

PROPOSED DEVELOPMENT OF NATURE ESTATE FOR RESIDENTIAL PURPOSES  
LOCATED NORTH OF KOMATIPOORT TOWN IN MPUMALANGA PROVINCE

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

Compiled by:



NULEAF PLANNING AND ENVIRONMENTAL PTY LTD

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## ACRONYMS AND ABBREVIATIONS

A&ICP:	Alien and Invader Control Programme
BA:	Basic Assessment
BAR:	Basic Assessment Report
CDF:	Conservation Development Framework
CGP:	Community Grazing Plan
CMP:	Construction Management Plan
DEA:	South African National Department of Environmental Affairs
DWS:	South African National Department of Water and Sanitation
EA:	Environmental Authorisation
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment
EMPr:	Environmental Management Programme
EMS:	Environmental Management System
EO:	Environmental Officer
GA:	General Authorisation
I&AP:	Interested and Affected Party
IEM:	Integrated Environmental Management
LED:	Local Economic Development
NCR:	Non-conformance Report
NEMA:	National Environmental Management Act, Act No. 107 of 1998
NEMPAA:	National Environmental Management: Protected Areas Act, Act No. 57 of 2003
OMP:	Operational Management Plan
SAHRA:	South African Heritage Resources Agency
SMP:	Stormwater Management Plan
WHO:	World Health Organisation
WUL:	Water Use Licence
WULA:	Water Use Licence Application

## GLOSSARY OF TERMS

Alien Vegetation:	Alien vegetation defined as undesirable plant growth which shall include, but not be limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA) regulations.
Alien Species:	A plant or animal species introduced from elsewhere: neither endemic nor indigenous.
Alternatives:	<p>In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to:</p> <ul style="list-style-type: none"><li>(a) The property on which or location where it is proposed to undertake the activity;</li><li>(b) The type of activity to be undertaken;</li><li>(c) The design or layout of activity;</li><li>(d) The technology to be used in the activity; and</li><li>(e) The operational aspects of the activity.</li></ul>
Applicant:	Any person who applies for an authorization to undertake an activity or to cause such activity to be undertaken as contemplated in the National Environmental Management Act (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 20010.
Buffer zone:	Is a collar of land that filters out inappropriate influences from surrounding activities, also known as edge effects, including the effects of invasive plant and animal species, physical damage and soil compaction caused by trampling and harvesting, abiotic habitat alterations and pollution. Buffer zones can also provide more landscape needed for ecological processes, such as fire.
Construction Activity:	Any action taken by the Contractor, his subcontractors, suppliers or personnel during the construction process.
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;
Ecology:	The study of the inter relationships between organisms and their environments.
Environment:	All physical, chemical and biological factors and conditions that influence an object and/or organism.
Environmental Impact:	An Impact or Environmental Impact is the degree of change to the environment, whether desirable or undesirable, that will result from the effect of a defined activity. An Impact may be the direct or indirect consequence of an activity and may be simple or cumulative in nature.

Environmental Impact Assessment:	Assessment of the effects of a development on the environment.
Environmental Management Programme:	A legally binding working document, which stipulates environmental and socio-economic mitigation measures that must be implemented by several responsible parties throughout the duration of the proposed project.
Indigenous:	Means a species that occurs, or has historically occurred, naturally in a free state within the borders of South Africa. Species that have been introduced to South Africa as a result of human activity are excluded (South Africa (Republic) National Environmental Management: Biodiversity Act, 2004: Chapter 1).
Interested and Affected Party:	Any person, group of persons or organization interested in or affected by an activity contemplated in an application, or any organ of state that may have jurisdiction over any aspect of the activity.
Invasive vegetation:	Plant species that show the potential to occupy in unnatural numbers, any disturbed area, including pioneer species.
Public Participation:	The legislated process contemplated in terms GN R543, in which all potential interested and affected parties are informed of the proposed project and afforded the opportunity to input, comment and object. Specific requirements are listed in terms of advertising and making draft reports available for comment.
Road Reserve:	The road reserve is a corridor of land, defined by co-ordinates and proclamation, within which the road, including access intersections or interchanges, is situated. A road reserve may, or may not, be bounded by a fence.
Road Width:	The area within the Road Reserve including all areas beyond the Road Reserve that are affected by the continuous presence of the road i.e. the verge.
Mitigate:	The implementation of practical measures to reduce adverse impacts Public Participation Process: is a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters.
Non-conformance Report:	A Non-Conformance Report is a construction related document issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr.
Red data plant species:	Are fauna and flora species that require environmental protection based on the World Conservation Union (IUCN) categories and criteria.
ROD:	Record of Decision pertaining to the Application for Environmental Authorisation issued by the Competent Authority. The RoD is legally binding on the Applicant and may contain a positive or negative decision on the Application as well as conditions and provisions for each.

Soil Compaction:	Mechanically increasing the density of the soil, vehicle passage or any other type of loading. Wet soils compact easier than moist or dry soils.
Species:	Means a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind. The term "species" include any sub-species, cultivar, variety, geographic race, strain, and hybrid or geographically separate population (South Africa [Republic] National Environmental Management: Biodiversity Act, 2004: Chapter 1).
The Contractor:	The contractor, as the developers agent on site, is bound by the ROD and EMP conditions through his/her contract with the developer, and is responsible for ensuring that conditions of the EMP and ROD are strictly adhered to at all times. The contractor must comply with all orders (whether verbal or written) given by the ECO, project manager or site agent in terms of the EMPr.
The Developer:	Remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMP and the conditions of the Environmental Decision throughout all phases of the project.
The Environmental Control Officer (ECO):	The ECO is appointed by the developer as an independent monitor of the implementation of the EMP i.e. independent of the developer and contractor.
The Environmental Officer (EO):	The Contractor shall submit to the Site Agent a nominated representative of the Contractor as an EO to assist with day to day monitoring of the construction activities for the contract.
Vegetation:	Is a collective word for plants occurring in an area.
Vulnerable:	A taxon is 'Vulnerable' when it is not 'Critically Endangered' or 'Endangered' but is facing a high risk of extinction in the wild in the medium term future.
Watercourse:	A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may by notice in the Government Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks" (South Africa [Republic] National Water Act, 1998).

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## APPENDICES

- Appendix A: Curriculum Vitae of the Environmental Assessment Practitioner*  
*Appendix B: Layout Map*

## SECTION A: GENERAL

### 1. INTRODUCTION

A key requirement of the National Environmental Management Act (NEMA) of 1998 is compliance with the principles of Integrated Environmental Management (IEM). Chapter Five of NEMA deals with IEM and its objective to promote the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities.

Among these tools are Environmental Impact Assessments (EIAs) and Environmental Management Programmes (EMPr's). In compliance with the above mentioned environmental legislation, the Department of Environmental Affairs (DEA) requires that the Applicant undertake a Basic Assessment (BA) for the proposed development, and that the Basic Assessment Report (BAR) includes a detailed EMPr.

The EMPr typically becomes part of the Environmental Authorization (EA) prepared by the relevant environmental authority and becomes the basis for monitoring compliance with the recommendations of the EIA both during the Construction and Operational Phases.

The Environmental Management Programme (EMPr) addresses the construction and operational phases of the project. It serves as a stand-alone document to be disseminated to and used by the contractor, lodge manager and others involved in the construction and/or operational phases of the development.

It should be noted that the guidelines listed hereunder are not to be considered finite. Experience has shown that additional environmental issues are bound to arise as the project unfolds. When this happens, the Environmental Management Programme (EMPr) must be updated accordingly.

The Environmental Management Programme will ensure that the environmental commitments sketched as mitigation measures in the BA are adhered to. In addition, the EMPr can be used to evaluate the effectiveness of mitigation measures.

### 2. DETAILS AND EXPERTISE OF EAP

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Expertise	Environmental Assessment Practitioner, EAPASA Registered 2019/655

Please refer to Appendix A for EAP curriculum vitae.

### 3. BACKGROUND

The proposed development entails the creation of a Nature Estate for residential purposes and has been zoned as such in the Spatial Development Framework. The development will entail the construction of 54 river front erven and 39 bush erven. A new road is also proposed to provide access to the site via Rietbok Street. All associated civil infrastructure (water, electricity and waste treatment) will be included.

The proposed development will consist of the following:

- 54 river front erven approximately 30 x 80m
- 39 bush erven approximately 50 x 50m/ 80 x 40m
- Reception
- 3x bird hides
- A new access road

Please note that the following infrastructure will be located within 32 m of a watercourse:

- 3 x Bird hides

The minimum allowable distance from the ephemeral systems are 15 m, from the wetlands 20 m, the riparian zone in along the eastern boundary 35 m and from the Crocodile River is 60m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 3 bird hides which are located within 32 m of the ephemeral systems (drainage lines) and valley bottom wetlands.

### 4. ROLES AND RESPONSIBILITIES

#### 4.1 Parties responsibilities

Party	Responsibility
Applicant	<ul style="list-style-type: none"> <li>• Ensure adherence to, and compliance with, the EMPr in a legal and timely manner. This relates to all phases of the project lifecycle.</li> <li>• Appoint an Independent Environmental Control Officer (ECO) during both Construction and Operation Phases.</li> <li>• Ensure that a monitoring programme is drafted and implemented to assess compliance with the EMPr during the construction phase.</li> <li>• Ensure that contractors and operators undertake to adhere to the provisions of the EMPr as part of their respective contracts.</li> <li>• Ensure that independent Environmental Audits, including a Post Construction Close-Out audit is undertaken. The results of all audits must be forwarded to the Environmental Authority within 30 days after completion of the audit.</li> <li>• Ensure that all monitoring and audit reports are submitted to the Environmental Authority and that the contractor and operator implement recommendations.</li> <li>• Ensure that the EMPr is included as part of the tender documentation and / or included within any service level agreements made, thereby making it part of the enquiry document to make the recommendations &amp; constraints as set out in this document, enforceable under the general conditions of contract.</li> </ul>
Contractor	<ul style="list-style-type: none"> <li>• Development of an Environmental Method Statement to be submitted and approved by the ECO. See point 4.2 below for more information.</li> <li>• Ensure adherence to, and compliance with, the Construction EMPr in a legal and timely manner.</li> <li>• Ensure that all staff members, sub-contractors and suppliers have a comprehensive understanding of the EMPr and adhere to the provisions for the duration of the construction phase.</li> <li>• Designate a permanent Environmental Officer (EO) to monitor environmental</li> </ul>



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	<p>compliance on a day-to-day basis on the construction site.</p> <ul style="list-style-type: none"> <li>• Ensure that all staff members, sub-contractors and suppliers are aware of the environmental issues relating to the construction activities that they are undertaking on site and of all mitigating and precautionary measures that must be implemented.</li> <li>• Ensure that training is undertaken for construction supervisors and crews to recognise environmental 'red flags' and ensure that these will: <ul style="list-style-type: none"> <li>○ not be disturbed, damaged or removed and</li> <li>○ Be brought to the immediate attention of the EO or ECO to determine an action plan and way forward.</li> </ul> </li> <li>• Develop a layout of the operations of the construction site indicating the position of all construction activities, including but not limited to: offices, ablution facilities, storage areas, workshops, batching plant, stockpile areas, waste disposal facilities, hazardous substance storage area, access routes, etc. This layout plan is to be submitted to the ECO for acceptance prior to site establishment. Any changes to this plan will need to be reviewed in conjunction with the ECO.</li> <li>• Ensure that all recommendations made in monitoring and audit reports are implemented throughout the construction phase.</li> <li>• Accept liability for any and all Work required in terms of the environmental specifications, resulting from environmental negligence, mismanagement and / or non-compliance.</li> </ul>
Operator	<ul style="list-style-type: none"> <li>• Ensure adherence to, and compliance with, the Operational EMPr in a legal and timely manner.</li> <li>• Ensure that all staff members and suppliers have a comprehensive understanding of the EMPr and adhere to the provisions for the duration of the operational phase.</li> <li>• Designate an Environmental Officer (EO) to monitor environmental compliance on a day-to-day basis.</li> <li>• Ensure that all staff members and suppliers are aware of potential environmental issues and of all mitigating and precautionary measures that must be implemented.</li> <li>• Ensure that staff members and suppliers are able to recognise environmental 'red flags' and ensure that these will: <ul style="list-style-type: none"> <li>○ Not be disturbed, damaged or removed; and</li> <li>○ Be brought to the immediate attention of the EO or ECO to determine an action plan and way forward.</li> </ul> </li> <li>• Ensure that all recommendations made in monitoring and audit reports are implemented throughout the operational phase.</li> <li>• Accept liability for any and all Work required in terms of the environmental specifications, resulting from environmental negligence, mismanagement and / or non-compliance.</li> </ul>
Environmental Officer (EO)	<ul style="list-style-type: none"> <li>• Manage the day-to-day on-site implementation of the environmental specifications during the construction and operational phases, and provide support and input where required.</li> <li>• Compile regular (usually weekly) monitoring reports for submission to the contractor / operator, and copied to the ECO.</li> <li>• Act as liaison and advisor on all environmental and related issues, and seek advice from the ECO where required.</li> <li>• Understand the provisions and limitations of the project in terms of the EMPr and relevant regulations (such as NEMA and NEMWA) and provide advice accordingly.</li> <li>• Respond to incidents and keep records and reports as required.</li> </ul>
Environmental Control Officer (ECO)	<ul style="list-style-type: none"> <li>• Understand, interpret, monitor, audit and implement the EMPr from the "cradle to grave" stage.</li> <li>• Retain independence and report on environmental compliance in an objective manner.</li> </ul>

	<ul style="list-style-type: none"> <li>• Explain the contents of the EMPr to the Contractor, the site staff, supervisors, operators and any other relevant personnel or I&amp;A's as required.</li> <li>• Undertake environmental audits for the duration of the construction and operational phases as required.</li> <li>• Act as quality controller regarding all environmental concerns by conducting periodic site inspections, attending regular site meetings, pre-empting problems, suggesting mitigation and being available to advice on incidental issues that arise.</li> <li>• Submit audit reports to the applicant, contractor / operator and the Environmental Authority, including performance rating, recommendations and reports of non-compliance.</li> </ul>
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## 4.2 Contractors Environmental Method Statement

Method Statements are written submissions to the ECO by the Contractor in collaboration with the assigned EO, in response to a request by the ECO. The Method Statements should set out the plant, materials, labour and method that the contractor proposes using to carry out the intended construction activities. The Method Statement should contain the appropriate detail such that the ECO is able to assess whether the Contractor's proposal is in accordance with the requirements of this EMPr. The contractor must sign the Method Statement along with the ECO to formalize the approved Method Statement.

***The Method Statements must be submitted to the ECO for approval at least 1 month prior to the commencement of the any construction activity, including clearing.*** Any changes to the method of works must be reflected by amendments to the original approved Method Statement as is needed. Any changes in this regard must be approved by the ECO, understanding that such changes are environmentally acceptable and in line with the requirements of this EMPr.

It is a statutory requirement to ensure the wellbeing of employees and the environment. To allow the mitigation measures in this document to be implemented, the Method Statement should briefly detail how and when a process will be carried out, the possible dangers/risks, and the methods of control required. This should be detailed for the following:

- Type of construction activity;
- Timing and location of the activity;
- Construction procedures for the following specific activities;
  - Bunding;
  - Blasting;
  - Construction site and office/yard establishment;
  - Cement mixing / concrete batching/bentonite mixing;
  - Contaminated water;
  - Dust management;
  - Environmental awareness course(s);
  - Environmental monitoring;
  - Erosion control;
  - Fire, hazardous and/or poisonous substances including their storage;
  - Personnel, public and animal safety;
  - Rehabilitation of modified environment(s);
  - Solid and liquid waste management;
  - Sources of materials (including MSDSs);
  - Top-soil management;
  - Storm water Management.
- Materials and equipment to be used;

- Transportation of the equipment to / from site;
- How equipment/material will be moved while on site;
- Location and extent of construction site office and storage areas;
- Identification of impacts that might result from the construction activity;
- Methodology and/or specifications for impact prevention / containment;
- Methodology for environmental monitoring;
- Emergency/disaster incident and reaction procedures; and
- Rehabilitation procedures and continued maintenance of the impacted environment.

The Contractor will be accountable for all actions taken in non-compliance of the approved Method Statement and this EMP.

## 5. COMPLIANCE

Compliance involves actions and programmes designed to ensure that all relevant environmental laws, legislation, standards and other requirements such as permits are followed and adhered to.

### 5.1 Environmental monitoring and auditing

Environmental monitoring is the continuous evaluation of the status and condition of environmental elements, whereas, environmental auditing is the process of comparing the impacts predicted with those which have actually occurred during implementation.

The key to a successful Environmental Management System (EMS) is regular monitoring to identify and implement corrective measures in a timely manner and independent auditing to evaluate successful compliance with environmental specifications and outcomes. The ultimate purpose of environmental monitoring and auditing is to confirm that all relevant programmes, legislation, laws and policies are adhered to and abided by and that the environmental specifications are being implemented in an effective and correct manner. Monitoring and auditing is intended to promote environmental best practice, ensure protection of resources and support sustainable development.

### 5.2 Monitoring Methods

In order to ensure that the above objectives are met, the following monitoring methods will be employed:

- Aspect monitoring (such as water quality);
- Incident reporting;
- Site inspections;
- Site monitoring and reporting;
- Independent external auditing.

### 5.3 Timeframes/ Frequency

Site monitoring should be undertaken daily on an on-going basis throughout the project lifecycle. External auditing should take place once a month during the construction period, every 3 months during the rehabilitation period and annually during the operational period.

The completed monitoring reports should be submitted to all relevant parties, including the ECO who will conduct audits at regular intervals. Audit reports will, in turn, be submitted to all relevant parties, including the EO, who will drive the implementation of recommendations.

#### 5.4 Non-compliance

Failure by the contractor, operator and their staff and suppliers to comply with all relevant programmes laws, legislation, policies and mitigation measures laid out in this EMPr will result in the following actions and consequences:

- Notifications will be issued in monitoring and auditing reports advising of failure to adhere to the measures stipulated in the BA/EIA/EMPr.
- Failure to comply / respond to notifications and recommendations within a specified Timeframes will result in written warning being issued.
- Failure to comply / respond to warnings within a specified Timeframes will result in fines being issued.
- Continued and wilful failure to comply / respond will result in a Non-conformance Report being issued to the Contractor.

#### 5.5 Non-conformance

A Non-Conformance Report (NCR) will be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This will be issued by the ECO to the Contractor in writing. Preceding the issuing of an NCR, the Contractor must be given an opportunity to rectify the non-conformance issues.

Should the ECO assess an incident or issue and find it to be significant (e.g. non-repairable damage to the environment), it will be reported to the relevant authorities and immediately escalated to the level of a NCR. The following information should be recorded in the NCR:

- Details of non-conformance;
- Any plant or equipment involved;
- Any chemicals or hazardous substances involved;
- Work procedures not followed;
- Any other physical aspects;
- Nature of the risk;
- Actions agreed to by all parties following consultation to adequately address the non-conformance in terms of specific control measures and should take the hierarchy of controls into account;
- Agreed Timeframes by which the actions documented in the NCR must be carried out; and
- ECO should verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO and Contractor should sign the Close-Out portion of the Non-conformance
- Form and file it with the contract documentation.

#### 5.6 On-site documentation

An Environmental File including the following documentation (if applicable) must be kept on site during construction:

- EMPr;
- Environmental Authorization;
- Licenses/permits related to any other legislation;

- Specialist rehabilitation plans;
- Storm Water Management Plan;
- Flood Assessment Plan;
- Environmental Method statements compiled by the Contractor;
- Site Layout Plan
- Letter of appointment of ECO
- Written Notice of Commencement of construction
- Non-conformance Reports;
- Environmental register, which must include the following, but not limited to such:
  - Monitoring Results – including environmental monitoring reports, register of audits, Non-Conformance Reports (NCR); and
  - Incident book – including copies of notification of Emergencies and Incidents, this must be accompanied by a photographic record.
  - Safe disposal certificate for all types of waste disposed off-site;
  - Environmental training records;
  - Waste disposal receipts from a registered landfill site;
  - Material Safety Data Sheets for all hazardous substances;
  - Method Statements; and
  - Notification of Emergencies and Incidents

## 6. ENVIRONMENTAL AWARENESS

An environmental awareness plan must be implemented for both the construction and operational phases. The approved EMPr will provide the basis of the information to be supplied, as well as any other relevant documentation, including any specialist reports.

All construction and operational staff, as well as, suppliers and regular out-sourced contractors will be required to attend a general orientation session prior to the commencement of any activities. All impacts that could potentially arise and affect the environment will be discussed and explained in detail, as well as required mitigation measures. The consequences of not following the mitigation measures as stipulated in the EMPr (i.e. non-compliance) will also be addressed.

All permanent staff must receive detailed training relative to their specific job description. This training will focus on the environmental issues and impacts that are directly linked to their activities. Staff will be briefed on the correct protocol and procedures to follow in the event of an incident or accident (spill, fire etc.) in order to minimize and contain the damage.

In addition, staff will be required to report all incidents so that the appropriate mitigation measures can be implemented in a timely manner.

*Contractor to provide ECO with proof of environmental awareness training records upon the commencement of construction.*

## SECTION B: MANAGEMENT PLANS

The mitigation and recommendations contained in the Management Plans that follow have been based on best environmental practice and have been supplemented with specialist recommendations extracted from specialist reports developed in support of the Environmental Impact Assessment process for this project.

### 7. PLANNING AND DESIGN MANAGEMENT PLAN

The Planning Management Plan (PMP) addresses all aspects of the planning and design phase, such as the detailed architectural, infrastructural and engineering services layout and design. All members of the planning and design team are to be in possession of this Management Plan and must be aware of the environmental aspects, risks and mitigation measures.

#### 7.1 Hydrology

##### 7.1.1. Ground water

*To ensure protection of ground water resources via legislative requirements*

Mitigations:

- All boreholes (if required) to be used for potable water extraction will be registered as per DWS requirements. The Water Use license for the property will be in place and up to date for the lifetime of the development.
- Water saving devices such as low flow shower heads and taps, and the use of grey water for activities such as road wetting and irrigation should be installed

*Timeframes and Deliverables:*

- All above mitigations measures to be in place prior to commencement of construction activities.*
- No construction is to commence without submission of a WULA or GA.*

##### 7.1.2. Surface water

*To ensure protection of all surface hydrology, i.e. the Crocodile River, ephemeral drainage lines and wetlands/dams, in terms of ecological and hydrological function through careful planning and placement of structures and infrastructure. .*

Mitigations:

- Buildings and other hardened surface infrastructure (including storm water attenuation measures) will be located outside of buffered watercourses.
- The sensitivity map must be used as a decision tool to guide the layout design for the river front and share block units, as well as the safari lodge. Development on areas of high environmental sensitivity must be avoided.
- No purified effluent will be discharged directly into any watercourse without the appropriate Water Use Licence in place.
- All permanent structures and infrastructure must be located outside/above of the 1:100 year floodline.
- Construction should preferably take place during the low flow/winter months in order to minimise the risk of sediment and debris being washed into riparian and/or wetland areas.
- All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.

*Timeframes and Deliverables:*

- All above mitigations measures to be in place prior to commencement of construction activities.*

ii. *No construction is to commence without submission of a WULA or GA.*

## 7.2. Biodiversity Management

### 7.2.1. Soil

*To prevent undue erosion via careful planning and design.*

#### Mitigations:

- Remove only vegetation essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.
- Measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation.
- The accumulation of water on the surface must be prevented. The drainage of the surface should be done in such a way that storm water will be led away quickly and efficiently without any erosion taking place.
- Do not allow surface water or storm water to canalize or be concentrated.
- Dissipate concentrated storm water flows through energy dissipaters or vegetated areas.
- All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.

#### *Timeframes and Deliverables:*

- i. *All above mitigations measures to be in place prior to commencement of construction activities.*

### 7.2.2. Biodiversity (Flora): Loss of vegetation, CBAs/ESAs and disturbance of sensitive habitats

*To prevent the loss of critical biodiversity areas, ecological support areas as well as, disturbance to sensitive habitats (riparian zones, high biodiversity areas) owing to the placement of infrastructure.*

#### Mitigations:

- Buildings and other hardened surface infrastructure (including storm water attenuation measures) will be located outside of the buffered watercourses.
- The sensitivity map must be used as a decision tool to guide the layout design for the placement of or the river front and share block units, as well as the safari lodge. Development on areas of high environmental sensitivity must be avoided.
- The location of structures and infrastructure will be consolidated so as to localise and contain the development footprint as much as possible. All areas beyond the development footprint will be rehabilitated as part of wetland condition improvements.
- No construction camps should be allowed in or within 20m of riparian and/or wetland areas.
- The construction of pathways (disturbance zones) in or adjacent to the riparian and/or wetland areas is to be closely managed and strictly controlled to minimise damage to riparian and/or wetland areas.
- No development to take place over the larger exposed rocks within the Outcrop Woodland vegetation community, which has High SEI.
- A 10 m wide ecological buffer should be established around the outcrops, and this must be incorporated into conservation "open space" land, or can form part of an erf as long as no development takes place on the outcrop. The one exception is the current footprint containing the two tourist huts where development can take place on that exact footprint. This area has been slightly degraded historically.

- No development to take place within the Riparian Forest / Wetland Mosaic vegetation community or the ephemeral drainage lines and drier portions of the riparian forest/wetland. The following buffers are to be implemented:
  - 30 m conservation no development zone should be implemented in the three larger, wetter portions
  - 15 m conservation no development zone around the ephemeral drainage lines
- A 30 m conservation buffer should be implemented around the two small pans located in the north-western portion of the study area to minimize disturbance on foraging birds and wallowing mammals.
- Construction should preferably take place during the low flow/winter months in order to minimise the risk of sediment and debris being washed into riparian and/or wetland areas.
- No manicured landscape or gardening is permitted. All areas beyond the development footprint are to be rehabilitated as natural bush using appropriate endemic species.
- The internal road network will be developed as gravel tracks that allow for faunal dispersal and minimize fragmentation of ecologically sensitive areas.
- Leave as much of the natural vegetation intact as possible.
- All permanent structures and infrastructure must be located outside/above of the 1:100 year floodline.
- Operation and storage of equipment in the riparian and/or wetland areas to be prevented.
- All landscaping should make use of indigenous plants, and should preferably make use of plant species that are native to the area (e.g. native to the regional vegetation types).
- In order to comply with the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004), all listed invasive exotic plants as indicated in Appendix 1 of the ecology report should be targeted and controlled. This may necessitate the compilation of an alien plant control plan as at least 18 declared invasive species were recorded during fieldwork.
- An alien plant control plan (APCP) will be compiled and implemented to remove all invasive exotic plants.

### *Timeframes and Deliverables:*

- All above mitigations measures to be in place prior to commencement of construction activities.*
- Final planting plan as developed by a registered Landscape Architect is to be submitted to the ECO at least 1 month prior to the commencement of construction.*
- The APCP to be developed and adopted within 6 months of the EA being approved prior to the commencement of construction.*
- Should the follow up late summer survey need to be undertaken this must be done at least 3 months prior to the commencement of construction.*

### 7.2.3. Biodiversity (Flora): Conservation important species

*To prevent the destruction and damage to conservation important species and protected trees i.e. Aloe komatiensis (VU), and Elaeodendron transvaalense, Dalbergia melanoxylon (NT), Sclerocarya birrea, Boscia albitrunca, Combretum imberbe, Afzelia quanzensis, Philenoptera violacea and Elaeodendron transvaalense, Aloe chabaudii, A. marlothii, A. spicata, A. komatiensis, Eulophia petersii, Stapelia gigantea and Pachypodium saundersii and the trees Spirostachys africana and Berchemia zeyheri through careful planning and design.*

### Mitigations:

- A follow-up survey in late summer (February to April) should be performed to search for the VU-listed Sensitive Plant Species No. 3 and the EN-listed *Barleria oxyphylla*, both of which potentially occur within the study area and flower in that period. If a population is confirmed, then a monitoring program needs to be implemented to check the health of these populations each year.



- Each stand, lodge, road or other proposed development areas should be checked by an experienced botanist prior to clearing and all SCC or protected plants should be marked with hazard tape to indicate where development may not take place. These plants must remain in situ.
- The sensitivity map must be used as a decision tool to guide the layout design. Development in the vicinity of high environmental sensitivity must be avoided.
- A 50 m conservation buffer will be implemented around the two small colonies of *Aloe komatiensis*, and this area should be incorporated into conservation "open space" land.

*Timeframes and Deliverables:*

- All above mitigations measures to be in place prior to commencement of construction activities.*
- Final planting plan, as developed by a registered Landscape Architect, indicating the location of any conservation important species found during the botanist's site walk-through is to be submitted to the ECO at least 1 month prior to the commencement of construction.*
- Should the follow up late summer survey need to be undertaken this must be done at least 3 months prior to the commencement of construction.*

7.2.4. Biodiversity (Fauna): Habitat fragmentation

*To prevent faunal habitat fragmentation due to removal and alteration of the habitat.*

Mitigations:

- The location of structures and infrastructure will be consolidated so as to localise and contain the development footprint as much as possible. All areas beyond the development footprint will be rehabilitated as natural wetland habitats.
- Leave as much of the natural vegetation intact as possible.
- All rehabilitation structures and designs should take cognizance of faunal species movement and not prevent the movement of species.
- No manicured landscape or gardening is permitted. All areas beyond the development footprint are to be rehabilitated as natural bush using appropriate endemic species.
- The internal road network will be developed as gravel tracks that allow for faunal dispersal and minimize fragmentation of ecologically sensitive areas.

*Timeframes and Deliverables:*

- All above mitigations measures to be in place prior to commencement of construction activities.*

7.3. Visual Impact Management

7.3.1. Visual

*To prevent a visual impact on the visual quality of the surrounding area due to development in an otherwise natural environment.*

Mitigations:

- Make use of earth tones and natural materials rather than primary colours and high-tech finishes.
- Make use of earthy, muted colours and avoid pastel and primary colours.
- Make use of natural, non-reflective, earthy materials rather than high-tech reflective materials.
- All areas beyond the development footprint are to be rehabilitated as natural vegetation using appropriate endemic species.

- Ensure that lighting design for the project is undertaken by a suitably qualified design professional. Pro-active design, planning and specification lighting for the development is key to containing rather than spreading lighting impact.
- Avoid the use of flood lights and high mast lighting. Rather make use of post top and bollard lights in high use and pedestrian areas.
- Sources of light must be shielded by physical barriers (walls, vegetation, or the structure itself).
- Be discerning in the application of lights, opting to light pathways and facilities rather than a blanket lighting treatment.
- Limit mounting heights of lighting fixtures.
- Shield the sources of light by physical barriers (walls, vegetation, or the structure itself);
- Make use of minimum lumen or wattage in fixtures;
- Make use of down-lighters, or shielded fixtures;
- Make use of Low Pressure Sodium lighting or other types of low impact lighting
- Motion detectors must be used on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

*Timeframes and Deliverables:*

- All above mitigations measures to be in place prior to commencement of construction activities.*
- Final lighting plan, as developed by a registered Landscape Architect or suitably qualified design professional, is to be submitted to the ECO at least 1 month prior to the commencement of construction together with material colour samples.*

## 8. CONSTRUCTION MANAGEMENT PLAN

The Construction Management Plan (CMP) addresses the environmental risks and impacts associated with the construction phase. This plan must be adhered to at all times during the construction phase.

It is the responsibility of the contractor, in conjunction with EO and ECO, to educate, inform and foster a sound understanding of the CMP in all staff, sub-contractors, suppliers etc. Strict adherence to the CMP must be enforced and monitored.

An 'Environmental Site Book' should be supplied and kept on site. This site book should be in the form of a file and will house all environmental status reports as compiled by the ECO. All issues and proposed actions as noted by the ECO during site visits will also be documented in the site book. The EMP, as well as, a copy of the environmental sensitivity plans and construction layout plan must be available onsite.

### 8.1. Site establishment

#### 8.1.1. Planning and preparation

*To prevent environmental damage during pre-construction activities*

Mitigations:

- An independent Ecological Control Officer (ECO) must be appointed to oversee construction.
- A permanent Environmental Officer (EO) must be designated to monitor environmental compliance on a day-to-day basis on the construction site.
- The ECO must be consulted to identify possible suitable construction site camp.
- No construction camps are allowed in or within 20m of riparian and/or wetland areas.
- No stockpile areas are to be located in or within 20m of riparian and/or wetland areas.
- No development to take place over the larger exposed rocks within the Outcrop Woodland vegetation community, which has High SEI.
- A 10 m wide ecological buffer should be established around the outcrops, and this must be incorporated into conservation "open space" land, or can form part of an erf as long as no development takes place on the outcrop. The one exception is the current footprint containing the two tourist huts where development can take place on that exact footprint. This area has been slightly degraded historically.
- No development to take place within the Riparian Forest / Wetland Mosaic vegetation community or the ephemeral drainage lines and drier portions of the riparian forest/wetland. The following buffers are to be implemented:
  - 30 m conservation no development zone should be implemented in the three larger, wetter portions
  - 15 m conservation no development zone around the ephemeral drainage lines
- A 30 m conservation buffer should be implemented around the two small pans located in the north-western portion of the study area to minimize disturbance on foraging birds and wallowing mammals.
- A 50 m conservation buffer will be implemented around the two small colonies of *Aloe komatiensis*, and this area should be incorporated into conservation "open space" land.
- Each stand, lodge, road or other proposed development areas should be checked by an experienced botanist prior to clearing and all SCC or protected plants should be marked with hazard tape to indicate where development may not take place. These plants must remain in situ.
- Based on the ECO's recommendations for the site, the contractor must develop a plan of the operations of the construction site indicating the position of all construction activities, including but not limited to: offices, ablution facilities, storage areas, workshops, batching plant, stockpile areas, waste disposal facilities, hazardous substance storage area, access routes, etc. This layout plan is to be submitted to the ECO for acceptance prior to site establishment. Any changes to this plan will need to be reviewed in conjunction with the ECO.

- The contractor must develop a management and monitoring programme for alien and invasive species detailing basic ID information, actions to prevent the establishment of invasive plants and methods of removal of site during construction.
- The contractor must develop a plan indicating the mapped positions of vegetation specimens to be conserved and which should be removed and replaced (if any).
- Operation and storage of equipment in the riparian and/or wetland areas is not permitted.
- The contractor is to provide the scheduling for construction to the ECO prior to commencement of construction. Should this schedule change, the contractor is to send a revised schedule to the ECO.
- All construction activities must be restricted to daytime (e.g. from sunrise to sunset).
- The contractor will ensure that his construction staff are briefed as to the provisions of the EMPr.
- An Environmental Awareness Plan must be presented before the commencement of any construction activities. All construction staff must be aware of the biodiversity importance of the area (pertaining to all development areas);
- The contractor must comply at all times with the Occupational Health and Safety Act and implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase.
- Construction activities will only commence once the Contractors method statement has been approved by the ECO.

*Timeframes and Deliverables:*

- All above mitigations measures to be in place prior to commencement of construction activities.*
- Independent ECO to be appointed at least 3 months prior to the commencement of construction. Appointment letter to be submitted to the Department with the 14 day notification of intent to construct.*
- Name and details of EO to be provided to the ECO at least a month prior to commencement of construction.*
- Layout plan of operations of the site to be submitted to the ECO for approval at least a month prior to the commencement of construction.*
- The alien plant control plan to be developed and adopted within 6 months of the EA being approved prior to the commencement of construction. All mitigations as recommended in the APCP are to be adhered to throughout the construction period.*
- Final planting plan, as developed by a registered Landscape Architect, indicating the location of any conservation important species found during the botanist's site walk-through is to be submitted to the ECO at least 1 month prior to the commencement of construction.*
- Contractor to submit construction schedule to ECO for approval at least a month prior to commencement of construction.*
- Intended construction hours are to be submitted to the ECO at least one month prior to commencement of construction.*

8.1.2. Site demarcation

*To prevent site facilities, structures and infrastructure imposing on the surrounding environment ensuring that the construction footprint is kept to a minimum in order to conserve and protect plant and animal species, as well as, habitats.*

Mitigations:

- Minimize the construction footprint and where possible, restrict all construction related activities to previously disturbed areas or transformed vegetation.
- Buffers zones as indicated below are to be demarcated and declared as no-go zones for the duration of the construction period:
  - TB01-07 (ephemeral) 15 m
  - TB08 (riparian) 35 m

- TB09 (wetland) 30 m
  - TB10 (wetland) 30 m
  - TB11 (wetland) 30 m
  - TB12 (Riparian- Crocodile River) 60 m
- A 10 m wide ecological buffer should be established around the outcrops, and this must be incorporated into conservation "open space" land, or can form part of an erf as long as no development takes place on the outcrop. The one exception is the current footprint containing the two tourist huts where development can take place on that exact footprint. This area has been slightly degraded historically.
  - No development to take place within the Riparian Forest / Wetland Mosaic vegetation community or the ephemeral drainage lines and drier portions of the riparian forest/wetland. The following buffers are to be implemented:
    - 30 m conservation no development zone should be implemented in the three larger, wetter portions
    - 15 m conservation no development zone around the ephemeral drainage lines
  - A 30 m conservation buffer should be implemented around the two small pans located in the north-western portion of the study area to minimize disturbance on foraging birds and wallowing mammals.
  - A 50 m conservation buffer will be implemented around the two small colonies of *Aloe komatiensis*, and this area should be incorporated into conservation "open space" land.
  - A perimeter fence or suitable perimeter demarcation (such as steel droppers and hessian rope) must be erected around the construction works areas.
  - Identified sensitive environments will be demarcated as No-go zones, where no construction activities or staff are permitted.
  - Demarcate vegetation and other site features to be retained with danger tape and / or fencing as required. This barrier to be at least 2m from the stem of the specimen / feature.
  - Establish and maintain site demarcations for the duration of the construction phase. Ensure that materials do not blow or move outside of the demarcation line.
  - Clearly indicate which activities are to take place in which areas within the site e.g. the mixing of cement, stockpiling of materials etc. Limit these activities to single sites wherever possible.
  - The ECO's details should be displayed on a notice board at the entrance to the site so members of the public can report perceived transgressions of conditions.

*Timeframes and Deliverables:*

- i. *All above mitigations measures to be in place prior to commencement of construction activities.*
- ii. *Site perimeter fencing, demarcation of no-go zones, vegetation and other site features to be in place prior to the pre-site inspection and commencement of any clearing activities. These are to be inspected by the ECO during the pre-site inspection.*
- iii. *Photographic evidence of ECO's details on notice board are to be provided to the ECO upon commencement of construction.*

8.1.3. Staff management

*To ensure that all construction staff and contractors are aware of what is expected of them in terms of conduct and environmental performance.*

Mitigations:

- The contractor must ensure that his construction staff is briefed as to the provisions of the EMPr.
- An Environmental Awareness Plan must be presented before the commencement of any construction activities. All construction staff must be aware of the biodiversity importance of the area (pertaining to all development areas).
- The contractor must comply at all times with the Occupational Health and Safety Act and implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase.

- Construction activities may only commence once the Contractors method statements have been approved by the ECO.
- All construction staff need to be accommodated off-site and driven to site each day. No construction workers, with the exception of security personnel, should be permitted to stay overnight on the site.
- Staff can be transported in open vehicles, as long as the vehicles have built up sides, with a cover or roof of some sort.
- Designate an area for food preparation and consumption and ensure that facilities are available to properly store, prepare and consume food, as well as to wash up afterwards.
- Food and utensils must be properly stored away, and may not be left lying around.

*Timeframes and Deliverables:*

- All above mitigations measures to be in place prior to commencement of construction activities.*
- Contractor to provide ECO with proof of environmental awareness training records upon the commencement of construction.*
- The Method Statements must be submitted to the ECO for approval at least 3 months prior to the commencement of the any construction activity, including clearing.*
- All required on-site documentation (if applicable) as listed in Section 5.5 must be located on site at all times. ECO to inspect during pre-site inspection and at every audit.*

8.1.4. Access roads

*To prevent site access routes from creating or impacting unnecessary damage on the surrounding environment and existing surrounding road networks ensuring that the construction footprint is kept to a minimum.*

Mitigations:

- The construction of pathways (disturbance zones) in or adjacent to the riparian and/or wetland areas is to be closely managed and strictly controlled to minimise damage to riparian and/or wetland areas
- Make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas.
- Construction access roads should not be wider than necessary with a maximum width of 3m.
- Regulate and control movement over the site. Personnel, vehicles and equipment to move along designated routes only.
- Damage caused to public roads by the construction related activities, including heavy vehicles, must be repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*

8.2. Hydrology

8.2.1 Groundwater

*To ensure that measures are put in place to prevent the waste of water during the construction phase and prevent/reduce the pollution and contamination of ground water owing to unmanaged storm water runoff, sewage leaks, spills and discharge, as well as, discharge and spills of solvents, paints, chemicals, fuel etc.*

Mitigations:

- The Water Use license for the property will be in place and up to date for the lifetime of the development.
- All construction staff will be trained in water wise principles, and prudent use of water will be practiced at all times for the construction of the development.
- Water saving measures will be implemented where possible and practical.
- Leak detection systems will be installed during routine maintenance and upgrades and any leaks promptly attended to.
- Water consumption will be monitored on a monthly basis to ensure that there is no undue waste. Keep up to date records of water monitoring.
- Clearly indicate which activities are to take place in which areas within the site e.g. the mixing of cement, stockpiling of materials etc. Limit these activities to single sites wherever possible.
- The Contractor must take reasonable precautions to prevent the pollution of the ground and / or water resources on and adjacent to the site as a result of his activities.
- A drainage diversion system will be installed to divert clean runoff around areas of potential pollution, e.g. batching areas, workshops, etc.
- Polluted runoff and waste water emanating from the construction site will be diverted into a collection system (e.g. sump, attenuation dam, PVC porta-ponds, etc.) for treatment or collection and disposal.
- Collected contaminated runoff / wastewater is to be pumped out of the final collection point and disposed of at an appropriate waste disposal site. Sump liners are to be treated in the same manner.
- The Contractor is encouraged to recycle dirty wash water to minimise the amount to be removed off-site.
- The Contractor may discharge 'clean' silt laden water overland and allow this water to filter into the ground. However, he shall ensure that he does not cause erosion as a result of any overland discharge.
- Concrete and cement works will be undertaken in specified areas only.
- All operations that involve the use of cement and concrete will be carefully controlled. Water and slurry from concrete mixing operations must be contained to prevent pollution of the ground surrounding the mixing points.
- Plastic trays or liners will be used when mixing cement and concrete: Do not mix cement and concrete directly on the ground.
- Excess concrete from mixing must be deposited in a designated area awaiting removal to an approved landfill site.
- All hazardous substances (chemicals, oils, etc.) will be stored in appropriate, tamper proof containers in locked stores.
- All hazardous substances will be used and handled by qualified personnel on bunded surfaces.
- Tanks containing fuel will have lids, which will remain firmly shut.
- All hazardous products dispensed from 200 litre drums will be transferred by pump, and not dispensed by tipping of the drum.
- All machinery and/or vehicles standing in place for more than 2 days will be placed on drip trays.
- No oil, petrol, diesel etc. will be discharged onto the ground.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place within properly equipped, bunded maintenance areas/workshops.
- Gas and liquid fuel will not be stored in the same storage area.
- Petroleum, chemical, harmful and hazardous materials will be stored in enclosed, bunded areas. The bunded areas will be clearly marked.
- The bund will have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- The slab will be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump will be disposed of as hazardous waste. This will be collected by a private contractor as employed by the Contractor.

- No smoking is allowed inside the stores or within 3m of a bund.
- The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores.
- Fuels and chemicals may not be stored under trees.
- Exercise extreme care with the handling of diesel and other toxic solvents so that spillage is minimised.
- A spills containment kit must be kept on site at all times for the duration of the construction phase.
- Regularly check vehicles, machinery and equipment operating on site to ensure that none have leaks or cause spills of oil, diesel, grease or hydraulic fluid.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place only within properly equipped, bunded maintenance areas or workshops.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days will be placed on drip trays. The drip trays will be watertight and will be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays will be cleaned before any possible rain events that may result in the drip trays overflowing.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*
- Water consumption monitoring records are to be provided to the ECO on a monthly basis.*
- Waste disposal receipts from a registered hazardous waste disposal site must be onsite at all times for all hazardous waste removed from the site. These are to be provided to the ECO on a monthly basis.*
- Waste disposal receipts from a registered landfill site must be onsite at all times for all construction waste removed from the site. These are to be provided to the ECO on a monthly basis.*
- A list of all hazardous substances and Material Safety Data Sheets for all hazardous substances to be stored on site is to be provided to the ECO at the commencement of construction.*

#### 8.2.2 Surface water: Ecological and hydrological Function

*To ensure that measures are put in place to prevent disturbance and loss of ecological and hydrological functions of the Crocodile River, drainage lines and wetlands/dams due to clearing of vegetation, loss of fringing vegetation, invasion by alien species, destabilization of banks and sedimentation and siltation.*

Mitigations:

- All permanent structures and infrastructure must be located outside/above of the 1:100 year floodline.
- Buffers zones as indicated below are to be demarcated and declared as no-go zones for the duration of the construction period:
  - TB01-07 (ephemeral) 15 m
  - TB08 (riparian) 35 m
  - TB09 (wetland) 30 m
  - TB10 (wetland) 30 m
  - TB11 (wetland) 30 m
  - TB12 (Riparian- Crocodile River) 60 m
- A rehabilitation plan should be implemented throughout the construction phase to address remnant impacts and control alien plants within the depression wetland. Several aliens are present in the wetland and targeted control using mechanical removal, landscape management (e.g. controlled burning) and herbicides will result in a positive project-associated impact. Refer to Section 13.
- All stormwater management features should be constructed in a manner that will ensure the continued functioning of the natural drainage lines and wetland features on the study site. Stormwater management should not impede or divert surface water flow, as any changes in surface water flow quality or quantity could have significant impacts on associated fauna groups.
- All temporary construction mitigation measures as per the developed and approved Stormwater Management Plan for the site are to be adhered to throughout the duration of construction.



- All walkways/pedestrian pathways should be constructed of a material that is water permeable in order to minimise stormwater run-off or the ponding of water. In addition, appropriate stormwater features should be installed to minimise erosion.
- All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.
- Construction within or near the wetland should take place outside of the rainy season when the flow of is at a minimum.
- Construction should preferably take place during the low flow/winter months in order to minimise the risk of sediment and debris being washed into riparian and/or wetland areas.
- Do not create additional wetland crossings without the express permission of the ECO. The ECO will ensure that the crossing is permitted in terms of DWS's General Authorisations, Construction of the crossings must be as per the ECO's instruction.
- Limit the use of impermeable surfaces.
- Locate stockpiles outside of wetland habitat where possible.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*

### 8.2.3 Surface water: Pollution and Contamination

*To ensure that measures are put in place to prevent the pollution and contamination of surface water owing to unmanaged runoff of grey water, cement slurry, unmanaged sewage discharge and leaks, litter and inert construction material, sewage leaks and spills, discharge and spills of solvents, fuel etc.*

- The Contractor must take reasonable precautions to prevent the pollution of the ground and / or water resources on and adjacent to the site as a result of his activities.
- Install a drainage diversion system to divert clean runoff around areas of potential pollution, e.g. batching areas, workshops, etc.
- Direct polluted runoff and waste water emanating from the construction site into a collection system (e.g. sump, attenuation dam, PVC porta-ponds, etc.) for treatment or collection and disposal.
- Collected contaminated runoff / wastewater is to be pumped out of the final collection point and disposed of at an appropriate waste disposal site. Sump liners are to be treated in the same manner.
- Prevent polluted water from reaching the watercourses.
- Washing of plant / equipment / concreting equipment etc. may only be washed in dedicated areas and the dirty water is not allowed to discharge into a watercourse or surrounding natural vegetation
- The Contractor is encouraged to recycle dirty wash water to minimise the amount to be removed off-site.
- No natural watercourse is to be used for the cleaning of tools or any other apparatus. This includes for purposes of bathing, or the washing of clothes etc.
- The Contractor may discharge 'clean' silt laden water overland and allow this water to filter into the ground. However, he shall ensure that he does not cause erosion as a result of any overland discharge.
- Trucks delivering concrete shall not be washed on site or anywhere on site.
- Concrete and cement works will be undertaken in specified areas only.
- All operations that involve the use of cement and concrete will be carefully controlled. Water and slurry from concrete mixing operations must be contained to prevent pollution of the ground surrounding the mixing points.
- Plastic trays or liners will be used when mixing cement and concrete: Do not mix cement and concrete directly on the ground.
- Excess concrete from mixing must be deposited in a designated area awaiting removal to an approved landfill site.

- All visible remains of excess concrete shall be physically removed immediately and disposed of as waste. Washing the visible signs into the ground is not acceptable. All excess aggregate shall also be removed.
- All hazardous substances will be used and handled by qualified personnel on bunded surfaces.
- Tanks containing fuel will have lids, which will remain firmly shut.
- All hazardous products dispensed from 200 litre drums will be transferred by pump, and not dispensed by tipping of the drum.
- All machinery and/or vehicles standing in place for more than 2 days will be placed on drip trays.
- No oil, petrol, diesel etc. will be discharged onto the ground.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place within properly equipped, bunded maintenance areas/workshops.
- Gas and liquid fuel will not be stored in the same storage area.
- Petroleum, chemical, harmful and hazardous materials will be stored in enclosed, bunded areas. The bunded areas will be clearly marked.
- The bund will have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- The slab will be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump will be disposed of as hazardous waste. This will be collected by a private contractor as employed by Applicant.
- No smoking is allowed inside the stores or within 3m of a bund.
- The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores.
- Fuels and chemicals may not be stored under trees.
- Exercise extreme care with the handling of diesel and other toxic solvents so that spillage is minimised.
- A spills containment kit must be kept on site at all times for the duration of the construction phase.
- Regularly check vehicles, machinery and equipment operating on site to ensure that none have leaks or cause spills of oil, diesel, grease or hydraulic fluid.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place only within properly equipped, bunded maintenance areas or workshops.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days will be placed on drip trays. The drip trays will be watertight and will be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays will be cleaned before any possible rain events that may result in the drip trays overflowing.
- Check vehicles regularly for oil leaks and only refuel in designated areas outside of wetland habitat.
- Provide clearly marked bins for litter and the discard of other waste materials.
- Provide and maintain portable toilets outside of wetland habitat during the construction phase.
- At least one portable toilet is to be provided for every 15 people on site.
- Portable toilets are to be emptied as and when required, however, this should be undertaken at least once a week by a registered service provider.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*
- Proof of weekly maintenance and servicing of the portable toilets by a registered service provider is to be provided to the ECO on a monthly basis.*

### **8.3. Biodiversity management**

#### **8.3.1. Soil: Pollution and Contamination**

*To ensure that measures are put in place to prevent contamination and pollution owing to unmanaged storm water runoff, unmanaged sewage discharge, leaks and spills, Discharge and spill of solvents, paints, chemicals, Discharge and spill of hydrocarbons and fuel and litter and other inert construction material.*

Mitigations:

- As per Waste Management Plan (refer to Section 10).
- Concrete and cement works will be undertaken in specified areas only.
- All operations that involve the use of cement and concrete will be carefully controlled. Water and slurry from concrete mixing operations must be contained to prevent pollution of the ground surrounding the mixing points.
- Plastic trays or liners will be used when mixing cement and concrete: Do not mix cement and concrete directly on the ground.
- Excess concrete from mixing must be deposited in a designated area awaiting removal to an approved landfill site.
- All visible remains of excess concrete shall be physically removed immediately and disposed of as waste. Washing the visible signs into the ground is not acceptable. All excess aggregate shall also be removed.
- All hazardous substances will be used and handled by qualified personnel on bunded surfaces.
- Tanks containing fuel will have lids, which will remain firmly shut.
- All hazardous products dispensed from 200 litre drums will be transferred by pump, and not dispensed by tipping of the drum.
- All machinery and/or vehicles standing in place for more than 2 days will be placed on drip trays.
- No oil, petrol, diesel etc. will be discharged onto the ground.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place within properly equipped, bunded maintenance areas/workshops.
- Gas and liquid fuel will not be stored in the same storage area.
- Petroleum, chemical, harmful and hazardous materials will be stored in enclosed, bunded areas. The bunded areas will be clearly marked.
- The bund will have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- The slab will be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump will be disposed of as hazardous waste. This will be collected by a private contractor as employed by the Nature Estate.
- No smoking is allowed inside the stores or within 3m of a bund.
- The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores.
- Fuels and chemicals may not be stored under trees.
- Exercise extreme care with the handling of diesel and other toxic solvents so that spillage is minimised.
- A spills containment kit must be kept on site at all times for the duration of the construction phase.
- Regularly check vehicles, machinery and equipment operating on site to ensure that none have leaks or cause spills of oil, diesel, grease or hydraulic fluid.
- Construction vehicles will be maintained in an acceptable state of cleanliness when leaving site. Sand, dust and spillages from these vehicles that inevitably fall on the main roads must be cleared on a regular basis.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place only within properly equipped, bunded maintenance areas or workshops.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days will be placed on drip trays. The drip trays will be watertight and will be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays will be cleaned before any possible rain events that may result in the drip trays overflowing.
- All machinery and/or vehicles standing in place for more than 2 days will be placed on drip trays.

- All recyclables and non-recyclables will be stored in waste cages to prevent spread into the natural environment.

*Timeframes and Deliverables:*

- All above mitigation measures to be implemented continuously throughout the duration of construction.*
- Waste disposal receipts from a registered hazardous waste disposal site must be onsite at all times for all hazardous waste removed from the site. These are to be provided to the ECO on a monthly basis.*
- Waste disposal receipts from a registered landfill site must be onsite at all times for all construction waste removed from the site. These are to be provided to the ECO on a monthly basis.*

8.3.2. Soil: Erosion

*To ensure that measures are put in place to prevent erosion owing to removal of stabilizing vegetation, compaction by movement of construction vehicles and equipment, increase of water runoff in construction areas.*

- The construction footprint will be minimized and where possible, restrict all construction related activities to previously disturbed areas or transformed vegetation.
- Vegetation disturbance and removal must be kept to a minimum and the areas monitored to ensure that areas are exposed for brief periods of time only.
- Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. No vegetation outside of the demarcated construction areas may be removed whatsoever.
- Do not excavate until all required materials / services are on-site, to facilitate immediate laying of services / construction of subsurface infrastructure.
- In general, excavations remaining open overnight must be fenced or equipped with escape ramps to allow trapped animals to escape.
- Preferably undertake clearing activities during the dry season in order to prevent erosion and siltation.
- During the construction and operational phases, erosion and siltation measures should be implemented (e.g., the use of temporary silt traps downstream of construction areas).
- Excavation of sand to solid ground to be done carefully and appropriate drainage incorporated i.e. sand and debris need to be removed and solid rock preferably exposed to ensure proper binding with concrete material.
- Construction must preferably be extended over rocky substrate to give maximum anchoring opportunity.
- Progressively reinstate of disturbed areas to topsoil profile on an on-going basis, immediately after selected construction activities (e.g. backfilling of a trench) are completed. This allows for passive rehabilitation (i.e. natural re-colonisation by vegetation) to commence.
- Deficiency of backfill material shall not be made up by excavation within the protected area.
- Excavated material is to be stockpiled along a pipeline trench within the working servitude, unless otherwise authorised.
- Subsoil backfill to be followed by topsoil. Compact backfilled trenches to prevent erosion. Subsoil to be compacted to engineer's specification.
- Consider using any excess rocks and boulders that were excavated from the construction site for any erosion protection work, which is required on site. Consider removing the rocks for the packing of gabions at other soil erosion sites.
- Removed soil is to be used to backfill areas where required and excess is to be landscaped into natural looking banks that fit the surrounding topography.
- Monitor backfilled areas for erosion and remediate as required.
- Progressively rehabilitate (rip, scarify and plant) areas as soon as works have been completed.
- Construction of proposed roads may not be wider than necessary with a maximum width of 3m.
- Regulate and control movement over the site. Personnel, vehicles and equipment to move along designated routes only.

- All road rules and speed limits must be adhered to at all times.
- Construction staff will only use authorised paths and roads.
- Movement of heavy vehicles and machinery will be limited wherever possible, and construction noise reduced wherever possible.
- Vehicles used during construction or to transport material or staff on site, will have the minimum impact on the environment (trees, roads or other) or other road users. The size, height and weight of vehicles must be kept in mind; the access route will determine the type of vehicle that can be used.
- Adjacent landowners must be given due warning ahead of any particularly loud construction works.
- The contractor must maintain all access and site roads and repair these as required. Damage caused to roads by the construction related activities, including heavy vehicles, must be repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor.
- Upon completion of the construction period, the Contractor shall ensure that the access roads are returned to a state no worse than prior to construction commencing.
- All disturbed areas along the fringes of access roads must be rehabilitated once the road is complete.
- All existing and proposed roads will contain adequate stormwater drainage and erosion control measures.
- All stormwater should be diverted to a point from where the water must be released in a controlled manner that will not initiate or enhance any erosion, and the way stormwater enters a natural waterway is important because high-energy flows can cause serious damage (especially to riparian zones)
- Energy dissipaters and smaller permeable gabion-structures covered with reeds can be constructed at the effluent points of all stormwater.
- All measures detailed in the storm water management plan (section 11.1) inclusive of the following:
  - The accumulation of water on the surface will be prevented. The drainage of the surface will be done in such a way that storm water will be led away quickly and efficiently without any erosion taking place.
  - Surface water or storm water will not be allowed to canalize or be concentrated.
  - Runoff from roads will be managed to avoid erosion and pollution problems.
  - Concentrated storm water flows will be dissipated through energy dissipaters or vegetated areas.
  - Proactively protect steep access roads, cuttings against and other areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible and by taking such other measures as may be necessary to prevent surface water being concentrated in water sources and from scouring the slopes, banks or other areas.
  - All erosion damage will be repaired as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.
- As per the Storm Water Management Plan (refer to Section 11).

*Timeframes and Deliverables:*

- i. *All above mitigations measures to be implemented continuously throughout the duration of construction.*

8.3.3. Soil: Stockpiles, storage and handling

*To ensure that all materials are handled and stored in the correct manner so as to protect the materials and the environment*

Mitigations:

- Topsoil will be conserved through pre-emptive stripping and stockpiling prior to the commencement of works in any area, pending reapplication during rehabilitation.
- Strip topsoil together with grass / groundcover from all areas where permanent or temporary structures are located, construction related activities occur, and access roads are to be constructed.

- Topsoil will to be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify.
- Works will be coordinated to limit unnecessarily prolonged exposure of stripped areas and stockpiles. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area.
- Do not strip topsoil when it is wet.
- No stockpile areas are to be located in or within 20m of riparian and/or wetland areas.
- Topsoil stockpiles must be positioned/ stored in approved locations only.
- Topsoil stockpiles may not exceed 2 m in height and should be protected from erosion
- Do not disturb, compact or disrupt topsoil stockpiles, and ensure that nothing is stored on them;
- Regular weeding of stockpiles must occur to ensure that no invasive or alien plant species are established.
- Topsoil stockpiled for extended periods of time must be revegetated with indigenous grasses.
- Topsoil is to be replaced along the contour.
- Topsoil is to be replaced by direct return where feasible (i.e. replaced immediately on the area where construction is complete), rather than stockpiling it for extended periods

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*

#### 8.3.4. Air Quality

*To ensure that measures are put in place to prevent air pollution by emissions from construction vehicles and equipment, dust liberated and smoke from open fires.*

Mitigations:

- Retain vegetation and soil within construction areas in position for as long as possible, removing it immediately ahead of construction / earthworks in that area.
- Site vehicles and equipment will be maintained in an acceptable state of repair and serviced regularly.
- All road rules and speed limits must be adhered to at all times.
- Construction vehicles transporting materials to and from the construction site must be covered to reduce the formation of dust.
- A dust abatement programme will be used. Standard dust abatement measures include watering or otherwise stabilising soils, covering haul trucks, employing speed limits on unpaved roads, minimising vegetation clearing, and promptly re-vegetated after construction is completed.
- Dust suppression measures must be implemented such as wetting of the site and access roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- Long-term stockpiles of soil and fine spoil material will be vegetated or covered to minimise the sources of dust pollution.
- All disturbed areas, construction areas, roads, slopes etc. will be rehabilitated immediately after the completion of construction works according to the wetland rehabilitation and monitoring plan. Refer to Section 13.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*

#### 8.3.5. Biodiversity (Flora): Removal of alien invasives

*To ensure that measures are put in place to maximize the positive benefits of removing all identified alien invasive plant species during the construction phase.*

Mitigation:

- The contractor must develop a management and monitoring programme for alien and invasive species detailing basic ID information, actions to prevent the establishment of invasive plants and methods of removal of site during construction.
- In order to comply with the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004), all listed invasive exotic plants as indicated in Appendix 1 of the ecology report should be targeted and controlled. This may necessitate the compilation of an alien plant control plan as at least 18 declared invasive species were recorded during fieldwork.
- Alien invasive species within the site will be removed prior to construction-related soil disturbances.
- All sites disturbed by construction activities must be monitored for colonization by invasive alien plant species.
- All alien seedlings and saplings must be removed as they emerge or become evident for the duration of construction.
- Manual / mechanical removal is preferred to chemical control.
- Manufacturer's instructions will be followed when using chemical methods, especially in terms of quantities, time of application etc.
- Only properly trained people will handle and make use of chemicals.
- Herbicide and pesticide use will be limited to non-persistent, immobile products and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- All construction vehicles and equipment, as well as, construction material must be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access to the Reserve.
- The measures currently in progress to curb bush-encroachment from the indigenous shrub *Dichrostachys cinerea* should continue to operate.

*Timeframes and Deliverables:*

- i. All above mitigations measures to be implemented continuously throughout the duration of construction.*
- iv. The APCP to be developed and adopted within 6 months of the EA being approved prior to the commencement of construction.*

8.3.6. Biodiversity (Flora): Loss of vegetation, CBAs/ESAs and disturbance of sensitive habitats

*To ensure that measures are put in place to prevent/minimize the loss of critical biodiversity areas, ecological support areas, as well as, disturbance to sensitive habitats (riparian vegetation, high biodiversity zones) owing to site clearing and general construction activities and movement of construction vehicles, litter and waste, unmanaged sewage discharge and solvent, paint, and chemical spills.*

Mitigations:

- Remove all dumped and refuse material from the riparian and/or wetland area
- Vegetation disturbance and removal must be kept to a minimum and the areas monitored to ensure that areas are exposed for brief periods of time only.
- Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. No vegetation outside of the demarcated construction areas may be removed whatsoever.
- Buffers zones as indicated below are to be demarcated and declared as no-go zones for the duration of the construction period:
  - TB01-07 (ephemeral) 15 m
  - TB08 (riparian) 35 m
  - TB09 (wetland) 30 m
  - TB10 (wetland) 30 m

- TB11 (wetland) 30 m
- TB12 (Riparian- Crocodile River) 60 m
- All activities should stay out of the riparian areas area and its recommended buffer zones.
- No development to take place over the larger exposed rocks within the Outcrop Woodland vegetation community, which has High SEI.
- A 10 m wide ecological buffer should be established around the outcrops, and this must be incorporated into conservation "open space" land, or can form part of an erf as long as no development takes place on the outcrop. The one exception is the current footprint containing the two tourist huts where development can take place on that exact footprint. This area has been slightly degraded historically.
- No development to take place within the Riparian Forest / Wetland Mosaic vegetation community or the ephemeral drainage lines and drier portions of the riparian forest/wetland. The following buffers are to be implemented:
  - 30 m conservation no development zone should be implemented in the three larger, wetter portions
  - 15 m conservation no development zone around the ephemeral drainage lines
- A 30 m conservation buffer should be implemented around the two small pans located in the north-western portion of the study area to minimize disturbance on foraging birds and wallowing mammals.
- A perimeter fence or suitable perimeter demarcation (such as steel droppers and hessian rope) must be erected around the construction works area to prevent access to adjacent bush and sensitive environs. Buffer areas and identified sensitive environments must be demarcated as No-go zones, where no construction activities or staff are permitted.
- Vegetation and other site features to be retained will be demarcated with danger tape and / or fencing as required. This barrier will be at least 2m from the stem of the specimen / feature.
- Site demarcations will be established and maintained for the duration of the construction phase. Materials must not blow or move outside of the demarcation line.
- The construction of pathways (disturbance zones) in or adjacent to the riparian and/or wetland areas is to be closely managed and strictly controlled to minimise damage to riparian and/or wetland areas
- Vehicular or pedestrian access will be prohibited into all natural areas beyond the demarcated boundary of the construction site.
- Construction activities must be carefully planned and implemented in such a way that facilitates and aids in the rehabilitation and establishment of plant communities.
- Fines will be implemented for the damage or destruction of marked and protected specimens. It is the contractor's responsibility to ensure that these are retained.
- No natural feature may be marked or defaced.
- No large tree (with a trunk diameter exceeding 200mm) may be felled without the permission of the ECO.
- Consider the selective trimming of branches before opting to remove any trees.
- Workers will not tamper or remove flora and neither may anyone collect seed from the plants without permission from the local authority.
- Only wood from trees felled as part of the construction contract may be sold / made available for firewood. No dead wood may be gathered from the surrounding veld.
- A Plant Rescue Plan for protected species will be implemented within the construction areas. Where feasible, these will be removed by a suitably qualified specialist and replanted as part of vegetation rehabilitation plan.
- No material storage or lay down is permitted under trees.
- Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. No vegetation outside of the demarcated construction areas may be removed whatsoever.
- Alien vegetation will not be allowed to colonise the disturbed riparian and/or wetland areas.
- The measures currently in progress to curb bush-encroachment from the indigenous shrub *Dichrostachys cinerea* should continue to operate.



- Maintain site vehicles and equipment in an acceptable state of repair. All vehicles must be road-worthy and regularly serviced.
- All road rules and speed limits must be adhered to at all times.
- Construction staff should only use authorised paths and roads.
- Retain vegetation and soil within construction areas in position for as long as possible, removing it immediately ahead of construction / earthworks in that area.
- All stormwater should be diverted to a point from where the water must be released in a controlled manner that will not initiate or enhance any erosion, and the way stormwater enters a natural waterway is important because high-energy flows can cause serious damage (especially to riparian zones)
- Energy dissipaters and smaller permeable gabion-structures covered with reeds can be constructed at the effluent points of all stormwater.
- If the riparian and/or wetland areas are disturbed during construction it will be re-vegetated using site-appropriate indigenous vegetation and/or seed mixes.

*Timeframes and Deliverables:*

- ii. All above mitigations measures to be implemented continuously throughout the duration of construction.

8.3.7. Biodiversity (Flora): Conservation important species

*To ensure that measures are put in place to prevent/minimize the destruction and damage to conservation important species and protected trees i.e. Aloe komatiensis (VU), and Elaeodendron transvaalense, Dalbergia melanoxylon (NT), Sclerocarya birrea, Boscia albitrunca, Combretum imberbe, Afzelia quanzensis, Philenoptera violacea and Elaeodendron transvaalense, Aloe chabaudii, A. marlothii, A. spicata, A. komatiensis, Eulophia petersii, Stapelia gigantea and Pachypodium saundersii and the trees Spirostachys africana and Berchemia zeyheri due to vegetation clearing and general construction activities and movement of construction vehicles.*

Mitigations:

- A follow-up survey in late summer (February to April) should be performed to search for the VU-listed Sensitive Plant Species No. 3 and the EN-listed *Barleria oxyphylla*, both of which potentially occur within the study area and flower in that period. If a population is confirmed, then a monitoring program needs to be implemented to check the health of these populations each year.
- Each stand, lodge, road or other proposed development areas should be checked by an experienced botanist prior to clearing and all SCC or protected plants should be marked with hazard tape to indicate where development may not take place. These plants must remain in situ.
- A 50 m conservation buffer will be implemented around the two small colonies of *Aloe komatiensis*, and this area should be incorporated into conservation "open space" land.
- Wherever possible, trees taller than 5 m or with a diameter at breast height of 30 cm will be left unharmed, whether protected by law or not.
- A nursery could be constructed on site where naturally occurring plants can be propagated from seed and sold to prospective residents. Special attention could be placed on propagating some of the many aloes or other succulents on site, especially for conservation purposes, such as for *Aloe komatiensis* (VU).
- No material storage or lay down is permitted under trees.
- A perimeter fence or suitable perimeter demarcation (such as steel droppers and hessian rope) must be erected around the construction works area to prevent access to adjacent bush and sensitive environs. Buffer areas and identified sensitive environments must be demarcated as No-go zones, where no construction activities or staff are permitted.
- Vegetation and other site features to be retained will be demarcated with danger tape and / or fencing as required. This barrier will be at least 2m from the stem of the specimen / feature.
- Site demarcations will be established and maintained for the duration of the construction phase. Materials must not blow or move outside of the demarcation line.

- Vehicular or pedestrian access will be prohibited into all natural areas beyond the demarcated boundary of the construction site.
- Regulate and control movement over the site. Personnel, vehicles and equipment to move along designated routes only.
- Construction staff will only use authorised paths and roads.
- Movement of heavy vehicles and machinery will be limited wherever possible, and construction noise reduced wherever possible.
- Any plant species of conservation concern found during the pre-construction site walk through are to be avoided or relocated prior to any site clearance activity taking place.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*
- All plant species of conservation concern are reflected on the final planting plan and are to be demarcated and protected throughout the duration of construction.*
- Demarcation of no-go zones, vegetation and other site features to be in place prior to the pre-site inspection and commencement of any clearing activities. These are to be inspected by the ECO during the pre-site inspection and maintained throughout the duration of construction.*

8.3.8 Biodiversity (Flora): Alien invasive species

*To ensure that measures are put in place to prevent/minimize an increase in exotic vegetation/alien species and bush encroachment into disturbed soils and areas owing to unmanaged cleared and disturbed areas and stockpiles, unrehabilitated areas cleared and disturbed during construction and construction vehicles carrying material and seed onto site.*

Specific mitigation:

- Rehabilitation must be implemented immediately upon completion of construction.
- Alien vegetation will not be allowed to colonise the disturbed riparian and/or wetland areas.
- After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.
- Excess topsoil is to be spread evenly over the area in a manner that blends in with the natural topography.
- Excess stockpiled building material is to be removed completely and the areas levelled.
- All disturbed areas must be levelled and cleared of any foreign material. It is unacceptable to leave foreign material behind with the knowledge that it will become hidden amongst the rejuvenating vegetation with time.
- Construction areas, disturbed sites and obsolete roads should be rehabilitated by breaking the surface crust and erecting earth embankments to prevent erosion, while vegetation should be re-established.
- The construction site will be rehabilitated using appropriate indigenous vegetation. Salvaged vegetation, rather than new planting or seeding, will be used to the extent possible.
- Specifications for soil preparation, endemic plant/seed mixes, fertilizer, and mulching will be provided for all areas disturbed by construction activities.
- A nursery could be constructed on site where naturally occurring plants can be propagated from seed and sold to prospective residents. Special attention could be placed on propagating some of the many aloes or other succulents on site, especially for conservation purposes, such as for *Aloe komatiensis* (VU).
- With the permission of the local authority, seed from appropriate indigenous species may be harvested for later use during rehabilitation. An ecologist should be consulted in this regard.
- Plants that are removed / propagated during construction may be maintained on site and used to re-vegetate the disturbed soil.

- All harvested seeds and seedlings, as well as plants removed for transplanting which are not immediately re-planted, are the responsibility of the Contractor and must be kept under approved nursery conditions.
- Rehabilitated areas will be cordoned off and no grazing or access into these areas is permitted until such time that re-vegetation was found to be successful.
- Rehabilitated areas must be monitored regularly to ensure that revegetation is successful, plants are maintained, weeds and invaders are removed, and that areas where replanting is unsuccessful are replaced.
- All rehabilitation will make use of indigenous plant species, and preferably of species native to the study area and immediate surroundings. The species selected must strive to represent habitat types typical of the ecological landscape prior to construction.
- The contractor must develop a management and monitoring programme for alien and invasive species detailing basic ID information, actions to prevent the establishment of invasive plants and methods of removal of site during construction.
- In order to comply with the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004), all listed invasive exotic plants as indicated in Appendix 1 of the ecology report should be targeted and controlled. This may necessitate the compilation of an alien plant control plan as at least 18 declared invasive species were recorded during fieldwork.
- Alien invasive species within the site will be removed prior to construction-related soil disturbances.
- All sites disturbed by construction activities must be monitored for colonization by invasive alien plant species.
- All alien seedlings and saplings must be removed as they emerge or become evident for the duration of construction.
- Manual / mechanical removal is preferred to chemical control.
- Manufacturer's instructions will be followed when using chemical methods, especially in terms of quantities, time of application etc.
- Only properly trained people will handle and make use of chemicals.
- Herbicide and pesticide use will be limited to non-persistent, immobile products and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- All construction vehicles and equipment, as well as, construction material must be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access to the Reserve.
- Regular weeding of stockpiles must occur to ensure that no invasive or alien plant species are established.
- Topsoil stockpiled for extended periods of time must be revegetated with indigenous grasses.

*Timeframes and Deliverables:*

- i. *All above mitigations measures to be implemented continuously throughout the duration of construction.*

8.3.8. Biodiversity (Fauna): Faunal habitat and connectivity

*To ensure that measures are put in place to prevent/minimize the loss of faunal habitat and ecological connectivity due to vegetation clearing, general construction activities, construction material, litter and inert construction waste.*

Mitigations:

- Vegetation disturbance and removal must be kept to a minimum and the areas monitored to ensure that areas are exposed for brief periods of time only.
- Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. No vegetation outside of the demarcated construction areas may be removed whatsoever.
- A 30 m conservation buffer should be implemented around the two small pans located in the north-western portion of the study area to minimize disturbance on foraging birds and wallowing mammals.

- All arterial roads and buildings / houses / lodges should not be placed adjacent to the KNP fence to minimise noise and visual disturbance. A visual / noise buffer of 10 to 20m should be implemented on the fence line.
- All disturbed areas, construction areas, roads, slopes etc. will be rehabilitated immediately after the completion of construction works.
- Rehabilitation must be implemented immediately upon completion of construction.
- After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.
- All disturbed areas must be levelled and cleared of any foreign material. It is unacceptable to leave foreign material behind with the knowledge that it will become hidden amongst the rejuvenating vegetation with time.
- Construction areas, disturbed sites and obsolete roads should be rehabilitated by breaking the surface crust and erecting earth embankments to prevent erosion, while vegetation should be re-established.
- The construction site will be rehabilitated using appropriate indigenous vegetation as per the approved planting plan.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*

8.3.9. Biodiversity (Fauna): Mortality and injury

*To ensure that measures are put in place to prevent injury and mortality of fauna due to trenches and excavations, persecution and extermination, Solvents, paints, chemicals (poisoning), construction material, litter and inert construction waste and collisions with construction vehicles.*

Mitigations:

- Construction personnel will be briefed on the potential occurrence of protected faunal species, what they look like, and where they are likely to be found. Personnel will be instructed that these species are not to be hurt or destroyed if encountered. This applies specifically to the snakes, lizards and spiders, as these are often perceived to be vermin and pests.
- Personnel must be instructed to report the presence of protected species to the contractor or EO so that arrangements may be made to relocate these species to adjacent natural areas.
- A procedure for dealing with animals encountered on the site will be developed, including dangerous animals and vermin. Where necessary, call in professionals to remove the animals.
- All personnel will be made aware of what the procedures for dealing with animals are. It is the contractor's responsibility to ensure that proper procedures are followed.
- No faunal species may unnecessarily be handled, killed, hunted or harassed.
- No poaching or snaring of any game is permitted. The contractor must regularly undertake checks of the surrounding natural vegetation and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. The contractor must implement fines in this regard.
- Poaching could be a significant threat. If any external labour teams are used during construction, then these teams must preferably be accommodated off site; if this is not possible then teams must be carefully monitored to ensure that no unsupervised access to plant and animal resources takes place.
- After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.
- All disturbed areas must be levelled and cleared of any foreign material. It is unacceptable to leave foreign material behind with the knowledge that it will become hidden amongst the rejuvenating vegetation with time.
- Do not excavate until all required materials / services are on-site, to facilitate immediate laying of services / construction of subsurface infrastructure.

- In general, excavations remaining open overnight must be fenced or equipped with escape ramps to allow trapped animals to escape.
- Preferably undertake clearing activities during the dry season in order to prevent erosion and siltation.
- Excavation of sand to solid ground to be done carefully and appropriate drainage incorporated i.e. sand and debris need to be removed and solid rock preferably exposed to ensure proper binding with concrete material.
- Construction must preferably be extended over rocky substrate to give maximum anchoring opportunity.
- Progressively reinstate of disturbed areas to topsoil profile on an on-going basis, immediately after selected construction activities (e.g. backfilling of a trench) are completed. This allows for passive rehabilitation (i.e. natural re-colonisation by vegetation) to commence.
- Deficiency of backfill material shall not be made up by excavation within the protected area.
- Excavated material is to be stockpiled along a pipeline trench within the working servitude, unless otherwise authorised.
- Subsoil backfill to be followed by topsoil. Compact backfilled trenches to prevent erosion. Subsoil to be compacted to engineer's specification.
- Consider using any excess rocks and boulders that were excavated from the construction site for any erosion protection work, which is required on site. Consider removing the rocks for the packing of gabions at other soil erosion sites.
- Removed soil is to be used to backfill areas where required and excess is to be landscaped into natural looking banks that fit the surrounding topography.
- Monitor backfilled areas for erosion and remediate as required.
- Progressively rehabilitate (rip, scarify and plant) areas as soon as works have been completed.
- All hazardous substances will be used and handled by qualified personnel on bunded surfaces.
- Tanks containing fuel will have lids, which will remain firmly shut.
- All hazardous products dispensed from 200 litre drums will be transferred by pump, and not dispensed by tipping of the drum.
- All machinery and/or vehicles standing in place for more than 2 days will be placed on drip trays.
- No oil, petrol, diesel etc. will be discharged onto the ground.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place within properly equipped, bunded maintenance areas/workshops.
- Gas and liquid fuel will not be stored in the same storage area.
- Petroleum, chemical, harmful and hazardous materials will be stored in enclosed, bunded areas. The bunded areas will be clearly marked.
- The bund will have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- The slab will be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump will be disposed of as hazardous waste. This will be collected by a private contractor as employed by the applicant.
- No smoking is allowed inside the stores or within 3m of a bund.
- The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores.
- Fuels and chemicals may not be stored under trees.
- Exercise extreme care with the handling of diesel and other toxic solvents so that spillage is minimised.
- A spills containment kit must be kept on site at all times for the duration of the construction phase.
- Regularly check vehicles, machinery and equipment operating on site to ensure that none have leaks or cause spills of oil, diesel, grease or hydraulic fluid.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place only within properly equipped, bunded maintenance areas or workshops.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days will be placed on drip trays. The drip trays will be watertight and will be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays will be cleaned before any possible rain events that may result in the drip trays overflowing.

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*Timeframes and Deliverables:*

- i. All above mitigations measures to be implemented continuously throughout the duration of construction.*
- ii. All incidents relating to fauna species encountered on site are to be documented by the EO and submitted to the ECO on a monthly basis.*

8.3.10. Biodiversity (Fauna): Poaching and Smuggling

*To ensure that measures are put in place to prevent the poaching and snaring of fauna on site by construction staff and preventing any opportunity to smuggle poached items out of the site and the adjacent KNP..*

Mitigation:

- No poaching or snaring of any game is permitted. The contractor must regularly undertake checks of the surrounding natural vegetation and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. The contractor must implement fines in this regard.
- Poaching could be a significant threat. If any external labour teams are used during construction, then these teams must preferably be accommodated off site; if this is not possible then teams must be carefully monitored to ensure that no unsupervised access to plant and animal resources takes place.

8.4. Heritage and Cultural Management

8.4.1. Heritage: Discovery of new artefacts

*To ensure that measures are put in place to maximize the positive aspects for the possible discovery of new artefacts.*

Mitigations:

- If archaeological or historical 'chance finds' are encountered, then work in the area must be halted, and a heritage specialist must be called to assess the situation and make recommendations.
- If any fossils are discovered during the construction then a palaeontologist must be called to assess their importance and rescue them if necessary.

*Timeframes and Deliverables:*

- i. All above mitigations measures to be implemented continuously throughout the duration of construction.*
- ii. All work is to be halted immediately and the findings are to be reported to the ECO immediately.*

8.4.2. Heritage: Damage to and destruction of archaeological artefacts

*To ensure that measures are put in place to prevent the damage to and destruction of archaeological, paleontological or historical artefacts unearthed during construction owing to site clearing and general construction activities.*

Mitigations:

- Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a

university or museum notified in order for an investigation and evaluation of the find(s) to take place (cf. NHRA (Act No. 25 of 1999), Section 36 (6)).

- If archaeological or historical 'chance finds' are encountered, then work in the area must be halted, and a heritage specialist must be called to assess the situation and make recommendations.
- If any fossils are discovered during the construction then a palaeontologist must be called to assess their importance and rescue them if necessary.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*
- All work is to be halted immediately and the findings are to be reported to the ECO immediately.*

## 8.5. Visual Impact Management

### 8.5.1. Visual

*To ensure that measures are put in place to mitigate the visual impact of construction, lighting and dust on sensitive visual receptors and conservation areas in the region.*

Mitigations:

- Reduce the construction period through careful logistical planning and productive implementation of resources.
- Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting. No after hour's construction work or work on weekends or public holidays is permitted.
- A dust abatement programme should be used. Standard dust abatement measures include watering or otherwise stabilising soils, covering haul trucks, employing speed limits on unpaved roads, minimising vegetation clearing, and promptly re-vegetated after construction is completed.
- Vegetate or cover long-term stockpiles of soil and fine spoil material to minimise the sources of dust pollution.
- All arterial roads and buildings / houses / lodges should not be placed adjacent to the KNP fence to minimise noise and visual disturbance. A visual / noise buffer of 10 to 20m should be implemented on the fenceline.
- Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works
- Ensure that existing indigenous vegetation is not unnecessarily cleared or removed during the construction period.
- Plan the placement of lay-down areas and any potential temporary construction camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented continuously throughout the duration of construction.*
- Waste disposal receipts from a registered landfill site must be onsite at all times for all construction waste removed from the site. These are to be provided to the ECO on a monthly basis.*

## 8.6. Socio-economic Management

### 8.6.1. Socio-economic: Stimulation of the Economy and creation of employment opportunities

*To ensure that measures are put in place to maximize the positive benefits during the construction phase of the development in terms of the local economy, the creation of short term employment opportunities, ensuring community beneficiation via job creation and skills transfer.*

#### Mitigations:

- Clear criteria for identifying and funding projects and initiatives should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community.
- The Contractor should appoint local employees and implement a 'locals first' policy, especially for semi and low-skilled job categories.
- The local authorities, community representatives, and organisations on the interested and affected party database will be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the Applicant intends following for the construction phase of the project.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- Where feasible, efforts will be made to employ local employees that are compliant with Black Economic Empowerment (BEE) criteria.
- Where feasible, training and skills development programmes for locals will be initiated and maintained throughout the construction phase.

#### *Timeframes and Deliverables:*

- i. All above mitigations measures to be implemented continuously throughout the duration of construction.*
- ii. ECO to include proof of notification of final decision to all I&AP's together with notification of intent to construct.*

### 8.6.2. Socio-economic: Noise, safety and presence of construction workers

*To ensure that measures are put in place to mitigate any undue noise, dust and safety impacts on adjacent landowners, and to address an increase in the number of construction workers in the local community.*

#### Mitigations:

- No staff may be housed on the project site. The operator is responsible for making the necessary arrangements for transporting staff to and from site on a daily basis.
- All Contractors must take all the necessary precautions to ensure that fires are not started as a result of activities on site.
- As per the mitigation mentioned in the Fire Protection Management Plan (Section 12) inclusive of the following:
  - No open fires will be permitted anywhere on site.
  - No incineration or burning of waste will be permitted anywhere on site.
  - Personnel and staff will be provided with gas for cooking purposes in demarcated, safe areas within the construction camp.
  - A fire break will be established and maintained around the perimeter of all construction sites prior to the commencement of construction activities.



- All Contractors will ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced.
- Measures to reduce the risk of fires include clearing working areas and avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, winter months.
- All Contractors shall supply all site offices, kitchen areas, workshop areas, material stores and any other areas identified with suitable, tested and approved fire-fighting equipment.
- All Contractors to provide fire-fighting training to selected construction staff.
- In the event of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate private landowners for any damage caused by the fire. The contractor should bear the costs associated with fighting the fire.
- All Contractors to ensure that the necessary firefighting equipment is on site in accordance with relevant legislative requirements.
- A no employment at the gate policy will be implemented.
- The movement of construction workers on and off the site will be closely managed and monitored by the contractor.
- The contractor must make the necessary arrangements for allowing workers from outside the area to return home over weekends. This would reduce the risk posed by construction workers to local family structures and social networks.

*Timeframes and Deliverables:*

- i. All above mitigations measures to be implemented continuously throughout the duration of construction.*

8.6.3. Socio-economic: Municipal services and Traffic

*To ensure that measures are put in place to prevent any undue traffic on the local roads and to ensure there is no undue noise, dust and safety concerns as a result thereof.*

Mitigations:

- All road rules and speed limits must be adhered to at all times.
- All drivers employed during the construction phase must be briefed and notified of the potential safety risks posed by construction vehicles to members of the local community.
- Contractors will be required to submit a delivery timetable. Strict control is to be exercised over entering and exiting traffic and delivery procedures.
- All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits (50km on surfaced road and 40km on gravel road in the Site).
- A dust abatement programme will be used. Standard dust abatement measures include watering or otherwise stabilising soils, covering haul trucks, employing speed limits on unpaved roads, minimising vegetation clearing, and promptly re-vegetated after construction is completed.
- Dust suppression measures must be implemented such as wetting of the site and access roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.  
Long-term stockpiles of soil and fine spoil material will be vegetated or covered to minimise the sources of dust pollution

*Timeframes and Deliverables:*

- i. All above mitigations measures to be implemented continuously throughout the duration of construction.*

## 8.7. Post-construction Management

### 8.7.1. Rehabilitation

*To ensure that the site is restored to a better natural state than prior to any construction activities*

#### Mitigations:

- Rehabilitation must be implemented immediately upon completion of construction.
- If the riparian and/or wetland areas are disturbed during construction it will be re-vegetated using site-appropriate indigenous vegetation and/or seed mixes.
- After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.
- Excess topsoil is to be spread evenly over the area in a manner that blends in with the natural topography.
- Excess stockpiled building material is to be removed completely and the areas levelled.
- All disturbed areas must be levelled and cleared of any foreign material. It is unacceptable to leave foreign material behind with the knowledge that it will become hidden amongst the rejuvenating vegetation with time.
- Construction areas, disturbed sites and obsolete roads should be rehabilitated by breaking the surface crust and erecting earth embankments to prevent erosion, while vegetation should be re-established.
- Ensure that the construction site is rehabilitated using appropriate indigenous vegetation.
- With the permission of the local authority, seed from appropriate indigenous species may be harvested for later use during rehabilitation. An ecologist should be consulted in this regard.
- Plants that are removed / propagated during construction may be maintained on site and used to re-vegetate the disturbed soil.
- All harvested seeds and seedlings, as well as plants removed for transplanting which are not immediately re-planted, are the responsibility of the Contractor and must be kept under approved nursery conditions.
- Cordon off rehabilitated areas and do not allow grazing or access into these areas until such time that re-vegetation was found to be successful.
- Rehabilitated areas must be monitored regularly to ensure that revegetation is successful, plants are maintained, weeds and invaders are removed, and that areas where replanting is unsuccessful are replaced.

#### *Timeframes and Deliverables:*

- i. All above mitigations measures to be implemented following the completion of construction.*

## 9. OPERATIONAL MANAGEMENT PLAN

The Operational Management Plan (OMP) identifies and addresses the environmental risks and impacts associated with the day-to-day operation of the development. This plan must be adhered to at all times during the operational phase.

It is the Operators responsibility to ensure the implementation of all mitigation measures contained in the OMP in order to prevent/minimize the environmental impacts associated with the operations.

### 9.1 Hydrology

#### 9.1.1. Ground water protection

*To ensure that measures are put in place to prevent the waste of water during operational phase and prevent the pollution and contamination of ground water owing to unmanaged storm water runoff, sewage leaks, spills and discharge, as well as, discharge an spills of solvents, paints ,chemicals, fuel etc.*

#### Mitigations:

- The Water Use license for the property will be in place and up to date for the lifetime of the development.
- All facility staff will be trained in water wise principles, and prudent use of water will be practiced at all times for the lifetime of the development.
- Guests are to be sensitized to water conservation efforts through notices at the lodges.
- A Code of Conduct will be placed in guest rooms advising guests of relevant Reserve rules and regulations.
- Water saving measures will be implemented where possible and practical. The use of draught resistant species in landscaping around the lodges will be planted, irrigation will be done with volumes that can be obtained from the new wastewater treatment works.
- Leak detection systems will be installed during routine maintenance and upgrades and any leaks promptly attended to.
- Water consumption will be monitored on a monthly basis to ensure that there is no undue waste. Keep up to date records of water monitoring.
- All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.
- A storm water management plan will be compiled and adopted within 6 months of the EA being approved.
- All hazardous substances (chemicals, oils, etc.) will be stored in appropriate, tamper proof containers in locked stores.
- Tanks containing fuel will have lids, which will remain firmly shut.
- All hazardous products dispensed from 200 litre drums will be transferred by pump, and not dispensed by tipping of the drum.
- All machinery and/or vehicles standing in place for more than 2 days will be placed on drip trays.
- No oil, petrol, diesel etc. will be discharged onto the ground.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place within properly equipped, bunded maintenance areas/workshops.
- Gas and liquid fuel will not be stored in the same storage area.
- Petroleum, chemical, harmful and hazardous materials will be stored in enclosed, bunded areas. The bunded areas will be clearly marked.
- The bund will have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.

- The slab will be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump will be disposed of as hazardous waste. This will be collected by a private contractor as employed by Operator.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days will be placed on drip trays. The drip trays will be watertight and will be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays will be cleaned before any possible rain events that may result in the drip trays overflowing
- Potable water monitoring will be undertaken on a monthly basis to ensure that the output quality of the water complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request.
- Quality tests on the waste water will be undertaken on a monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*
- Up to date WUL to be provided to the ECO annually during the operational audits.*
- Monthly water consumption monitoring reports are to be provided to the ECO annually during the operational audits.*

9.1.2. Surface water: Ecological and hydrological Function

*To ensure that measures are put in place to prevent disturbance and loss of ecological and hydrological functions along the Crocodile River, Drainage lines and dams.wetlands due to alien invasive vegetation and vegetation clearing.*

Mitigations:

- In order to comply with the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004), all listed invasive exotic plants as indicated in Appendix 1 of the ecology report should be targeted and controlled. This may necessitate the compilation of an alien plant control plan as at least 18 declared invasive species were recorded during fieldwork.
- All disturbed sites will be monitored every 3 months for colonisation by exotics or invasive plants and control these as they emerge.
- Manual / mechanical removal is preferred to chemical control.
- Grounds staff will be trained to recognize and eradicate potential invasive plants.
- Removal of aliens within the area (done in summer) will be done annually until equilibration is reached. This may take several years.
- The alien plant control plan (APCP) will continue to be implemented. This program will include regular inspections and follow-ups.
- All rehabilitation will make use of indigenous plant species, and species native to the study area and immediate surroundings. The species selected will strive to represent habitat types typical of the ecological landscape prior to construction.
- All rehabilitated areas will be monitored annually following the completion of rehabilitation works for failure of vegetation to establish and / or erosion. Immediately implement remedial measures as required.
- Litter in the installed litter traps will not be permitted to build up against structures, plinths and columns and will be removed on a monthly basis or more frequently if required.
- During the construction and operational phases, erosion and siltation measures should be implemented (e.g., the use of temporary silt traps downstream of construction areas).

- Slope/bank stabilisation measures should be implemented, where necessary, to prevent erosion during the operational phase.
- Erosion of the river banks and wetlands edges will be monitored every 3 months. Should any erosion or destabilization be noted, this will be rectified immediately utilizing gabion baskets, reno mattresses or the like.
- No unauthorised access is permitted into buffer areas or any natural areas outside of the facility footprint.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*
- Proof of waste collection and disposal at a registered landfill to be provided to the ECO annually during the operational audits.*

9.1.3. Surface water: Pollution and Contamination

*To ensure that measures are put in place to prevent the pollution and contamination of surface water owing to unmanaged storm water runoff, litter and waste, sewage leaks and spills, discharge and spills of solvents, fuel etc..*

Mitigations:

- Quality tests on the waste water will be undertaken on a monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request.
- All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.
- All vehicles will be regularly serviced so that oil/fuel leaks are limited. Undersides of vehicles will be kept free of oil to limit wash from rivers during use of basic crossings.
- All hazardous substances (chemicals, oils, etc.) will be stored in appropriate, tamper proof containers in locked stores.
- Petroleum, chemical, harmful and hazardous materials will be stored in enclosed, bunded areas. The bunded areas will be clearly marked.
- The bund will have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- The slab will be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump will be disposed of as hazardous waste.
- No oil, petrol, diesel etc. will be discharged onto the ground.
- All hazardous products dispensed from 200 litre drums will be transferred by pump, and not dispensed by tipping of the drum.
- Tanks containing fuel will have lids, which will remain firmly shut.
- Gas and liquid fuel will not be stored in the same storage area.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place within properly equipped, bunded maintenance areas/workshops.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days will be placed on drip trays. The drip trays will be watertight and will be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays will be cleaned before any possible rain events that may result in the drip trays overflowing
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days will be placed on drip trays. The drip trays will be watertight and will be emptied regularly and

the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays will be cleaned before any possible rain events that may result in the drip trays overflowing

- All machinery and/or vehicles standing in place for more than 2 days will be placed on drip trays.
- All recyclables and non-recyclables will be stored in waste cages to prevent spread into the natural environment

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*
- Water quality monitoring reports undertaken every three months are to be provided to the ECO annually during the operational audits.*

## 9.2 Biodiversity management

*To ensure the continued integrity of the natural environment and the conservation of fauna and flora.*

### 9.2.1 Soil: Contamination and Pollution

*To ensure that measures are put in place to prevent contamination and pollution owing to unmanaged storm water runoff, Litter and uncontrolled waste, Sewage leaks and spills, Herbicides, pesticides and fertilisers, Discharge and spill of solvents, paints, chemicals and cleaning products, Discharge and spill of hydrocarbons and fuel.*

Mitigations:

- All hazardous substances (chemicals, oils, etc.) will be stored in appropriate, tamper proof containers in locked stores.
- Petroleum, chemical, harmful and hazardous materials will be stored in enclosed, bunded areas. The bunded areas will be clearly marked.
- The bund will have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- The slab will be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump will be disposed of as hazardous waste. This will be removed by a private contractor as employed by the Parks Management Authority.
- No oil, petrol, diesel etc. will be discharged onto the ground.
- All hazardous products dispensed from 200 litre drums will be transferred by pump, and not dispensed by tipping of the drum.
- Tanks containing fuel will have lids, which will remain firmly shut.
- Gas and liquid fuel will not be stored in the same storage area.
- The maintenance of all vehicles and equipment, including oil and lubricant changes, will only take place within properly equipped, bunded maintenance areas/workshops.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days will be placed on drip trays. The drip trays will be watertight and will be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays will be cleaned before any possible rain events that may result in the drip trays overflowing
- All machinery and/or vehicles standing in place for more than 2 days will be placed on drip trays.
- All recyclables and non-recyclables will be stored in waste cages to prevent spread into the natural environment

- The operational recommendations as per the SMP developed for the site are to be implemented immediately following the completion of construction and throughout the duration of the operational phase.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*
- Operational SMP to be implemented immediately following the completion of construction.*
- All timeframes and deliverables as per the SMP are to be adhered to.*

9.2.2. Soil: Erosion

*To ensure that measures are put in place to prevent erosion owing to compaction by uncontrolled movement of staff and visitors, runoff over exposed or cleared areas that have failed to rehabilitate.*

Mitigations:

- A storm water management plan is to be compiled and adopted within 6 months of the EA being approved and adopted and measures implemented to avoid erosion such as:
  - The accumulation of water on the surface will be prevented. The drainage of the surface will be done in such a way that storm water will be led away quickly and efficiently without any erosion taking place.
  - Surface water or storm water will not be allowed to canalize or be concentrated.
  - Runoff from roads will be managed to avoid erosion and pollution problems.
  - Concentrated storm water flows will be dissipated through energy dissipaters or vegetated areas.
  - Proactively protect steep access roads, cuttings against and other areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible and by taking such other measures as may be necessary to prevent surface water being concentrated in water sources and from scouring the slopes, banks or other areas.
  - All erosion damage will be repaired as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.
- All stormwater should be diverted to a point from where the water must be released in a controlled manner that will not initiate or enhance any erosion, and the way stormwater enters a natural waterway is important because high-energy flows can cause serious damage (especially to riparian zones)
- Energy dissipaters and smaller permeable gabion-structures covered with reeds can be constructed at the effluent points of all stormwater.
- All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.
- During the construction and operational phases, erosion and siltation measures should be implemented (e.g., the use of temporary silt traps downstream of construction areas).
- Slope/bank stabilisation measures should be implemented, where necessary, to prevent erosion during the operational phase.
- All disturbed areas will be rehabilitated with indigenous vegetation. Rehabilitation will commence immediately following construction.
- Storm water management plan to be compiled within the next 6 months
- Rehabilitation of disturbed sites to be undertaken in the next growing season (August/September)
- Movement over the site will be regulated and controlled. Personnel, vehicles and equipment will only move along designated routes.

*Timeframes and Deliverables:*

- i. *All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*
- ii. *Proof of waste collection and disposal to be provided to the ECO annually during the operational audits.*

#### 9.2.3. Air quality

*To ensure that measures are put in place to prevent air pollution by emissions from landscape maintenance vehicles.*

##### Mitigations:

- Site vehicles and equipment will be maintained in an acceptable state of repair.
- Carpools and lift clubs will be encouraged and staff picked up at a central point. Staff will be discouraged from travelling to site in private vehicles.
- Speed control measures will be implemented on site and in the surrounding area to reduce air pollution and animal mortality.
- No waste will be incinerated on site.
- All non-recyclables will be stored at the waste sorting site in waste cages prior to collection from a registered waste collection company/ municipality and transportation to a licenced landfill.

##### *Timeframes and Deliverables:*

- i. *All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*
- ii. *Proof of waste collection and disposal at a registered landfill to be provided to the ECO annually during the operational audits.*

#### 9.2.4. Biodiversity (flora): Loss of vegetation and CBAs/ESAs and disturbance of sensitive habitats

*To ensure that measures are put in place to prevent loss of Vegetation, critical biodiversity areas, ecological support areas as well as, disturbance to sensitive habitats (riparian vegetation) owing to uncontrolled vegetation clearing, encroachment of alien invasives, litter and waste.*

##### Mitigations:

- The measures currently in progress to curb bush-encroachment from the indigenous shrub *Dichrostachys cinerea* should continue to operate.
- No large tree (with a stem diameter exceeding 200mm) will be felled without the permission of the ECO.
- All conserved species and specimens will be suitably protected for the duration of the operational phase.
- No protected trees or plants will be removed without the relevant permits from the local authority.
- Guests and staff will not tamper or remove flora and neither will anyone collect seed from the plants without permission from the local authority.
- Fines will be implemented for the damage or destruction of marked and protected specimens.
- The picking of flowers or removal of plants will be prohibited in the Estate Rules.
- No bush clearing is allowed for firewood or for any other purpose (with the exception of the clearing of invasive species and the control of unnatural bush encroachment).
- Maintenance workers and guests will not trample natural vegetation and work will be restricted to dedicated roads, paths and gardens within the development footprint.
- All stormwater should be diverted to a point from where the water must be released in a controlled manner that will not initiate or enhance any erosion, and the way stormwater enters a natural waterway is important because high-energy flows can cause serious damage (especially to riparian zones)



- Energy dissipaters and smaller permeable gabion-structures covered with reeds can be constructed at the effluent points of all stormwater.
- No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.
- No wood will be collected for firewood or any other purpose.
- No alien plants should be allowed to be planted within any of the stands, lodge site or any other development sites.
- In order to comply with the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004), all listed invasive exotic plants as indicated in Appendix 1 of the ecology report should be targeted and controlled. This may necessitate the compilation of an alien plant control plan as at least 18 declared invasive species were recorded during fieldwork.
- The recommendations as per the APCP developed for the site are to be adhered to at all times.
- All disturbed sites will be monitored every 3 months for colonisation by exotics or invasive plants and control these as they emerge.
- Manual / mechanical removal is preferred to chemical control.
- Grounds staff will be trained to recognize and eradicate potential invasive plants.
- Removal of aliens within the area (done in summer) will be done annually until equilibration is reached. This may take several years.
- All rehabilitation will make use of indigenous plant species, and species native to the study area and immediate surroundings. The species selected will strive to represent habitat types typical of the ecological landscape prior to construction.
- All rehabilitated areas will be monitored annually following the completion of rehabilitation works for failure of vegetation to establish and / or erosion. Immediately implement remedial measures as required.
- All recyclables and non-recyclables will be stored in waste cages to prevent spread into the natural environment prior to being collected by outside contractors

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*
- Proof of waste collection and disposal at a registered landfill to be provided to the ECO annually during the operational audits.*

9.2.5. Biodiversity (flora): Conservation important species

*To ensure that measures are put in place to prevent the destruction and damage to conservation important species and protected trees due to uncontrolled vegetation clearing and access by staff and visitors.*

Mitigations:

- No large tree (with a stem diameter exceeding 200mm) will be felled without the permission of the ECO.
- Selective trimming of branches will be considered before opting to remove any trees.
- All conserved species and specimens will be suitably protected for the duration of the operational phase.
- No protected trees or plants will be removed without the relevant permits from the local authority.
- Residents and staff will not tamper or remove flora and neither will anyone collect seed from the plants without permission from the local authority.
- Fines will be implemented for the damage or destruction of marked and protected specimens.
- The picking of flowers or removal of plants will be prohibited in the Estate Rules.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*

9.2.6. Biodiversity (flora): Alien plant control

*To ensure that measures are put in place to prevent an increase in exotic vegetation/alien species and bush encroachment into disturbed soils and areas in the event that the rehabilitation process is not successful.*

Mitigations:

- No alien plants should be allowed to be planted within any of the stands, lodge site or any other development sites.
- In order to comply with the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004), all listed invasive exotic plants as indicated in Appendix 1 of the ecology report should be targeted and controlled. This may necessitate the compilation of an alien plant control plan as at least 18 declared invasive species were recorded during fieldwork.
- The recommendations as per the A&ICP developed for the site are to be adhered to at all times.
- All disturbed sites will be monitored every 3 months for colonisation by exotics or invasive plants and control these as they emerge.
- Manual / mechanical removal is preferred to chemical control.
- Manufacturer's instructions will be followed when using chemical methods, especially in terms of quantities, time of application etc.
- Only properly trained people will handle and make use of chemicals.
- Herbicide and pesticide use to non-persistent, immobile products will be limited and applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- Grounds staff will be trained to recognize and eradicate potential invasive plants.
- Removal of aliens within the area (done in summer) will be done annually until equilibration is reached. This may take several years.
- All rehabilitation will make use of indigenous plant species, and species native to the study area and immediate surroundings. The species selected will strive to represent habitat types typical of the ecological landscape prior to construction.
- All rehabilitated areas will be monitored annually following the completion of rehabilitation works for failure of vegetation to establish and / or erosion. Immediately implement remedial measures as required.

*Timeframes and Deliverables:*

- i. All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*

9.2.7. Biodiversity (Fauna): Faunal Habitat

*To ensure that measures are put in place to prevent the loss of faunal habitat due to uncontrolled vegetation and bush clearing and access by staff, encroachment of alien invasive species, litter and waste.*

Mitigations:

- No unauthorised access will be permitted to buffer areas or any natural areas outside of the facility footprint.
- The operator will maintain connectivity between ecologically important habitats by retaining natural corridors for the movement of fauna.

- The internal road network will be maintained as gravel tracks that allow for faunal dispersal and minimize fragmentation of ecologically sensitive areas.
- A game / security fence or suitable equivalent will be maintained around the perimeter of the sites. These fences will allow access by small mammals, tortoises etc.
- A management plan should be compiled to effectively manage and control populations of game so as to avoid overgrazing, as is evident in a number of similar developments in the Lowveld.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan.*

9.2.8. Biodiversity (Fauna): Faunal disturbance

*To ensure that measures are put in place to prevent faunal disturbances, displacement of taxa and changes in distribution and abundance due to uncontrolled vegetation and bush clearing and access by staff and park visitors, general operations (activities) of the facility, as well as, noise from staff and vehicles.*

Mitigations:

- All arterial roads and buildings / houses / lodges should not be placed adjacent to the KNP fence to minimise noise and visual disturbance. A visual / noise buffer of 10 to 20m should be implemented on the fence line.
- No unauthorised access will be permitted to buffer areas or any natural areas outside of the facility footprint.
- No bush clearing is allowed for firewood or for any other purpose.
- Maintenance workers and park visitors will not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint
- Noise will be kept to a minimum at night.
- Personnel, vehicles and equipment will move along designated routes.
- Yellow light bulbs will be utilized as they attract fewer insects and arachnids.
- Outside lighting will be directed away (or "inland") from the riparian zone.
- Internal lights will be shielded by blinds/curtains.
- No feeding of any animals is permitted anywhere.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan*

9.2.9. Biodiversity (Fauna): Injury and mortality

*To ensure that measures are put in place to prevent injury and mortality of fauna due to persecution and extermination, solvents, paints, chemicals and cleaning products (poisoning), litter and waste (suffocation).*

Mitigations:

- Personnel and residents will be briefed on the potential occurrence of protected faunal species, what they look like, and where they are likely to be found. Personnel will be instructed that these species are not to be hurt or destroyed if encountered. This applies specifically to the snakes, lizards, chameleons and spiders, as these are often perceived to be vermin and pests.
- Personnel and residents will be instructed to report the presence of protected species to the Operator so that arrangements may be made to relocate these species to adjacent natural areas.
- A procedure for dealing with animals encountered on the site, including dangerous animals and vermin will be developed. Where necessary, call in professionals to remove the animals.

- All personnel and residents will be aware of what the procedures for dealing with animals are. It is the operator's responsibility to ensure that proper procedures are followed. In this regard, Environmental awareness training will be conducted annually.
- Pets and livestock are not allowed on site.
- No poaching or snaring of any game is permitted. Reserve Management must implement fines in this regard.
- Residents will be briefed on the dangers of feeding wildlife, and will be discouraged from feeding any animal. Residents will also be informed of recommended measures to secure food and food waste from animal scavengers.
- All food and waste storage areas will be properly secured against animal scavengers at all times.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan*

9.2.10. Biodiversity (Fauna): Poaching

*To ensure that measures are put in place to prevent in the poaching and snaring of faunal species by staff.*

Specific mitigation:

- No poaching or snaring of any game is permitted. HOA will implement fines in this regard.
- The Applicant will undertake bimonthly checks of the surrounding natural vegetation and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. Must implement fines in this regard.

**9.3 Visual Impact Management**

9.2.1. Visual

*To ensure that measures are put in place to mitigate the visual impact on sensitive visual receptors in close proximity and within the region, as well as, the visual impact due to safety and security lightening.*

Mitigations:

- Natural vegetation will be retained and maintained in all areas outside of the development footprints.
- The general appearance of all of the sites as a whole will be maintained, including roads and servitudes.
- Down lighting will be utilized.
- Rehabilitate all disturbed areas, construction areas, roads, slopes etc.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan*

**9.4 Socio-economic Management**

*To mitigate the socio-economic impacts associated with the operation of the facility, specifically pertaining to job creation, employment and noise.*

9.3.1. Socio-economics: Stimulation of the Economy and creation of employment opportunities

*To ensure that measures are put in place to maximize the positive benefits of the development in terms of the local economy, the creation of long term employment opportunities and opportunities for SMME's*

Mitigations:

- The Residents is responsible for making the necessary arrangements for transporting staff to and from site on a daily basis.
- Where feasible, efforts will be made to employ local employees that are compliant with Black Economic Empowerment (BEE) criteria.
- Where feasible, training and skills development programmes for locals will be initiated and maintained throughout the operational phase.
- The recruitment selection process will seek to promote gender equality and the employment of women wherever possible.
- Clear criteria for identifying and funding projects and initiatives will be identified. The criteria will be aimed at maximising the benefits for the community as a whole and not individuals within the community.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan*

9.3.2. Socio-economics: Land uses

*To ensure that measures are put in place to ensure that adjacent land uses and activities are not negatively impacted upon.*

Specific mitigation:

- Noisy activities will be conducted during daylight hours only.
- All neighbours will be notified ahead of time of any noisy activities that are to take place.
- Speed limits on all roads are to be strictly adhered to at all times. Fines are to be implemented in this regard.
- The HOA must regularly undertake checks of the surrounding natural vegetation and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. The contractor must implement fines in this regard.
- Vehicles of outside contractors should be checked when entering and exiting the site.

*Timeframes and Deliverables:*

- All above mitigations measures to be implemented throughout the duration of the developments operational lifespan*

9.3.3. Socio-economics: Municipal Services and Traffic

*To ensure that measures are put in place to prevent any undue traffic on the local roads and to ensure there is no undue noise, dust and safety concerns as a result thereof.*

Specific mitigation:

- Speed limits on all roads will be strictly adhered to at all times. Fines will be implemented in this regard.
- All vehicles will be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits (50km on surfaced road and 40km on gravel road in the Nature Estate)
- Carpools and lift clubs must be encouraged and staff picked up at a central point. Staff must be discouraged from travelling to site in private vehicles.

*Timeframes and Deliverables:*

- i. All above mitigations measures to be implemented throughout the duration of the developments operational lifespan*

## SECTION C: SPECIAL MANAGEMENT PLANS

### 10. WASTE MANAGEMENT PLAN

A Waste Management Plan (WMP) outlines measures and procedures for the appropriate handling, storage and disposal of wastes generated during the entire project lifecycle (pre-construction, construction and operational phases).

The objectives of the WMP are to:

- Formalise waste handling, transfer and disposal activities associated with waste from the resort;
- To prevent inappropriate management of waste and associated risk of pollution of the environment;
- To facilitate waste minimisation entailing avoidance, reduction, reuse, recycling or treatment before disposal;
- To streamline waste segregation, storage, and disposal and promote resource recovery from waste;
- To contain, control and dispose of waste in accordance with the required waste management practices (e.g. waste segregation);
- To define responsibility for waste management at the various levels of operation associated with the development;
- To provide a framework for the selection of waste management service providers in line with cradle to grave principles.
- To provide actions and guidelines to ensure that waste management is undertaken in line with:-
  - Existing South African waste management legislation, waste management guidelines and policies; and international best practise (Waste Hierarchy).

In accordance with international trends, the management of all waste streams that will be generated at the lodges should demonstrate support for the Hierarchy of Waste Management (HWM), which aims to promote the re-use and recycling of wastes, giving effect to the concept of 'cradle-to-cradle' waste management. The aim of the Waste Management Plan is to minimize the amount of waste disposed of, and as such, a waste hierarchy is followed: Prevent, Minimise, Reuse, Recycle, Recover and then Dispose.

As this section forms part of the EMP, the overall responsibility of ensuring compliance with the Waste Management Plan ultimately lies with the Applicant.

#### 10.1. Planning phase

##### 10.1.1. Permits and permissions

- In order to comply with legislation, the following storage volumes may not be exceeded without a Waste Management License
  - General Waste: - 100m<sup>3</sup>
  - Hazardous Waste: - 35m<sup>3</sup>
- Finalize agreements and programmes with the Local Municipality regarding the disposal of domestic waste at the nearest landfill, particularly in terms of initial cleanup volumes (existing dumping) required for this rehabilitation project.

#### 10.2. Construction Phase

##### 10.2.1. Good management practices

- Ensure that all personnel are familiar with waste management requirements on site;

- An adequate number of 'scavenger proof' refuse bins must be provided at the construction sites. Receptacles must be equipped with a closing mechanism to prevent their contents from blowing out and from scavenging animals.
- Ensure that personnel make use of the receptacles provided;
- Empty receptacles for disposal at least once per week, but more often if required;
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- If there is a shortage of space and not enough room for multiple skips the principal contractor should employ a licensed waste management company to deal with waste,
- Onsite recycling containers and/or areas must be clearly marked.
- The working areas and storage sites must be cleared of litter on daily basis. The contractor will maintain 'good housekeeping' practises as ensure that all work sites and construction camp are kept tidy and litter free.
- Dispose of solid waste at the nearest, applicably licensed recycling centre, salvage yard or landfill site;
- All waste must be transported in an appropriate manner (e.g. plastic rubbish bags) to the approved waste site.
- The contractor may not dispose of any waste and / or construction debris by burning, or by burying.
- Safe disposal waybills for all waste and material loads removed from the site must be kept on file.
- Complete waste transfer notes before any waste leaves the site.
- Ensure all waste service providers have a valid waste carrier's registration certificate.

### 10.2.2. Non-hazardous construction waste

- Segregate different types of waste as they are generated using different skips where possible (General wastes, non-hazardous wastes and hazardous wastes). At a minimum there should be skips for wood, metals, inert and mixed materials,
- Collect maintenance and domestic refuse (scrap metal, packaging materials etc.) in appropriate bins for recycling or send to landfill for disposal in an approved manner.
- Recycle suitable spoil, demolition materials, all pruning, and surplus construction material arising from the works on site to avoid the need to transport materials.
- Metal waste has commercial value and is to be sold on to a scrap metal contractor for recycling purposes.
- Wood waste includes oversized cable reels, wooden packaging boxes, palletes and other wood materials. Palletes in good condition may be reused and are to be returned to materials suppliers on a return system – this will need to be negotiated with the relevant suppliers. Damaged wood waste is to be donated to local communities.

### 10.2.3. Hazardous construction waste

Hazardous waste can be defined as waste, which can, even in low concentrations, have significant adverse effects on public health and/ or the environment.

- The disposal of hazardous waste must comply with all relevant Regulations, Norms and Standards pertaining to waste classification in order to ensure disposal at the correct landfill class.
- Avoid the generation of hazardous waste wherever possible through procurement processes e.g. purchasing of less toxic / environmentally friendly products.
- Petroleum, chemical, harmful and hazardous waste must be stored in enclosed, bunded areas. The bunded areas shall be clearly marked. Such waste shall be disposed of off-site at a licensed hazardous waste disposal site.
- Forecast and prevent potential situations in which accidents and spills can mitigate against unwarranted waste emissions.



- Hazardous waste may be temporarily stored on site in vessels equipped with secondary containment structures to prevent contamination of soil, groundwater and surface waters due to accidental spills or releases.
- Hazardous waste must be separated at source from the general waste stream. Where possible, all hazardous wastes, including hydrocarbon wastes such as oils, should be recycled either by a recognized recycling company or returned to the supplier.
- All hazardous wastes that cannot be reused or recycled should be labelled correctly and stored in the designated waste storage area until collected for correct disposal.
- Load and unload any solid hazardous materials in a manner that reduces potential spills.
- Ensure that a spills containment kit is available on site and that personnel are trained in spills clean up procedures.
- No spills may be hosed down into a storm water drain or sewer, or into the surrounding natural environment.
- Immediately clean leaks and spills of hazardous substances and dispose of as hazardous waste. The EO and ECO should be notified immediately if a hazardous waste spill occurs, to ensure proper clean-up and disposal.
- Any contaminated soil / substrate must be removed and stored in a skip until it can be disposed of at a permitted disposal site.
- Report major spills to the regional DWS office.
- Hazardous waste disposal must be undertaken by an approved waste contractor, and waste must be disposed of at a permitted hazardous waste disposal facility on a regular basis (H:H or H:h – landfill operator to be contacted for verification). Ensure that all transportation and disposal / recovery permits and licenses are held by the service provider.
- All hazardous waste transported from the site must be reconciled with safe disposal certificates to be issued by the waste management service provider. These should be kept on file for inspection by the environmental authorities if required.

#### 10.2.4. Sewage and effluent

- Ensure that sufficient numbers of mobile toilets are available on site and that these are located beyond the buffer zones.
- The location of chemical toilets or soak-aways should be put as far as possible from any wetland, watercourse or drainage line.
- Ensure that mobile toilets are maintained in a sanitary and operational state. Service slips need to be kept on file for verification
- Waste from ablution facilities must be regularly removed and care must be taken to ensure that there is no spillage.

### 10.3. Operational Phase

#### 10.3.1. Waste management areas

- Waste must be transported from the point of generation directly to the centralised waste storage area where it can be safely stored prior to offsite disposal.
- The operator must obtain consent / confirmation from the nearest landfill (or similar) to dispose their non-recyclable waste at the facility.
- Duty of care obligations should be adopted and enforced, meaning that only reputable waste transport companies and permitted waste disposal facilities are used.
- Recordkeeping of the waste types and quantities must be as accurate as possible. Landfill waybills must be obtained and kept on file.
- Arrangements must be in place for the regular maintenance and cleaning of waste/recycling storage areas.

10.3.2. Landscape and organic waste

- Develop a comprehensive system for waste separation at the relevant generation points.
- Separate waste into items, which can be reused, composted, or recycled, and send the remaining portion to the general waste stream for disposal at landfill.

10.3.3. General waste

- Adopt waste reduction procurement philosophy, also known as "Greener purchasing", "Pre-cycling", or "eco/green procurement".
- Staff should be made aware of the aim to recycle waste by means of posters, training and staff meetings.
- Visitors/residents should be made aware of the recycling programmes by means of recycling in strategic locations.
- Implement a 'sort-at-source' approach to waste management, and separate recyclable waste from non-recyclable waste;
- Separate viable recyclable components from the general waste stream prior to disposal. Recyclables that are typically recovered from general waste include metals, plastics, glass, and paper / cardboard.
- Waste storage receptacles must be covered or lidded to prevent scavenging by wild animals and vermin, and to prevent waste from being windblown into the adjacent sensitive areas.
- Undertake regular clean-ups and litter removal across the entire site;
- Skips / receptacles should be emptied on a weekly basis to prevent the formation of odour.
- Ensure that the waste is removed by a suitably qualified waste service provider and that the relevant documentation with proof of proper waste disposal is available.
- A manifest indicating the volume (monthly) of disposed general waste should be kept on file.
- A community group could be tasked with the continuous cleaning of the rehabilitated area.

10.3.4. Hazardous waste

- Not relevant

10.3.5. Sewage and effluent

- Not relevant.

## 11. STORM WATER MANAGEMENT PLAN

The purpose of the Storm Water Management Plan is to provide general guidelines and principles for the management of storm water during both the construction and operational phase. This is done to ensure minimal erosion and ecological damage as a result of increased volumes of storm water and runoff from hard surfaces (roofs, roads, paving etc.).

As this section forms part of the EMP, the overall responsibility of ensuring compliance with the Storm Water Management Plan ultimately lies with the applicant.

### 11.1. Construction Phase

Implement and maintain a storm water management system for the facility. In general, the following measures are recommended:

- The protective buffer around the watercourses must be respected as it acts as a trap for sediment and contaminants. Measures must be put in place around sensitive areas to protect these from sediment and contaminants.
- Erosion control measures must be put in place to minimise erosion at excavation / clearing sites or aggregate storage sites. Earth moving construction activities to take place in dry season as far as possible.
- Vegetation essential for construction must only be removed and do not allow any disturbance to the adjoining natural vegetation cover.
- Measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation.
- The accumulation of water on the surface must be prevented. The drainage of the surface must be done in such a way that storm water will be led away quickly and efficiently without any erosion taking place.
- Surface water or storm water is not permitted to canalize or be concentrated.
- Storm water outflows must not be allowed to enter directly into watercourses.
- Runoff from roads must be managed to avoid erosion and pollution problems.
- Erosion control barriers must be put in place and maintained as appropriate to prevent sedimentation.
- Storm water or contaminated water is not allowed to directly enter any watercourse.
- Waste traps will be installed to catch litter conveyed by surface runoff.
- All waste traps within the storm water system will be emptied / cleaned regularly to ensure their efficient functioning.
- Concentrated storm water flows must be dissipated through energy dissipaters or vegetated areas.
- Proactively protect steep access roads, cuttings against and other areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible and by taking such other measures as may be necessary to prevent surface water being concentrated in water sources and from scouring the slopes, banks or other areas.
- All erosion damage will be repaired as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.
- The stabilisation of disturbed areas, access roads and / or steep cuttings is very site specific and could include reno mattresses, mitre drains, drainage pipes, benches, gabions; scarifying (ripping) areas along the natural contours or packing branches and rocks.
- All rehabilitated areas will be monitored for at least a year following the completion of rehabilitation works for failure of vegetation to establish and / or erosion. Immediately implement remedial measures as required.

## 11.2. Operational Phase

Maintain the storm water management system for the facility on an ongoing basis and ensure that this is always in good working order. The following is of relevance:

- All activities that affect surface drainage will be designed so as to ensure that storm water runoff does not lead to excessive surface erosion problems on the site.
- Porous paving surfaces must be used in place of hard paved surfaces in order to promote and encourage the infiltration of storm water.
- The protective buffer around the watercourses must be respected as it acts as a trap for sediment and contaminants. Measures must be put in place around sensitive areas to protect these from sediment and contaminants.
- Measures must be in place to control the flow of excess water so that it does not impact on the surface vegetation.
- The accumulation of water on the surface must be prevented. The drainage of the surface must be done in such a way that storm water will be led away quickly and efficiently without any erosion taking place.
- Surface water or storm water is not permitted to canalize or be concentrated.
- Runoff from roads must be managed to avoid erosion and pollution problems.

- Erosion control barriers must be established and maintained as appropriate to prevent sedimentation.
- Prevent storm water or contaminated water directly entering any watercourse.
- Waste traps will be installed to catch litter conveyed by surface runoff.
- All waste traps within the storm water system will be emptied / cleaned regularly to ensure their efficient functioning.
- Dissipate concentrated storm water flows through energy dissipaters or vegetated areas.
- All erosion damage will be repaired as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.
- All rehabilitated areas will be monitored for at least a year following the completion of rehabilitation works for failure of vegetation to establish and / or erosion. Immediately implement remedial measures as required

## 12. FIRE PROTECTION MANAGEMENT PLAN

The National Veldt and Forest Fire Act (Act No. 101 of 1998) deals with the prevention and combat of veld, forest and mountain fires throughout South Africa, and should be adhered to at all times. This Act provides guidelines regarding fire break preparation and maintenance, the equipment needed for fighting fires and availability of personnel during fire emergencies, the roles and responsibilities of persons and officials during fire emergencies, the offences and penalties, as well as the powers of registered fire protection officers and law enforcement.

In terms of the National Veldt and Forest Fire Act 101 of 1998 there is a restriction on the making of fires, in that no fires may be made without a permit.

Both the National Environmental Management (NEMA): Protected Areas Act, 57/2003 and National Veld Forest Fire Act are very clear on the penalties (fines, imprisonment or both) and/or disciplinary action which may be imposed on persons who are found guilty of not complying with the laws stipulated.

### 12.1. Construction Phase

The following is applicable during the construction phase:

- All Contractors must take all the necessary precautions to ensure that fires are not started as a result of activities on site.
- No open fires will be permitted anywhere on site.
- No incineration or burning of waste will be permitted anywhere on site.
- Provide personnel and staff with gas for cooking purposes in demarcated, safe areas within the construction camp.
- All Contractors to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced.
- Measures to reduce the risk of fires include clearing working areas and avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, winter months.
- All Contractors shall supply all site offices, kitchen areas, workshop areas, material stores and any other areas identified with suitable, tested and approved fire-fighting equipment.
- All equipment shall be maintained in good operating order.
- All Contractors to provide fire-fighting training to selected construction staff.
- All Contractors to ensure that the necessary firefighting equipment is on site in accordance with relevant legislative requirements.

### 12.2. Operational Phase

The following general fire management actions apply throughout the operational phase of the facility:

- No incineration or burning of waste is permitted on the site.
- Operator is to ensure that the necessary firefighting equipment is on site in terms of relevant legislative requirements.
- Staff members or the persons who give the instruction to light a fire without complying with the abovementioned regulations will be subjected to disciplinary action and may also face criminal charges in terms of the Veld and Forest Fire Act 101 of 1998.

## REFERENCES

*Cultural Heritage Impact Assessment: Phase 1 Investigation f for a Basic Assessment of the Proposed Development of a Nature Estate for Leisure Purposes and a Lodge, North of Komatipoort, Nkomazi Local Municipality, Ehlanzeni District Municipality, Mpumalanga Province* FP Coetzee, 2020.

*Environmental Best Practice Specifications: Construction for Construction Sites, Infrastructure Upgrades and Maintenance Works.* Department of Water Affairs and Forestry, 2005.

*Tenbosch- komatipoort Wetland and Riparian Zone Identification and Assessment.* Wet-earth Eco-specs, 2020

*Tenbosch Terrestrial Ecological Assessment.* Ecorex Consulting Ecologist CC, 2020

## APPENDICES

*Appendix A: Curriculum Vitae of the Environmental Assessment Practitioner*

*Appendix B: Layout Map*

APPENDIX A: CURRICULUM VITAE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

CURRICULUM VITAE  
**BRYONY PAIGE VAN NIEKERK**

**PERSONAL INFORMATION**

Full Name: Bryony Paige van Niekerk  
 Date of Birth: 1987-06-21  
 Gender: Female  
 Identity number: 8706210115089  
  
 Nationality: South African  
 Race: White  
 Language(s): English and Afrikaans (written and spoken)  
 Marital Status: Single  
 Dependents: 0  
 Drivers License: Code 08  
 Residential Address: The Globe, Paramount Estate, Monroe Close, Silver lakes, Pretoria  
 Postal Address: As above  
 Telephone number: 074 818 9788  
 Email address: bryony@nuleafsa.co.za

**FORMAL EDUCATION**

Date	Qualification	Institution
2005	Grade 12	Pretoria High School for Girls
2012	Bachelor of Science in Natural Sciences: Chemistry and Zoology Stream	University of South Africa
2015	Bachelor of Science Honours in Environmental Management	University of South Africa

**TECHNICAL SKILLS**

Software	Skill level
MS Word	proficient
MS Excel	proficient
MS Outlook	proficient
MS PowerPoint	proficient
Internet operation and navigation	proficient
CorelDRAW	proficient



**BRIEF SUMMARY OF CORE COMPETENCIES**

Bryony has an Honors Degree in Environmental Management, and 5 years of experience. Bryony has specialized in Environmental Planning and Management, with specific expertise in Bioregional Planning, Environmental Impact Assessments and Environmental Management Planning.

**CAREER HISTORY**

<b>Date</b>	<b>Company / Organisation</b>	<b>Position</b>
2015 - present	Nuleaf Planning and Environmental (Pty) Ltd	Environmental Practitioner
2013-2014	Ecotourism Solutions	Project Administrator

**RELEVANT WORK EXPERIENCE (KEY PROJECTS)**

(All projects in South Africa unless otherwise stated)

COMPANY	YEAR	PROJECT NAME	CLIENT	DESCRIPTION OF DUTIES
Nuleaf Planning & Environmental	2020	Proposed Amendment to the Vredenburg Landfill site (VIA)	JG Afrika	Consultant
Nuleaf Planning & Environmental	2019-2020	Proposed Expansion to River Lodge and WWTW Upgrades in Kapama Private Game Reserve	Kapama Game Reserve Pty Ltd	Environmental practitioner and Project Leader. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2019-2020	Proposed Expansion to the Runway in Lapalala Wilderness Reserve and the construction of an access road.	Lapalala Wilderness Pty Ltd	Environmental practitioner and Project Leader. Responsible for compilation of the Report and management of specialists
Nuleaf Planning & Environmental	2019-2020	Proposed Expansion to Pestana Kruger Lodge.	Pestana Kruger Lodge	Environmental practitioner and Project Leader. Responsible for compilation of the Report and management of specialists
Nuleaf Planning & Environmental	2019	Application for Environmental Authorization in terms of S24G for Tourist Lodges and Management Infrastructure within Kapama Private Game Reserve	Kapama Game Reserve Pty Ltd	Environmental practitioner and Project Leader. Responsible for compilation of the Report and management of specialists
Nuleaf Planning & Environmental	2018-2019	Proposed Expansion to Founders Lodge in Lapalala Wilderness Reserve	Lapalala Wilderness Pty Ltd	Environmental Practitioner and Project Leader. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2018-2019	Sekhukhune District: Bioregional Plan	Limpopo Province Department of Economic Development, Environment and Tourism	Team Leader, Project coordinator. Compilation of the Bioregional Plan
Nuleaf Planning & Environmental	2018-2019	Capricorn District: Bioregional Plan	Limpopo Province Department of Economic Development, Environment and Tourism	Team Leader, Project coordinator. Compilation of the Bioregional Plan
Nuleaf Planning & Environmental	2018-2020	Lapalala Custodians	Various	Environmental Control Officer. Compilation of construction audit

## DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

Nuleaf Planning & Environmental	2018	Proposed Expansion to River Lodge, Kapama Private Game Reserve	Kapama Game Reserve Pty Ltd	reports submitted to LEDET Environmental practitioner and Project Leader. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2018	Proposed Amendment to the Custodian Sites in Lapalala Wilderness Reserve	Lapalala Wilderness Pty Ltd	Environmental Practitioner. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2018	Proposed Establishment of a Staff Village in Lapalala Wilderness Reserve	Lapalala Wilderness Pty Ltd	Environmental Practitioner and Project Leader. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2018	Expansion to Ngwenya Lodge	Ngwenya Lodge (3&4) C/O Vacation Recreational Services	Environmental Practitioner. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2018	Ngwenya Waste Water Treatment Facility	Ngwenya Lodge (3&4) C/O Vacation Recreational Services	Environmental Practitioner. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2017-2018	Proposed Establishment of an Aquaculture Development Zone in Amatikulu, KZN	Department of Agriculture, Forestry and Fisheries	Environmental Practitioner. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2017	Tenbosch Lodge / Resort Basic Assessment Process	Roosmaryn Boerdery (Edms) Bpk	Environmental Practitioner. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2017	Vhembe District: Bioregional Plan	Limpopo Province Department of Economic Development, Environment and Tourism	Team Leader, Project coordinator. Compilation of the bioregional plan, project management and

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Nuleaf Planning & Environmental	2017	Application for Proclamation as Protected Area: Lapalala Wilderness Private Game Reserve	Lapalala Wilderness Pty Ltd	hosting of workshops Environmental Practitioner. Compilation of application and motivational report.
Nuleaf Planning & Environmental	2017	Application for Proclamation as Protected Area: Kapama Private Game Reserve	Kapama Private Game Reserve	Environmental Practitioner. Compilation of application and motivational report.
Nuleaf Planning & Environmental	2017	Moses Kotane District Municipality: Integrated Environmental Management Plan	Moses Kotane District Municipality	Environmental Practitioner & Project Leader. Compilation of the IEMP
Nuleaf Planning & Environmental	2017	Amendment: Hans Hoheisen Wildlife Research Station	University of Pretoria	Environmental Practitioner
Nuleaf Planning & Environmental	2016	Basic Assessment for the proposed Lapalala Custodian Sites and Management Infrastructure	Lapalala Wilderness Pty Ltd	Environmental Practitioner and Project Leader. Responsible for compilation of the Report and overall project management
Nuleaf Planning & Environmental	2016	Monate Game Reserve Application for Proclamation	Monate Game Reserve	Environmental Practitioner
Nuleaf Planning & Environmental	2016	Section 24G Application for the Lapalala Private Game Reserve	Lapalala Private Game Reserve	Environmental Practitioner
Nuleaf Planning & Environmental	2015-2016	EIA for the proposed Kaalspruit Open Space Project, Tembisa, Gauteng	Silverhorns Consulting	Environmental Practitioner. Responsible for compilation of the Report
Nuleaf Planning & Environmental	2015-2016	Basic Assessment for the proposed Sebele Game Lodge	Barokologadi Community Property Association	Environmental Practitioner. Responsible for compilation of the Report and management of specialists.
Nuleaf Planning & Environmental	2015	Spa at Bakubung Lodge	Pilanesberg Resorts Pty Ltd	Environmental Control officer
Nuleaf Planning & Environmental	2015	Various VIAs	Exheredo	Consultant
Nuleaf Planning & Environmental	2015	Basic Assessment for the proposed Bhundu Inn Hotel	Paul Mojapelo	Environmental Practitioner

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Nuleaf Planning & Environmental	2015-2016	Mopani District: Bioregional Plan	Limpopo Province Department of Economic Development, Environment and Tourism	Project coordinator
Nuleaf Planning & Environmental	2014	Basic Assessment for the proposed spa at Bakubung Lodge, Pilanesberg Game Reserve	Pilanesberg Resorts Pty Ltd	Environmental Practitioner
Nuleaf Planning & Environmental	2014-2015	Basic Assessment for the proposed Malelane Safari Lodge, Kruger National Park	Malelane Safari Resort Investments Pty Ltd	Environmental Practitioner
Nuleaf Planning & Environmental	2014-2015	Basic Assessment for the proposed upgrades to the Maropeng Interpretation Centre	GAPP	Environmental Practitioner

APPENDIX B: LAYOUT MAP



