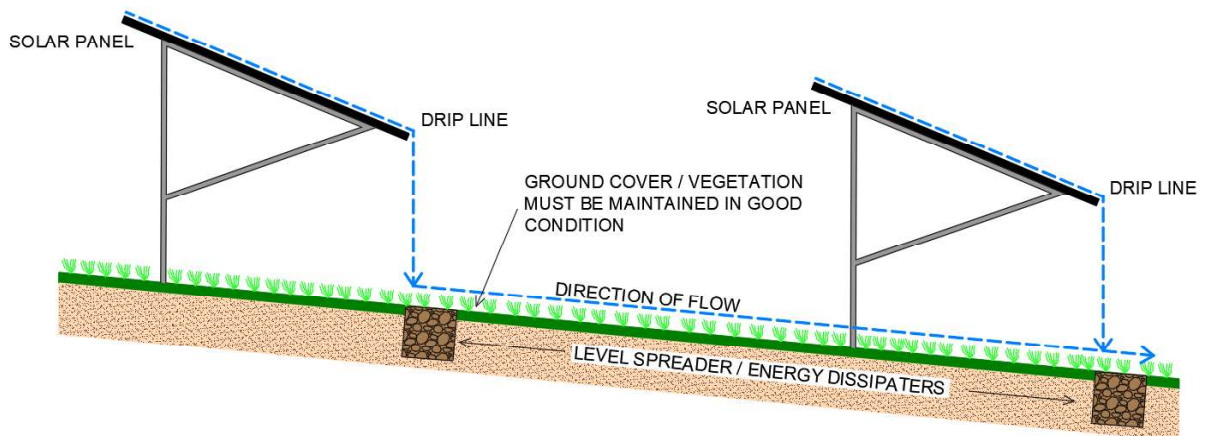


Figure 7-1: Stormwater control of PV panel runoff

### 7.11. STORMWATER POLLUTION CONTROL

The stormwater systems should be free from any materials that could have a detrimental effect on the fauna, flora and aquatic life in the water systems.

Sites which generate “dirty” (Grey or Black) water must have measures in place that separates the clean and “dirty” water. Depending on the nature of the “dirty” water, this must either be discharged into the wastewater system or contained on site for treatment or packaging before being re-used or disposed of. It is important

that the wastewater system does not flood and overflow into the stormwater systems and designers must ensure there is sufficient capacity for the wastewater system to receive this “dirty” water.

Any site that is required to store substances that could be regarded as hazardous in terms of water pollution must take measures to ensure spillages of such substances can be adequately contained and prevent contamination of the water resources within the development area.

## **8. COMPLIANCE WITH STORMWATER MANGEMENT POLICY**

This document should be read in conjunction with the EMP. The developer, owner and professional team, shall be responsible for ensuring that the requirements and conditions as set out in the EMP are to be adhered to.

The developer, owner and the professional team shall be responsible for the performance of all stormwater control measures implemented on the site and the impact such works may have on downstream or neighbouring properties. Approval of any plan or document shall not be construed as absolving the developer, owner, and professional teams of this responsibility.

## **9. CONCLUSIONS & RECOMMENDATIONS**

The following may be concluded:

- The hydrological assessment (Section 5) reveals that the proposed development/infrastructure will have a minimal impact on the stormwater quality and quantities post-development (operational phase).
- The highest impact will occur during the construction phase and it is important that these impacts are strictly managed under the advisement of the guidelines set out in this document.
- The need for formal stormwater interventions can be minimised if the development is designed to maintain the existing drainage patterns. Overland flow via poorly-defined drainage paths will be the primary form of conveyance.
- A detailed stormwater management plan describing and illustrating the proposed stormwater and erosion control measures must be prepared by the Civil Engineers during the detailed design phase.

It is recommended that:

- The policy described in Section 6 be implemented.
- The guidelines described in Section 7 be incorporated into the detailed design of the development.



**Annexure A:**

**Calculations**

## Pre-Development Runoff Calculations

### Catchment 1.1

Return Period	Tc (hrs)	Rainfall (mm)	Intensity (mm/hr)	A (Km <sup>2</sup> )	C	Q (m <sup>3</sup> /s)
1:2yr	2.21	36.3	16.43	3.14	0.42	6.02
1:5yr	2.21	49	22.17	3.14	0.42	8.12
1:10yr	2.21	57.8	26.15	3.14	0.42	9.58
1:20yr	2.21	66.6	30.14	3.14	0.42	11.04
1:50yr	2.21	78.5	35.52	3.14	0.42	13.01
1:100yr	2.21	87.7	39.68	3.14	0.42	14.54

### Catchment 1.2

Return Period	Tc (hrs)	Rainfall (mm)	Intensity (mm/hr)	A (Km <sup>2</sup> )	C	Q (m <sup>3</sup> /s)
1:2yr	1.25	30.2	24.16	1.16	0.33	2.57
1:5yr	1.25	40.8	32.64	1.16	0.33	3.47
1:10yr	1.25	48.2	38.56	1.16	0.33	4.10
1:20yr	1.25	55.5	44.40	1.16	0.33	4.72
1:50yr	1.25	65.4	52.32	1.16	0.33	5.56
1:100yr	1.25	73.1	58.48	1.16	0.33	6.22

### Catchment 1 (Combined Catchment)

Return Period	Tc (hrs)	Rainfall (mm)	Intensity (mm/hr)	A (Km <sup>2</sup> )	C	Q (m <sup>3</sup> /s)
1:2yr	2.4	36.8	15.33	4.3	0.4	7.33
1:5yr	2.4	49.7	20.71	4.3	0.4	9.89
1:10yr	2.4	58.7	24.46	4.3	0.4	11.69
1:20yr	2.4	67.6	28.17	4.3	0.4	13.46
1:50yr	2.4	79.7	33.21	4.3	0.4	15.87
1:100yr	2.4	89.1	37.13	4.3	0.4	17.74

## Construction Phase Runoff Calculations

### Catchment 1.1

Return Period	Tc (hrs)	Rainfall (mm)	Intensity (mm/hr)	A (Km <sup>2</sup> )	C	Q (m <sup>3</sup> /s)
1:2yr	2.21	36.3	16.43	3.14	0.42	6.02
1:5yr	2.21	49	22.17	3.14	0.42	8.12
1:10yr	2.21	57.8	26.15	3.14	0.42	9.58
1:20yr	2.21	66.6	30.14	3.14	0.42	11.04
1:50yr	2.21	78.5	35.52	3.14	0.42	13.01
1:100yr	2.21	87.7	39.68	3.14	0.42	14.54

### Catchment 1.2

Return Period	Tc (hrs)	Rainfall (mm)	Intensity (mm/hr)	A (Km <sup>2</sup> )	C	Q (m <sup>3</sup> /s)
1:2yr	1.25	30.2	24.16	1.16	0.47	3.66
1:5yr	1.25	40.8	32.64	1.16	0.47	4.94
1:10yr	1.25	48.2	38.56	1.16	0.47	5.84
1:20yr	1.25	55.5	44.40	1.16	0.47	6.72
1:50yr	1.25	65.4	52.32	1.16	0.47	7.92
1:100yr	1.25	73.1	58.48	1.16	0.47	8.86

### Catchment 1 (Combined Catchment)

Return Period	Tc (hrs)	Rainfall (mm)	Intensity (mm/hr)	A (Km <sup>2</sup> )	C	Q (m <sup>3</sup> /s)
1:2yr	2.4	36.8	15.33	4.3	0.43	7.88
1:5yr	2.4	49.7	20.71	4.3	0.43	10.64
1:10yr	2.4	58.7	24.46	4.3	0.43	12.56
1:20yr	2.4	67.6	28.17	4.3	0.43	14.47
1:50yr	2.4	79.7	33.21	4.3	0.43	17.06
1:100yr	2.4	89.1	37.13	4.3	0.43	19.07

## Post-Development Runoff Calculations

### Catchment 1.1

Return Period	Tc (hrs)	Rainfall (mm)	Intensity (mm/hr)	A (Km <sup>2</sup> )	C	Q (m <sup>3</sup> /s)
1:2yr	2.21	36.3	16.43	3.14	0.42	6.02
1:5yr	2.21	49	22.17	3.14	0.42	8.12
1:10yr	2.21	57.8	26.15	3.14	0.42	9.58
1:20yr	2.21	66.6	30.14	3.14	0.42	11.04
1:50yr	2.21	78.5	35.52	3.14	0.42	13.01
1:100yr	2.21	87.7	39.68	3.14	0.42	14.54

### Catchment 1.2

Return Period	Tc (hrs)	Rainfall (mm)	Intensity (mm/hr)	A (Km <sup>2</sup> )	C	Q (m <sup>3</sup> /s)
1:2yr	1.25	30.2	24.16	1.16	0.33	2.57
1:5yr	1.25	40.8	32.64	1.16	0.33	3.47
1:10yr	1.25	48.2	38.56	1.16	0.33	4.10
1:20yr	1.25	55.5	44.40	1.16	0.33	4.72
1:50yr	1.25	65.4	52.32	1.16	0.33	5.56
1:100yr	1.25	73.1	58.48	1.16	0.33	6.22

### Catchment 1 (Combined Catchment)

Return Period	Tc (hrs)	Rainfall (mm)	Intensity (mm/hr)	A (Km <sup>2</sup> )	C	Q (m <sup>3</sup> /s)
1:2yr	2.4	36.8	15.33	4.3	0.4	7.33
1:5yr	2.4	49.7	20.71	4.3	0.4	9.89
1:10yr	2.4	58.7	24.46	4.3	0.4	11.69
1:20yr	2.4	67.6	28.17	4.3	0.4	13.46
1:50yr	2.4	79.7	33.21	4.3	0.4	15.87
1:100yr	2.4	89.1	37.13	4.3	0.4	17.74



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