

Proposed Tuna Park Open Space Project, City of Ekurhuleni Municipality, Nigel,  
Gauteng

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

Compiled by:



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On behalf of:

City of Ekurhuleni

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## ACRONYMS AND ABBREVIATIONS

BA:	Basic Assessment
BAR:	Basic Assessment Report
CDF:	Conservation Development Framework
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
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
WHO:	World Health Organisation

## 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).

**CONTENTS**

ACRONYMS AND ABBREVIATIONS ..... i

GLOSSARY OF TERMS ..... ii

CONTENTS ..... v

APPENDICES ..... vi

SECTION A: GENERAL ..... 7

1. INTRODUCTION ..... 7

2. DETAILS AND EXPERTISE OF EAP ..... 7

3. BACKGROUND ..... 8

4. ROLES AND RESPONSIBILITIES ..... 8

4.1 Parties responsibilities ..... 8

4.2 Contractors Environmental Method Statement ..... 10

5. COMPLIANCE ..... 11

5.1 Environmental monitoring and auditing ..... 11

5.2 Monitoring Methods ..... 11

5.3 Timeframes/ Frequency ..... 11

5.4 Non-compliance ..... 11

5.5 Non-conformance ..... 12

5.6 On-site documentation ..... 12

6. ENVIRONMENTAL AWARENESS ..... 13

SECTION B: MANAGEMENT PLANS ..... 14

7. PLANNING AND DESIGN MANAGEMENT PLAN ..... 14

7.1 Planning and compliance ..... 14

7.2 Development footprint planning ..... 16

7.3 Visual environment planning ..... 16

7.4 Socio-economic planning ..... 17

8. CONSTRUCTION MANAGEMENT PLAN ..... 19

8.1 Pre-construction ..... 19

8.2 Site establishment ..... 20

8.3 Materials management ..... 23

8.4 Stockpiles, storage and handling ..... 24

8.5 Erosion control ..... 25

8.6 Alien plant control ..... 26

8.7 Vehicles and equipment management ..... 26

8.8 Socio-economic management ..... 27

8.9 Fire management ..... 28

8.10. Rehabilitation ..... 28

9. OPERATIONAL MANAGEMENT PLAN ..... 29

9.1 Biodiversity management ..... 29

9.2 Materials management ..... 31

9.3 Erosion control ..... 32

9.4 Vehicles and equipment management ..... 32

9.5 Socio-economic management ..... 32

9.6 Fire management ..... 33

SECTION C: SPECIAL MANAGEMENT PLANS ..... 34

10. WASTE MANAGEMENT PLAN ..... 34

11. STORM WATER MANAGEMENT PLAN ..... 37

11.1	Planning Phase .....	37
11.2	Construction Phase.....	38
11.3	Operational Phase .....	39
12.	FIRE PROTECTION MANAGEMENT PLAN.....	39
12.1	Construction Phase.....	40
12.2.	Operational Phase .....	40
	REFERENCES .....	41
	APPENDICES.....	42
	PERSONAL INFORMATION .....	43
	FORMAL EDUCATION.....	43
	TECHNICAL SKILLS.....	44
	BRIEF SUMMARY OF CORE COMPETENCIES .....	44
	CAREER HISTORY .....	44
	RELEVANT WORK EXPERIENCE (KEY PROJECTS) .....	45

## 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

Environmental Assessment Practitioner	NuLeaf Planning and Environmental (Pty) Ltd.
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Expertise	Landscape Architect registered with SACLAP

Please refer to Appendix A for EAP curriculum vitae.



### 3. BACKGROUND

The affected property consists of natural wetland, public open space, sports fields and sports facilities in Cerutiville and is adjacent to Mackenzieville and Alra Park, situated in Nigel, within the city Ekurhuleni Municipality, Gauteng.

The proposed scope of the project will include the design, development and open space rehabilitation of Tuna Park, Nigel Gauteng. This will include the clean-up and rehabilitation of the wetland and its surrounds, as well as, improving the recreational quality of the park through the development of a community park that will incorporate pedestrian pathways, sports fields and bridges – this will guide the rehabilitation, landscape design and open space optimisation of the existing Tuna Park.

Refer to Appendix B for an example of a typical layout of the proposed infrastructure.

### 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 compliance on a day-to-day basis on the construction site.</li> <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</li> </ul> </li> </ul>

**DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME**

	<p align="center">action plan and way forward.</p> <ul style="list-style-type: none"> <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> <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</li> </ul>

	Authority, including performance rating, recommendations and reports of non-compliance.
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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 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 EMPr.

## **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 timeframe will result in written warning being issued.
- Failure to comply / respond to warnings within a specified timeframe 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 timeframe 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.

## 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 Planning and compliance

*To comply with regulations pertaining to surface water, ground water and protected species.*

##### 7.1.1 Ground water

###### General mitigation:

- Obtain a Water Use License for listed activities (water abstraction, irrigation with purified effluent and overland discharge of purified effluent) if required.
- No purified effluent may be discharged directly into any watercourse without the appropriate Water Use Licence in place.

##### 7.1.2 Surface water

###### General mitigation:

- Obtain a Water Use License for listed activities (impeding or diverting the flow and alteration of bed and banks).
- Ensure that hydrological and wetland designs, river shaping, energy dissipation and attenuation structures and rehabilitation specifications for the project are undertaken by a suitably qualified design professionals.

###### Specialist mitigation:

- Locate stockpiles outside of wetland habitat where possible.
- No new furrows, drains or dams should be created within delineated wetland areas.
- Footpaths and landscape areas should be located on areas designated as Infill and Disturbed outer zones as far as possible.
- 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.
- Walkways that are crossing the depression wetland should make use of elevated boardwalks rather than utilising bermed or infill walkways (e.g. walkways that are elevated by means of soil berms) which could facilitate surface run-off and erosion.
- 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.

##### 7.1.3 Protected species

General mitigation:

- The sensitivity map must be used as a decision tool to guide the layout design. Development in the vicinity of protected species or species of high environmental sensitivity must be avoided.

Specialist mitigation:

- 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). The use of *Pennisetum clandestinum* (kikuyu) as a "lawn" grass or ornamental should be avoided.
- The trees to be used along the pedestrian streetscape should be indigenous and preferably hardy and draught resistant (e.g. *Searsia lancea*).
- A communal grazing plan should be formulated and implemented whereby grazing regimes are defined, and rotational grazing is allowed in order to improve the natural grassland condition and structure.
- As a precautionary principle, a brief follow-up survey during summer is recommended and aimed specifically at searching for potentially occurring threatened and near threatened plant species on the rocky grassland section contained within the Happiness Primary School yard. The follow-up survey is only applicable if development or land use activities are planned to take place within the rocky grassland habitat.
- According to the Alien and Invader Species regulations, all declared alien weeds and invader plants must be effectively controlled or eradicated by means of an alien and invader control programme.

7.1.4 Storm water management

General mitigation:

- As per the Storm Water Management Plan (refer to section 11.1).

Specialist mitigation:

- 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 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.

7.1.5 Waste management

General mitigation:

- As per the Waste Management Plan (refer to section 10.1).

Specialist mitigation:

- Address the large scale removal of litter, and waste on the site (i.e. dumping) as a phased approach, integrating with rehabilitation activities. Ensure that agreements are in place with local landfill sites to receive this volume of waste.

7.1.6 Heritage

General mitigation:



- 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)).

## 7.2 Development footprint planning

*To ensure the development footprint is kept to a minimum and that sensitive environs are taken into consideration*

### General mitigation:

- Consolidate the location of structures and infrastructure so as to localise and contain the development footprint as much as possible. Retain all areas beyond the development footprint as natural / conservation landscape.
- All areas beyond the development footprint are to be rehabilitated as natural vegetation using appropriate endemic species.

### Specialist mitigation:

- 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). The use of *Pennisetum clandestinum* (kikuyu) as a "lawn" grass or ornamental should be avoided.
- All rehabilitation structures and designs should take cognizance of faunal species movement and not prevent the movement of species.
- Involve relevant specialist during detail planning and plan habitats and connectivity.
- Ensure that connectivity of habitat types is maintained and enhanced, ensuring that such interventions as structures (e.g. crossings) and techniques (e.g. fish/frog ladders, islands, pathways) are applied to encourage connectivity of fauna and flora.
- Add missing elements, such as indigenous roost trees, islands and nest sites (natural and/or artificial), to enhance the attraction of these secluded areas.
- Use only indigenous trees and shrubs, naturally occurring in Gauteng and along riparian areas. This will ensure suitable habitat for fauna species naturally occurring in the area.
- Ensure open, grassed spaces in between trees to promote water infiltration into soils
- Limit impermeable surfaces.

## 7.3 Visual environment planning

*To ensure that the visual impact on the surrounding area and sense of place will be kept to a minimum*

### 7.3.1 General planning and design

#### General mitigation:

- 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.

#### Specialist mitigation:

### 7.3.2 Lighting

#### General mitigation:

- 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.
- 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

#### Specialist mitigation:

## 7.4 Socio-economic planning

*To ensure community beneficiation via job creation and skills transfer*

### 7.4.1 General planning and design

#### General mitigation:

- Formalise recreational open space in accessible areas so as to serve surrounding users. Provide amenities and facilities for daily, regular use as indicated in the proposal.
- Incorporate site specific aesthetics of significance into project planning, i.e. rock structures.
- Formalise pedestrian pathways and river crossings as indicated in the proposal.
- Include signage in all park areas for information sharing and awareness building (i.e. in terms of wetland importance, dangers of flooding, dangers of dumping and littering etc).

#### Specialist mitigation:

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### 7.4.2 Community beneficiation

#### General mitigation:

- Develop strategies for local businesses to capitalise on project opportunities. These include construction projects, park maintenance, etc. The City of Ekurhuleni should provide guidance, and support as required.
- The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.
- Provide on-going support to management and maintenance programmes.
- Maintain lines of communication with the community and leaders throughout the project lifecycle.

Specialist mitigation:

- Community consultation is as an important component to help ensure the success and efficiency of the final rehabilitation actions and interventions.
- Before the construction phase commences, the applicant should meet with representatives from the local municipality to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase.
- The stakeholder list should be used as a basis for the above database.

## 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 EMPr, as well as, a copy of the environmental sensitivity plans and construction layout plan must be available onsite.

### 8.1 Pre-construction

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

#### 8.1.1 Planning and preparation

##### General mitigation:

- 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 camps (to be verified by a qualified botanist).
- 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).
- 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 statement has been approved by the ECO.
- 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.

##### Specialist mitigation:

- Remove dumped refuse and rubble from within the depression wetland and all associated affected infilled areas prior to the commencement of construction.
- All construction activities must be restricted to daytime (e.g. from sunrise to sunset).

## 8.2 Site establishment

*To ensure that the construction footprint is kept to a minimum in order to conserve and protect plant and animal species and habitat and to ensure that site facilities, structures and infrastructure do not impose on the surrounding environment*

### 8.2.1 Site demarcation

#### General mitigation:

- Minimize the construction footprint and where possible, restrict all construction related activities to previously disturbed areas or transformed vegetation.
- 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 must 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.

#### Specialist mitigation:

### 8.2.2 Accommodation

#### General mitigation:

- 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.

### 8.2.3 Pollution control

#### General mitigation:

- 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.

Specialist mitigation:

- 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.

8.2.4 Access roads

General mitigation:

- 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.

Specialist mitigation:

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8.2.5 Protection of flora

General mitigation:

- 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.
- Construction activities must be carefully planned and implemented in such a way that facilitates and aids in the rehabilitation and establishment of plant communities.
- Progressively rehabilitate (rip, scarify and plant) areas as soon as works have been completed.
- Implement fines for the damage or destruction of marked and protected specimens. It is the contractor's responsibility to ensure that these are retained.
- Do not mark or deface any natural feature.
- 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.
- 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.
- Retain vegetation and soil within construction areas in position for as long as possible, removing it immediately ahead of construction / earthworks in that area.
- 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.

### Specialist mitigation:

- The trees to be used along the pedestrian streetscape should be indigenous and preferably hardy and draught resistant (e.g. *Searsia lancea*).
- A communal grazing plan should be formulated and implemented whereby grazing regimes are defined, and rotational grazing is allowed in order to improve the natural grassland condition and structure.
- As a precautionary principle, a brief follow-up survey during summer is recommended and aimed specifically at searching for potentially occurring threatened and near threatened plant species on the rocky grassland section contained within the Happiness Primary School yard. The follow-up survey is only applicable if development or land use activities are planned to take place within the rocky grassland habitat.
- According to the Alien and Invader Species regulations, all declared alien weeds and invader plants must be effectively controlled or eradicated by means of an alien and invader control programme.

### 8.2.6 Protection of the depression wetland

#### General mitigation:

- 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.
- Avoid the sealing of surfaces under a bridge or gabion construction.
- Construction within or near drainage lines should take place outside of the rainy season when the flow of the non-perennial rivers is at a minimum.
- 

#### Specialist mitigation:

- Footpaths and landscape areas should be located on areas designated as Infill and Disturbed outer zones as far as possible.
- A rehabilitation plan should be implemented near the end of 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.
- Revegetate landscaped areas with indigenous wetland species during the start of the growing season.
- No new furrows, drains or dams should be created within delineated wetland areas.

### 8.2.7 Protection of fauna

#### General mitigation:

- Ensure that construction personnel are briefed on the potential occurrence of protected faunal species, what they look like, and where they are likely to be found. Personnel are to 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.

- Develop a procedure for dealing with animals encountered on the site, including dangerous animals and vermin. Where necessary, call in professionals to remove the animals.
- Ensure that all personnel are aware of what the procedures for dealing with animals are. It is the contractor's responsibility to ensure that proper procedures are followed.

Specialist mitigation:

- No faunal species may unnecessarily be handled, killed, hunted or harassed.

8.2.8 Protection of cultural heritage

General mitigation:

- 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.

Specialist mitigation:

8.3 Materials management

*To ensure that waste management activities on site are undertaken in the correct manner and that staff are aware of the procedures*

8.3.1 Solid, liquid and hazardous waste

General mitigation:

- As per Waste Management Plan (refer to section 10.2).

Specialist mitigation:

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8.3.2 Concrete and cement work

General mitigation:

- Ensure that concrete and cement works are undertaken in specified areas only.
- Ensure that all operations that involve the use of cement and concrete are carefully controlled. Water and slurry from concrete mixing operations must be contained to prevent pollution of the ground surrounding the mixing points or the depression wetland located within the site.
- Use plastic trays or liners 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.

Specialist mitigation:

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8.3.3 Fuel and hazardous material



General mitigation:

- Provide the ECO with a list of all petroleum, chemical, harmful and hazardous substances and materials on site, together with storage, handling and disposal procedures for these materials.
- Ensure that all hazardous substances (chemicals, oils, etc.) are stored in appropriate, tamper proof containers in locked stores.
- Petroleum, chemical, harmful and hazardous materials must be stored in enclosed, bunded areas. The bunded areas shall be clearly marked.
- The bund must 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 must be sloped towards a sump to enable any spilled fuel and water to be removed.
- Bunded areas are not to be located directly adjacent to the sites depression wetland.
- Any wastewater collected at the sump shall be disposed of as hazardous waste.
- Ensure that all hazardous substances are used and handled by qualified personnel on bunded surfaces.
- Ensure that no oil, petrol, diesel etc. is discharged onto the ground.
- All hazardous products to be dispensed from 200 litre drums shall be transferred by pump, and not dispensed by tipping of the drum.
- Tanks containing fuel must have lids, which are to remain firmly shut.
- Gas and liquid fuel may not be stored in the same storage area.
- 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.

Specialist mitigation:

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#### 8.4 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*

General mitigation:

- Conserve topsoil 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 is to be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify.
- Co-ordinate works 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.
- 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.

Specialist mitigation:

- Locate stockpiles outside of wetland habitat where possible.
- Protect stockpiles of topsoil and subsoil material with silt fences that should be maintained during the entire construction phase on site. This is especially important when construction occurs during the wet summer and autumn months.

## 8.5 Erosion control

*To reduce the erosive effects of surface water runoff on exposed soils*

### 8.5.1 Water management

General mitigation:

- Monitor water consumption to ensure that there is no undue waste. Keep records of water monitoring and make these available to the ECO upon request.
- Ensure that consumption does not exceed permitted quantities. Take action to reduce consumption if necessary.
- Ensure that all construction personnel are trained in water wise principles, and that they practise prudent use of water during the construction phase.

Specialist mitigation:

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### 8.5.2 Storm water management

General mitigation:

- As per the Storm Water Management Plan (refer to section 11.2).

Specialist mitigation:

- 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.
- Walkways that are crossing the depression wetland should make use of elevated boardwalks rather than utilising bermed or infill walkways (e.g. walkways that are elevated by means of soil berms) which could facilitate surface run-off and erosion.

### 8.5.3 Excavation, backfilling and trenching

General mitigation:

- 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 demarcated with danger tape to prevent injury to members of the community.
- 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.
- 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

Specialist mitigation:

## 8.6 Alien plant control

*To prevent the spread and establishment of alien invasive plant species owing to exposed soils.*

General mitigation:

- Alien invasive species within the site should 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.
- Follow manufacturer's instruction when using chemical methods, especially in terms of quantities, time of application etc.
- Ensure that only properly trained people handle and make use of chemicals.
- Limit herbicide and pesticide use 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 should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access to the Site.

Specialist mitigation:

- According to the Alien and Invader Species regulations, all declared alien weeds and invader plants must be effectively controlled or eradicated by means of an alien and invader control programme.
- A rehabilitation plan should be implemented near the end of 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.

## 8.7 Vehicles and equipment management

*To ensure that all construction vehicles and equipment are in good working order and condition*

General mitigation:

- 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.

- 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.
- 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 are to 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 should be cleared on a regular basis.
- Construction vehicles transporting materials to and from the construction site must be covered to reduce the formation of dust.
- Ensure that the maintenance of all vehicles and equipment, including oil and lubricant changes, takes 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 shall be placed on drip trays. The drip trays shall be watertight and shall be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing
- Movement of heavy vehicles and machinery to be limited wherever possible, and construction noise reduced wherever possible.
- Contactors will be required to submit a delivery timetable. Strict control is to be exercised over entering and exiting traffic and delivery procedures.
- Vehicles used during construction or to transport material or staff on site, should 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.

Specialist mitigation:

- Check vehicles regularly for oil leaks and only refuel in designated areas outside of wetland habitat.

## 8.8 Socio-economic management

*To ensure community beneficiation via job creation and skills transfer and to mitigate the visual and noise impact of the construction works*

### 8.8.1 Staff

General mitigation:

- 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.
- The Contractor should appoint local employees and implement a 'locals first' policy, especially for semi and low-skilled job categories.
- Where feasible, efforts should be made to employ local employees that are compliant with Black Economic Empowerment (BEE) criteria.
- Where feasible, training and skills development programmes for locals should be initiated and maintained throughout the operational phase.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- 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.

Specialist mitigation:

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### 8.8.2 Visual

#### General mitigation:

- 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.
- 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.

#### Specialist mitigation:

### 8.9 Fire management

*To safe guard and protect the environment from any potential fire hazards*

#### General mitigation:

- As per the Fire Protection Management Plan (refer to section 12.1).

### 8.10. Rehabilitation

*To ensure that the site is restored to its natural state prior to any construction activities*

#### General mitigation:

- 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.
- 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. Salvaged vegetation, rather than new planting or seeding, should be used to the extent possible.

- Specifications for soil preparation, endemic plant/seed mixes, fertilizer, and mulching should be provided for all areas disturbed by construction activities.
- 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.

Specialist mitigation:

- All rehabilitation should make use of indigenous plant species, and preferably of species native to the study area and immediate surroundings. The species selected should strive to represent habitat types typical of the ecological landscape prior to construction.
- A rehabilitation plan should be implemented near the end of 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.

## 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 Biodiversity management

*To ensure the continued integrity of the natural environment and the conservation of fauna and flora, particularly in rehabilitated areas.*

#### 9.1.1 Access roads

General mitigation:

- Regulate and control movement over the site. Personnel, vehicles and equipment to move along designated routes.
- Maintain all roads in good condition to prevent dust and erosion.
- Runoff from roads must be managed to avoid erosion and pollution problems.
- No additional wetland crossings may be developed without the express permission of DWS.

Specialist mitigation:

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#### 9.1.2 Resource management

General mitigation:

- Ensure that the Water Use license for the property is in place and up to date.
- Ensure that all facility staff is trained in water wise principles, and that they practise prudent use of water at all times.

Specialist mitigation:

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9.1.3 Protection of flora

General mitigation:

- Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.
- No protected trees or plants may be removed without the relevant permits from the local authority.
- Maintenance workers and the public may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.
- No vegetation clearing is allowed, either to make space for informal agriculture, for firewood or for any other purpose.
- Maintenance workers and pedestrians may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.

Specialist mitigation:

9.1.4 Alien plant control

General mitigation:

- The operator 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.
- Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.
- Manual / mechanical removal is preferred to chemical control.
- Follow manufacturer's instruction when using chemical methods, especially in terms of quantities, time of application etc.
- Ensure that only properly trained people handle and make use of chemicals.
- Limit herbicide and pesticide use to non-persistent, immobile products and apply in accordance with label and applications permit directions and stipulations for terrestrial and aquatic applications.

Specialist mitigation:

- Alien control of species identified should be undertaken once a year.

9.1.5 Protection of fauna

General mitigation:

- The development should maintain connectivity between ecologically important habitats by retaining natural corridors for the movement of fauna.
- Ensure that personnel are briefed on the potential occurrence of protected faunal species, what they look like, and where they are likely to be found. Personnel are to 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 must be instructed to report the presence of protected species to the contractor or EO so that arrangements may be made to relocate them.
- Develop a procedure for dealing with animals encountered on the site, including dangerous animals and vermin. Where necessary, call in professionals to remove the animals.
- Ensure that all personnel are aware of what the procedures for dealing with animals are. It is the operator's responsibility to ensure that proper procedures are followed.

Specialist mitigation:

- 

9.1.6 Protection of heritage resources

General mitigation:

- 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)).

Specialist mitigation:

- 

9.2 Materials management

*To ensure proper waste storing, handling and disposal of materials and waste*

9.2.1 Solid, liquid and hazardous waste

General mitigation:

- As per the Waste management Plan (refer to section 10.3)

Specialist mitigation:

- 

9.2.2 Fuel and hazardous material

General mitigation:

- Ensure that all hazardous substances (chemicals, oils, etc.) are stored in appropriate, tamper proof containers in locked stores.
- Petroleum, chemical, harmful and hazardous materials must be stored in enclosed, bunded areas. The bunded areas shall be clearly marked.
- The bund must 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 must be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump shall be disposed of as hazardous waste.
- Ensure that all hazardous substances are used and handled by qualified personnel on bunded surfaces.
- Ensure that no oil, petrol, diesel etc. is discharged onto the ground.
- All hazardous products to be dispensed from 200 litre drums shall be transferred by pump, and not dispensed by tipping of the drum.
- Tanks containing fuel must have lids, which are to remain firmly shut.
- Gas and liquid fuel may not be stored in the same storage area.
- 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.

Specialist mitigation:

- 

### 9.3 Erosion control

*To ensure that areas cleared of vegetation are protected and allowed to restabilize*

General mitigation:

- As per the Storm Water Management Plan (refer to section 11.1).

Specialist mitigation:

- Revegetate landscaped areas with indigenous wetland species during the start of the growing season.
- A communal grazing plan should be formulated and implemented whereby grazing regimes are defined, and rotational grazing is allowed in order to improve the natural grassland condition and structure.
- 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.
- New erosion features, such as rills and headcut that may develop, should be stabilised once observed.

### 9.4 Vehicles and equipment management

*To maintain air quality standards and limit soil and water contamination and pollution*

General mitigation:

- Maintain site vehicles and equipment in an acceptable state of repair.
- Personnel, vehicles and equipment to move along designated routes.
- No off-road driving is permitted.
- Speed control measures must be implemented on site and in the surrounding area to reduce air pollution and animal mortality.
- Maintenance activities should be limited to daylight hours and vehicles should remain on the designated roads at all times.
- Carpools and lift clubs must be encouraged and staff picked up at a central point.

Specialist mitigation:

- 

### 9.5 Socio-economic management

*To mitigate the socio-economic impacts associated with the operation of the facility, specifically pertaining to visual and noise impacts*

#### 9.5.1 Staff management

General mitigation:

- 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.

- The Operator should appoint local employees and implement a 'locals first' policy, especially for semi and low-skilled job categories.
- Where feasible, efforts should be made to employ local employees that are compliant with Black Economic Empowerment (BEE) criteria.
- Where feasible, training and skills development programmes for locals should be initiated and maintained throughout the operational phase.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- 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.

Specialist mitigation:

- 

9.5.3 Visual impact management

General mitigation:

- Retain and maintain natural vegetation in all areas outside of the development footprints.
- Maintain the general appearance of all of the sites as a whole, including roads and servitudes.

Specialist mitigation:

- 

9.6 Fire management

*To prevent any unplanned and uncontrolled fires from occurring*

General mitigation:

- As per the Fire Protection Management Plan (refer to section 12.2).

## 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 Planning Phase

Develop a Storm Water Management Plan (by suitably qualified professional) to ensure that runoff from storm water does not result in erosion at the collection areas and at the discharge points. In general, the following measures are recommended:

- All roads and parking areas must have stable surfaces and channels lined (where possible) with vegetation.
- Porous paving surfaces should be used in place of hard paved surfaces in order to promote and encourage the infiltration of storm water.
- Do not allow surface water or storm water to canalize or be concentrated.
- Storm water outflows should not be allowed to enter directly into watercourses without appropriate energy dissipation in place.
- Points of storm water discharge as well as any areas downstream where the risk of accelerated erosion could occur must be stabilised and energy dissipation measures specified. Ecological methods (attenuation ponds, gabions, perforated mattresses, vegetation, etc) are preferred.
- All activities that affect surface drainage should be designed so as to ensure that storm water runoff does not lead to excessive surface erosion problems on the proposed site.
- Storm water infiltration must be promoted through minimising hard paved areas and using porous paving surfaces wherever possible.
- Rainwater runoff from roofs and hard spaces should be directed into natural areas rather than into storm water drains wherever possible.
- Waste traps must be planned and included in the storm water design to catch litter conveyed by surface runoff and should be regularly cleared.
- The harvesting of storm water for appropriate uses (such as for irrigation) may be incorporated into the design of the development as appropriate.
- Ensure that river crossings are designed in such a way so as not to impede the flow of water or cause sedimentation upstream of the crossing. Make use of culverts large enough to prevent upstream sedimentation or downstream scouring.
- Employ recognised best practices to secure tie-ins and prevent erosion during extreme events and wherever possible place permanent infrastructure beyond the riparian zone.

## 11.2 Construction Phase

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

- Measures must be put in place around sensitive areas to protect these from sediment and contaminants.
- Make use of erosion control measures 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.
- Remove only vegetation essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.
- Ensure that measures are 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 should 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.
- Storm water outflows should not be allowed to enter directly into watercourses.
- Runoff from roads must be managed to avoid erosion and pollution problems.
- Place and maintain erosion control barriers as appropriate to prevent sedimentation.
- Prevent storm water or contaminated water directly entering any watercourse.
- Install waste traps 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.
- Repair all erosion damage 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.
- Monitor all rehabilitated areas 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.

### 11.3 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 should be designed so as to ensure that storm water runoff does not lead to excessive surface erosion problems on the site.
- Ensure that measures are in place to control the flow of excess water so that it does not impact on the surface vegetation.
- Measures must be put in place around sensitive areas to protect these from sediment and contaminants.
- The accumulation of water on the surface should 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.
- Runoff from roads must be managed to avoid erosion and pollution problems.
- Place and maintain erosion control barriers as appropriate to prevent sedimentation.
- Prevent storm water or contaminated water directly entering any watercourse.
- Install waste traps 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.
- Repair all erosion damage as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.
- Monitor all rehabilitated areas 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 for the Proposed Tuna Park Open Space Project on the Farm Bultfontein 192 IR in Nigel, Ekurhuleni Metropolitan Municipality, Gauteng.* FP Coetzee, 2019.

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

*An Ecological Evaluation for the Proposed Tuna Park Open Space Project, City Of Ekurhuleni Municipality, Nigel, Gauteng.* Pachnoda Consulting CC, 2019.

*Wetland Delineation Study for the Proposed Tuna Park Open Space Project, Nigel, Gauteng Province.* Imperata Consulting, 2019.

## 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  
**TOSCA DINA GRUNEWALD**

**PERSONAL INFORMATION**

Full Name: Tosca Dina Grünewald  
Date of Birth: 1988-07-24  
Gender: Female  
Identity number: 8807240027086  
  
Nationality: South African  
Race: White  
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**FORMAL EDUCATION**

Date	Qualification	Institution
2006	Grade 12	Christians Brothers College, Mount Edmund, Silverton, 2006
2009	Baccalaureus in Landscape Architecture	University of Pretoria
2011	Baccalaureus Honorius in Landscape Architecture	University of Pretoria
2012	Master of Landscape Architecture	University of Pretoria

## TECHNICAL SKILLS

Software	Skill level
MS Word	proficient
MS Excel	proficient
MS Outlook	proficient
MS PowerPoint	proficient
CorelDRAW	proficient
Google Sketchup	capable
Global Mapper GIS	proficient
AutoCAD	proficient
Adobe Photoshop, Illustrator & InDesign	proficient
Locus Maps	proficient

## BRIEF SUMMARY OF CORE COMPETENCIES

Bryony has a Masters in Landscape Architecture, and 6 years of experience. Tosca has specialized in Landscape Architecture, as well as, Environmental Planning and Management, with specific expertise in Framework and Master planning, Environmental Impact Assessments and Environmental Management Planning.

## CAREER HISTORY

Date	Company / Organisation	Position
2014 - present	Nuleaf Planning and Environmental (Pty) Ltd	Landscape Architect / Environmental Practitioner
2014	Interdesign Landscape Architects	Candidate Landscape Architect
2010	Grow Wild Indigenous Nursery	Consultation and Sale

## RELEVANT WORK EXPERIENCE (KEY PROJECTS)

(All projects in South Africa unless otherwise stated)

COMPANY	YEAR	PROJECT NAME	CLIENT	DESCRIPTION OF DUTIES
Nuleaf Planning & Environmental	2019	Bakubung Lifestyle Villas Compliance with Environmental Authorisation Letter	Pilanesberg Resorts (Pty) Ltd	Environmental Control Officer
Nuleaf Planning & Environmental	2019	City of Tshwane Landscape Specification Document	City of Tshwane	Team Leader, Project coordinator. Development of standardized landscape specifications and details for the City of Tshwane to provide Landscape Contractors
Nuleaf Planning & Environmental	2019	Rainbow Junction Mixed Use Development: Phase 1a	Rainbow Junction Development Company (Pty) Ltd	Development of landscape master plan for public and private open space components of the project.
Nuleaf Planning & Environmental	2019	Rietspruit Rehabilitation / Development Master Plan and Sketch Plan	Silverhorns Consulting	Development of a landscape master plan and sketch plan for the Rietspruit open space / wetland area, Gauteng Province.
Nuleaf Planning & Environmental	2019	Kapama Game Reserve Section 24(G) Application	Kapama Game Reserve	Visual Impact Assessment
Nuleaf Planning & Environmental	2019	Marataba Staff Accommodation & Roads ECO	Marakele Park (Pty) Ltd	Environmental Control Officer
Nuleaf Planning & Environmental	2019	KABA Proclamation Process	Grace Management Services	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2019	KABA Water Use License Application	Grace Management Services	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2019 - 2020	Tuna Park development master plan, EIA and WULA	Silverhorns Consulting	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2019	Limpopo Nature Reserves: Mapping	Limpopo Department of Economic Development, Environment and Tourism	Development of a GIS database, mapping and production of information and map brochures for 12 provincial nature reserves.
Nuleaf Planning & Environmental	2015-2019	Various Landscape Development Plans (LDP) for group housing	Various	Landscape Site Development Plans, BoQ and preliminary costing
Nuleaf Planning & Environmental	2018	Natalspruit landscape development master plan	Silverhorns Consulting	Development of a landscape master plan for the Natalspruit open space / wetland area, Gauteng Province.
Nuleaf Planning & Environmental	2018	Jukskei Rehabilitation	Silverhorns Consulting	Landscape Master Planning & Costing

## DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

Environmental				
Nuleaf Planning & Environmental	2018	Bakubung Reservoir Basic Assessment	Pilanesberg Resorts (Pty) Ltd	Environmental Control Officer
Nuleaf Planning & Environmental	2018 - 2019	Bakubung Villa	Pilanesberg Resorts (Pty) Ltd	Environmental Control Officer
Nuleaf Planning & Environmental	2018	Ngwenya Lodge VIA	Quality Time Marketing (Pty) Ltd	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2018	Kaba Private Homes Basic Assessment		Team Leader, Project coordinator
Nuleaf Planning & Environmental	2018	Ngwenya WWTS VIA	Quality Time Marketing (Pty) Ltd	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2017	Aquaculture Development Zone in Amatikulu VIA	Department of Agriculture, Forestry and Fisheries	Consultant
Nuleaf Planning & Environmental	2017	Ngwenya WWTS Basic Assessment Process	Quality Time Marketing (Pty) Ltd	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2017	Bakubung Reservoir Basic Assessment	Pilanesberg Resorts (Pty) Ltd	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2017	Bakubung Villa Sewage Amendment	Pilanesberg Resorts (Pty) Ltd	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2017	Marataba Section of the Marakele National Park – additional game viewing roads – Basic Assessment Process	Marakele Park (Pty) Ltd	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2017	Witsieshoek Mountain Lodge - Mountain Bike Trails mapping	Witsieshoek Mountain Lodge (Pty) Ltd	Team Leader, Project coordinator
Nuleaf Planning & Environmental	2017	SMEC Landscape	Rowbow Investments	Landscape Design
Nuleaf Planning & Environmental	2017	Lapalala Wilderness School Basic Assessment	Mapula Trust	Environmental Impact Assessment
Nuleaf Planning & Environmental	2017	Sasol Filling Stations	Rainbow Junction Company (Pty) Ltd	Landscape Design
Nuleaf Planning & Environmental	2017	Commetre Gardens	Commetre	Landscape Design
Nuleaf Planning & Environmental	2017	Maropeng Interpretation Centre	GAPP	Environmental Control Officer
Nuleaf Planning & Environmental	2016	Master Plan Framework for the Klipspruit, Soweto Water Management Unit	Silverhorns Consulting	Landscape Master Planning
Nuleaf Planning & Environmental	2016	Master Plan Framework for the Rehabilitation of the Jukskei Alexandra Water Management Unit	Silverhorns Consulting	Landscape Master Planning & Costing

## DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

Nuleaf Planning & Environmental	2016	Tourism Master Plan and Management Plan for Sani Top and Semonkong, Lesotho	Lesotho Tourism and Development Corporation	Tourism / Landscape Master Plan
Nuleaf Planning & Environmental	2016 - 2017	Sasol Filling Stations	Rainbow Junction Development Company	Landscape Design
Nuleaf Planning & Environmental	2015-2016	EIA for the proposed Kaalspruit Open Space Project, Tembisa, Gauteng	Silverhorns Consulting	Environmental Impact Assessment
Nuleaf Planning & Environmental	2015-2016	Master Plan Framework for the Rehabilitation of the Kaalspruit	Silverhorns Consulting	Landscape Master Plan
Nuleaf Planning & Environmental	2015	AIR Resource Mapping and Management Planning	CESVI / European Commission	Resource mapping and development of management guidelines for 10 African Ivory Routes camps and Community areas in Limpopo Province.
Nuleaf Planning & Environmental	2015	Rehabilitation specification and landscape audit for Union Buildings south lawn	Red Bull	Specification and auditing
Nuleaf Planning & Environmental	2015	Buccleuch ext 9 wetland design	Seaton Thompson Consulting	Landscape design
Nuleaf Planning & Environmental	2015	South Zambezi landscape design, Samrand	Khato Civils	Landscape design
Nuleaf Planning & Environmental	2014-2015	Various landscape SDP's for group housing	Sinovich Group	Landscape Site Development Plans, BoQ and preliminary costing
Nuleaf Planning & Environmental	2014-2015	Concept Master Plan for the proposed Banghazi Lake Development	African Safari Foundation	Concept Master Plan and development vision
Nuleaf Planning & Environmental	2014-2015	EIA for the proposed expansion of the Bhundu Inn Hotel, Nkangala District	Paul Mojapelo	EIA Mapping
Nuleaf Planning & Environmental	2014-2015	EIA for a proposed spa at Bakubung Lodge, Pilanesberg Game Reserve	Pilanesberg Resorts Pty Ltd	Environmental Control Officer auditing construction
Nuleaf Planning & Environmental	2014-2015	EIA for the proposed Malelane Safari Lodge near the Malelane gate, Kruger National Park	Marakele Safari Resort Investments Pty Ltd	EIA Mapping
Nuleaf Planning & Environmental	2014-2015	EIA for proposed tourism infrastructure at Marakele Park Pty Ltd	Marakele Park Pty Ltd	Environmental Control Officer auditing construction
Nuleaf Planning & Environmental	2014-2015	EIA for proposed upgrades to the Maropeng Interpretation Centre	GAPP	EIA Mapping
Nuleaf Planning & Environmental	2014-2015	Visual Impact Assessment for the proposed upgrades to the Maropeng Interpretation Centre	GAPP	Visual Impact Assessment
Nuleaf Planning & Environmental	2014	Visual Impact Assessment for the proposed Exheredo Solar Energy Facility	Savannah Environmental	Visual Impact Assessment
Interdesign Landscape Architects	2014	Rustenburg Open Space and Heritage Management Plan (ROSHMAP)	Rustenburg Local Municipality	Open Space and Heritage Management



APPENDIX B: LAYOUT MAP



TUNA PARK, NIGEL  
MASTER PLAN