Application for Environmental Authorization for Proposed Development of a 1Ml Reservoir at the Bakubung Lodge, Pilanesberg National Park, North West Province

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

Compiled by:

NULEAF PLANNING AND ENVIRONMENTAL PTY LTD

On behalf of:

Pilanesberg Resorts

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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
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:	In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to: (a)The property on which or location where it is proposed to undertake the activity; (b) The type of activity to be undertaken; (c) The design or layout of activity; (d) The technology to be used in the activity; and (e) The operational aspects of the activity.
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.
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 a the 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.
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, hybrid or geographically separate population (South Africa [Republic] National Environmental Management: Biodiversity Act, 2004: Chapter 1).
The Contractor:	The contractor, as the developers agent on site, is bound by the ROD and EMP conditions through his/her contract with the developer, and is responsible for ensuring that conditions of the EMP and ROD are strictly adhered to at all times. The contractor must comply with all orders

	(whether verbal or written) given by the ECO, project manager or site agent in terms of the EMPr.
The Developer:	Remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMP and the conditions of the Environmental Decision throughout all phases of the project.
The Environmental Control Officer (ECO):	The ECO is appointed by the developer as an independent monitor of the implementation of the EMP i.e. independent of the developer and contractor.
The Environmental Officer (EO):	The Contractor shall submit to the Site Agent a nominated representative of the Contractor as an EO to assist with day to day monitoring of the construction activities for the contract.
Vegetation:	Is a collective word for plants occurring in an area.
Vulnerable:	A taxon is 'Vulnerable' when it is not 'Critically Endangered' or 'Endangered' but is facing a high risk of extinction in the wild in the medium term future.
Watercourse:	A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may by notice in the Government Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks" (South Africa [Republic] National Water Act, 1998).

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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.
Contact Person	Peter Velcich
Postal Address	8a Trevor Street Murrayfield Pretoria 0184
Telephone	012 753 5792
Fax	086 571 6292
Email	peter@nuleafsa.co.za
Expertise	Professional Landscape Architect

Please refer to Appendix A for EAP curriculum vitae.

3. BACKGROUND

Construction of a new 1 Ml (1000 m^3) potable water storage reservoir to replace the various existing, aging and leaking potable water storage reservoirs at Bakubung Lodge, in the Pilanesberg National Park.

As part of the proposed development the existing electric fence will need to be extended to include the proposed site within the Bakubung Lodge boundary. This will allow for safe access to the Reservoir by the lodges maintenance staff, as well as, ensure the reservoir isn't damaged by wildlife such as elephant in search of water.

Refer to Appendix B for the site layout.

4. ROLES AND RESPONSIBILITIES

Party	Responsibility
Applicant	• Ensure adherence to, and compliance with, the EMPr in a legal and timely manner. This relates to all phases of the project lifecycle. • Appoint an Independent Environmental Control Officer (ECO) during both Construction and Operation Phases. • Ensure that a monitoring programme is drafted and implemented to assess compliance with the EMPr during the construction phase. • Ensure that contractors and operators undertake to adhere to the provisions of the EMPr as part of their respective contracts. • 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. • Ensure that all monitoring and audit reports are submitted to the Environmental Authority and that the contractor and operator implement recommendations.
Contractor	• Ensure adherence to, and compliance with, the Construction EMPr in a legal and timely manner. • 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. • Designate a permanent Environmental Officer (EO) to monitor environmental compliance on a day-to-day basis on the construction site. • 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. • Ensure that training is undertaken for construction supervisors and crews to recognise environmental 'red flags' and ensure that these will: o not be disturbed, damaged or removed and o be brought to the immediate attention of the EO or ECO to determine an action plan and way forward. • 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. • Ensure that all recommendations made in monitoring and audit reports are implemented throughout the construction phase. • Accept liability for any and all Work required in terms of the environmental specifications, resulting from environmental negligence, mismanagement and / or non-compliance.

Operator	• Ensure adherence to, and compliance with, the Operational EMPr in a legal and timely manner. • 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. • Designate an Environmental Officer (EO) to monitor environmental compliance on a day-to-day basis. • Ensure that all staff members and suppliers are aware of potential environmental issues and of all mitigating and precautionary measures that must be implemented. • Ensure that staff members and suppliers are able to recognise environmental 'red flags' and ensure that these will: o not be disturbed, damaged or removed and o be brought to the immediate attention of the EO or ECO to determine an action plan and way forward. • Ensure that all recommendations made in monitoring and audit reports are implemented throughout the operational phase. • Accept liability for any and all Work required in terms of the environmental specifications, resulting from environmental negligence, mismanagement and / or non-compliance.
Environmental Officer (EO)	• 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. • Compile regular (usually weekly) monitoring reports for submission to the contractor / operator, and copied to the ECO. • Act as liaison and advisor on all environmental and related issues, and seek advice from the ECO where required. • 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. • Respond to incidents and keep records and reports as required.
Environmental Control Officer (ECO)	• Understand, interpret, monitor, audit and implement the EMPr from the "cradle to grave" stage. • Retain independence and report on environmental compliance in an objective manner. • Explain the contents of the EMPr to the Contractor, the site staff, supervisors, operators and any other relevant personnel or I&A's as required. • Undertake environmental audits for the duration of the construction and operational phases as required. • 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. • Submit audit reports to the applicant, contractor / operator and the Environmental Authority, including performance rating, recommendations and reports of non-compliance.

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 the suspension of site activities until compliance is reached to the satisfaction of the ECO. In the event of severe negligence or failure to comply, all site activities may be terminated. Criminal proceedings may ensue.

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:

- Register boreholes to be used for potable water extraction as per DWS requirements.
- Obtain a Water Use License for listed activities (water abstraction, irrigation with purified effluent and overland discharge of purified effluent) if required.
- Ensure that overland discharge of excess purified effluent (if required) is undertaken in a controlled manner does not cause erosion.
- No purified effluent may be discharged directly into any watercourse without the appropriate Water Use Licence in place.
- Specify water saving devices and technologies wherever possible. Measures include the specification of low flow shower heads and taps, and the use of grey water for on potable activities such as road wetting and irrigation.

Specialist mitigation:

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7.1.2 Surface water

General mitigation:

- A minimum buffer zone of 30 m around any river / wetland should be established and regarded as No-Go areas for the development.
- Buildings and other hardened surface infrastructure (including storm water attenuation measures) should be located outside of buffered watercourses.

Specialist mitigation:

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7.1.3 Protected species

General mitigation:

- The sensitivity map for the Bakubung Reservoir site must be used as a decision tool to guide the layout design. Development on areas of high environmental sensitivity must be avoided.
- Wherever possible, tall trees should be left unharmed, whether protected by law or not.

Specialist mitigation:

- If possible, the position of the water reservoir should be such that all *Sclerocarya birrea* and *Spirostachys africana* trees and shrubs are avoided; these trees and shrubs should be demarcated with emergency tape and the construction team should be given strict instructions to avoid these plants.

7.1.4 Storm water management

General mitigation:

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

Specialist mitigation:

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7.1.5 Waste management

General mitigation:

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

Specialist mitigation:

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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.
- Refine the final layout of roads, buildings and infrastructure so these are located within natural bush clearings rather than removing vegetation to make way for infrastructure. This will allow the development to blend in with the receiving environment to a greater extent both visually and ecologically.
- No manicured landscape or gardening is permitted. All areas beyond the development footprint are to be rehabilitated as natural bush using appropriate endemic species.
- Plan to leave as much of the natural vegetation intact as possible.
- Ensure that all perimeter fences allow access by small mammals, tortoises etc. while keeping dangerous game out.

Specialist mitigation:

- If possible, the position of the water reservoir should be such that all Sclerocarya birrea and Spirostachys africana trees and shrubs are avoided; these trees and shrubs should be demarcated with emergency tape and the construction team should be given strict instructions to avoid these plants.
- The small fern Pellaea calomelanos can be carefully excavated and transplanted into suitable representative habitat adjacent to the study site.
- Where possible, no new roads should be constructed but the existing gate at the Bakubung fence should be reopened and upgraded to allow access to the proposed reservoir site.

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.
- Limit structures to single storey (3m) and make use of light, shallow gradient roofs.
- Visually break up large bulky buildings into smaller, subtler, less prominent shapes and planes.
- Make use of suitable paint colours on steel roofs reduce the impact of glare from sunlight.
- 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.
- No manicured landscape or gardening is permitted. All areas beyond the development footprint are to be rehabilitated as natural bush using appropriate endemic species.

Specialist mitigation:

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7.3.2 Lighting

General mitigation:

- Confine light output within property boundaries through using specifically designed luminaires such as full cut-off luminaires to minimise upward spread of light near to and above the horizontal;
- Tilt spotlight luminaires to direct the light to the intended spot, instead of allowing it to light areas outside its purpose;
- Mount outdoor spot lights on the appropriate pole height. Higher mounting heights allow lower main beam angles which can reduce glare.
- Utilise control systems to reduce light levels during inactive periods or at predetermined times while maintaining sufficient lighting for safety and security (NEMA, 2000).
- Where vertical surfaces are illuminated, such as advertising signs or buildings façades, it is recommended that luminaires should light downwards. If up-lighting is the only alternative, the use of shields, baffles or louvers should be installed to reduce light spillage over or under the structure.
- Do not over illuminate areas. Use the correct illuminance intensity for the purpose intended.

Specialist mitigation:

7.4 Socio-economic planning

To ensure community beneficiation via job creation and skills transfer

General mitigation:

- The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project.

Specialist mitigation:

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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 preferred sites, 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 plan indicating the mapped positions of vegetation specimens to be conserved and which should be removed and replaced.
- 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 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.

Specialist mitigation:

- Poaching could be a significant threat. If any external labour teams are used during construction, then these teams should preferably be accommodated off site; if this is not possible then teams should be carefully monitored to ensure that no unsupervised access to plant and animal resources takes place.

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 area to prevent access to adjacent bush and sensitive environs. Buffer areas and identified sensitive environments (such as the river area) 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 1m 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.
- Prohibit vehicular or pedestrian access into all natural areas beyond the demarcated boundary of the construction site.
- 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.

Specialist mitigation:

- If possible, the position of the water reservoir should be such that all *Sclerocarya birrea* and *Spirostachys africana* trees and shrubs are avoided; these trees and shrubs should be demarcated with emergency tape and the construction team should be given strict instructions to avoid these plants.
- Wherever possible, tall trees should be left unharmed, whether protected by law or not.
- The small fern Pellaea calomelanos can be carefully excavated and transplanted into suitable representative habitat adjacent to the study site.

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.

Specialist mitigation:

- Poaching could be a significant threat. If any external labour teams are used during construction, then these teams should preferably be accommodated off site; if this is not possible then teams should be carefully monitored to ensure that no unsupervised access to plant and animal resources takes place.

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 inside the property.

Specialist mitigation:

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8.2.4 Access roads

General mitigation:

- Formalize access roads and 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.
- The contractor must maintain all access and site roads and repair these as required. Damage caused to roads by the construction related activities, including heavy vehicles, must be repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor.
- Upon completion of the construction period, the Contractor shall ensure that the access roads are returned to a state no worse than prior to construction commencing.
- All disturbed areas along the fringes of access roads must be rehabilitated once the road is complete.

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.
- Workers may not tamper or remove flora and neither may anyone collect seed from the plants without permission from the local authority.
- Only wood from trees felled as part of the construction contract may be sold / made available for firewood. No dead wood may be gathered from the surrounding veld.
- Implement a Plant Rescue Plan for protected species within the construction areas. Where feasible, these should be removed by a suitably qualified specialist and replanted as part of vegetation rehabilitation plan.
- Demarcate vegetation and other site features to be retained with danger tape and / or fencing as required. This barrier to be at least 1m from the stem of the specimen / feature.

Specialist mitigation:

- If possible, the position of the water reservoir should be such that all Sclerocarya birrea and Spirostachys africana trees and shrubs are avoided; these trees and shrubs should be demarcated with emergency tape and the construction team should be given strict instructions to avoid these plants.
- The small fern Pellaea calomelanos can be carefully excavated and transplanted into suitable representative habitat adjacent to the study site.
- Wherever possible, tall trees should be left unharmed, whether protected by law or not.

8.2.6 Protection of the riparian system

General mitigation:

- Do not create additional drainage line 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 and rehabilitation of the crossing must be as per the ECO's instruction.
- 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.
- Development is not allowed to take place within any proposed buffer or riparian zone

Specialist mitigation:

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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 to adjacent bush areas.
- 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.
- Personnel are to be instructed on the presence of dangerous game and the appropriate behaviour and safety upon encountering such game.
- 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.
- Pets and livestock are not allowed on site.
- No poaching or snaring of any game is permitted. The contractor must regularly undertake checks of the surrounding natural vegetation and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. The contractor must implement fines in this regard.

Specialist mitigation:

- Poaching could be a significant threat. If any external labour teams are used during construction, then these teams should preferably be accommodated off site; if this is not possible then teams should be carefully monitored to ensure that no unsupervised access to plant and animal resources takes place.

8.2.8 Protection of cultural heritage

General mitigation:

- All areas of cultural heritage importance/ significance should be identified and mapped. These areas should be demarcated and appropriate buffers put in place.
- 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:

- 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)).

8.2.9 Drilling of off-site boreholes

General mitigation:

- Ensure that relevant approvals are in place from DWS in terms of drill sites.
- Existing access roads must be used wherever possible. If new access tracks are required to drill sites, then a suitably qualified ecologist must be on hand to ensure that sensitive sites, drainage lines and protected species are not affected. The ecologist must walk the required route before any clearing takes place.
- Access tracks must be used as the future pipeline alignment to minimise the extent of disturbance.
- No access track or pipeline may cross a drainage line.

- No large trees or shrubs are to be removed whatsoever. Ensure that vegetation is not ripped, but trimmed where necessary. All trimmed vegetation is to be left in place.
- Demarcate the drill site clearly and ensure that all activities take place within the site demarcations.
- Soil and geological material resulting from the drilling operation is to be spread evenly over the area in a manner that blends in with the natural topography.
- Remove all equipment, materials, waste and facilities used for the execution of the work upon completion of drilling. No foreign material may be left on site or along the access road.
- Fully rehabilitate the drill site and protect from erosion.

Specialist mitigation:

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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.
- 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.

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.

- 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.

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 though 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.

8.5 Erosion control

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

8.5.1 Water management

General mitigation:

- Ensure that abstraction from each borehole is limited to a maximum of 10 cubic metres per day until such a time as the required WULA / Registration is in place. At that time, abstraction may escalate to the Licensed or Registered volume.
- 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.

8.5.2 Storm water management

General mitigation:

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

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 equipped with escape ramps to allow trapped animals to escape.
- Preferably undertake clearing activities during the dry season in order to prevent erosion and siltation.
- Excavation of sand to solid ground to be done carefully and appropriate drainage incorporated i.e. sand and debris need to be removed and solid rock preferably exposed to ensure proper binding with concrete material.
- Construction must preferably be extended over rocky substrate to give maximum anchoring opportunity.
- Progressively reinstate of disturbed areas to topsoil profile on an on-going basis, immediately after selected construction activities (e.g. backfilling of a trench) are completed. This allows for passive rehabilitation (i.e. natural re- colonisation by vegetation) to commence.
- Deficiency of backfill material shall not be made up by excavation within the protected area.
- Excavated material is to be stockpiled along a pipeline trench within the working servitude, unless otherwise authorised.
- Subsoil backfill to be followed by topsoil. Compact backfilled trenches to prevent erosion. Subsoil to be compacted to engineer's specification.
- Consider using any excess rocks and boulders that were excavated from the construction site for any erosion protection work, which is required on site. Consider removing the rocks for the packing of gabions at other soil erosion sites.
- Removed soil is to be used to backfill areas where required and excess is to be landscaped into natural looking banks that fit the surrounding topography.
- Monitor backfilled areas for erosion and remediate as required.
- Progressively rehabilitate (rip, scarify and plant) areas as soon as works have been completed

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 property.

Specialist mitigation:

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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:

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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:

- Implement a policy that no employment will be available at the gate.

- The movement of construction workers on and off the site should be closely managed and monitored by the contractor. In this regard the contractor is responsible for making the necessary arrangements for transporting workers to and from site on a daily basis, specifically construction workers who are not from the local municipality.
- The contractor must make the necessary arrangements for allowing workers from outside the area to return home over weekends. This would reduce the risk posed by construction workers to local family structures and social networks.

Specialist mitigation:

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

Specialist mitigation:

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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:

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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 Ground water

General mitigation:

- Ensure that overland discharge of excess purified effluent (if required) is undertaken in a controlled manner does not cause erosion.
- No purified effluent may be discharged directly into any watercourse without the appropriate Water Use Licence in place.
- Specify water saving devices and technologies wherever possible. Measures include the specification of low flow shower heads and taps, and the use of grey water for on potable activities such as road wetting and irrigation.

Specialist mitigation:

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9.1.2 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 drainage line crossings may be developed without the express permission of DWS.
- The internal road network should be maintained as gravel tracks that allow for faunal dispersal and minimize fragmentation of ecologically sensitive areas.

Specialist mitigation:

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9.1.3 Resource management

General mitigation:

- Ensure that the Water Use license for the property is in place and up to date.
- Monitor water consumption to ensure that there is no undue waste. Keep up to date 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.
- Install a leak detection system, and promptly attend to leaks as required.
- Undertake monthly potable water monitoring to ensure that the output quality of the water complies with the minimum standards as prescribed by DWS. Ensure that these records are kept up to date and are available upon request.
- Ensure that all facility staff is trained in water wise principles, and that they practise prudent use of water at all times.
- Post a Code of Conduct in accommodation rooms advising to guests of relevant lodge rules and regulations.

9.1.4 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.
- Implement fines for the damage or destruction of marked and protected specimens.
- Guests and staff may not tamper or remove flora and neither may anyone collect seed from the plants without permission from the local authority.
- The picking of flowers or removal of plants should be prohibited in the Guest Rules.
- No bush clearing is allowed, either to enhance game viewing, for firewood or for any other purpose.
- Maintenance workers and guests may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.
- No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.
- No wood may be collected for firewood or any other purpose.
- No large tree (with a stem diameter exceeding 200mm) may be felled without the permission of the ECO.

Specialist mitigation:

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9.1.5 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 application permit directions and stipulations for terrestrial and aquatic applications.

Specialist mitigation:

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9.1.6 Protection of fauna

General mitigation:

- The development should maintain connectivity between ecologically important habitats by retaining natural corridors for the movement of fauna.
- No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.
- Maintain a game / security fence or suitable equivalent around the perimeter of the facility. This fence should, however, be designed to allow access by small mammals, tortoises etc.
- 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 these to adjacent bush areas.
- 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.
- Pets and livestock are not allowed on site.
- No poaching or snaring of any game is permitted. Bakubung Lodge Management must implement fines in this regard.
- All visitors should be briefed on the dangers of feeding wildlife, and must be discouraged from feeding any animal. They should also be informed of recommended measures to secure food and food waste from animal scavengers.
- All food and waste storage areas must be properly secured against animal scavengers at all times.

Specialist mitigation:

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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)

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.

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).

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. Staff must not be discouraged from travelling to site in private vehicles.

Specialist mitigation:

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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:

- Where reasonable and practical, 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:

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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 Bakubung Reservoir Site as a whole, including roads and servitudes.

Specialist mitigation:

- Monitor the effectiveness of the screen planting continuously in order to maintain its mitigation function.

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 EMPr, the overall responsibility of ensuring compliance with the Waste Management Plan ultimately lies with the Applicant.

10.1 Construction Phase

10.1.1 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 contactor or 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.

10.1.2 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, 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, palettes and other wood materials. Palettes 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.

10.1.3 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.

10.1.4 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 at least 100m from any wetland.
- 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.

10.2 Operational Phase

10.2.1 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.
- It is permissible to establish intermediate storage areas / collection points. All such areas would have to comply with safe storage requirements.
- 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.

10.2.2 Landscape and kitchen 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.

10.2.3 General waste

- Adopt waste reduction procurement philosophy, also known as "Greener purchasing", "Pre-cycling", or "eco/green procurement".
- Custodians and their staff should be made aware of the aim to recycle waste by means of posters, training and staff meetings.
- Custodians should be made aware of the Reserves recycling programmes by means of recycling instructions in rooms and 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.
- Recycling bins should be placed in strategic and convenient locations throughout the resort, and in sizes suitable to their location. They should be lidded and appropriately labelled or colour coded.
- 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.
- All general waste that cannot be reused or recycled should be stored temporarily in a designated area and transported to the closest permitted landfill.
- 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.

10.2.3 Hazardous waste

- 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.
- 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.
- Forecast and prevent potential situations in which accidents and spills can mitigate against unwarranted waste emissions.
- Hazardous waste must be separated at source from the general waste stream. Common potential hazardous wastes include chemicals, used oils, oil contaminated waste, used cooking oils, fats and greases from extraction fans/filters, paint waste, fluorescent bulb waste, battery waste and E-waste.
- Effective grease traps should be installed at all kitchen or cooking facilities and these should be regularly serviced and checked for functionality.
- Certain hazardous wastes, including used oil, batteries and light bulbs, can be recycled through reputable agents. 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 lodge 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 the facility sewage system is maintained in a sanitary and operational state.
- Ensure that the facility sewage system is not overloaded, and that it functions within its design capacity. Take action to reduce output or increase capacity if necessary.
- Ensure that measures are put in place to prevent all leaks and spills.
- Repairs to the sewage system must be done immediately.
- In the event of a failure or overflow situation at the waste water treatment plant, implement a back-up system which will ensure that no sewage is discharged into the environment.
- Regular removal of sludge from the septic tanks by a licenced contractor (if required).
- Ensure that all treated effluent meets or exceeds South African water quality regulations prior to discharge or reuse.
- Undertake monthly wastewater monitoring to ensure that the output quality of the water complies with the minimum standards as prescribed by DWS. Ensure that these records are kept up to date and are available upon request.
- Ensure that the waste water treatment plant is operated and maintained by suitably qualified personnel, in strict accordance with the operating procedures.

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 EMPr, the overall responsibility of ensuring compliance with the Storm Water Management Plan ultimately lies with the applicant.

11.1 Construction Phase

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

- The protective buffer around the watercourses must be respected as it acts as a trap for sediment and contaminants. Measures must be put in place around sensitive areas to protect these from sediment and contaminants.
- 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.
- Proactively protect steep access roads, cuttings against and other areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible and by taking such other measures as may be necessary to prevent surface water being concentrated in water sources and from scouring the slopes, banks or other areas.
- 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.

11.2 Operational Phase

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

- All activities that affect surface drainage should be designed so as to ensure that storm water runoff does not lead to excessive surface erosion problems on the site.
- Porous paving surfaces should be used in place of hard paved surfaces in order to promote and encourage the infiltration of storm water.
- The protective buffer around the watercourses must be respected as it acts as a trap for sediment and contaminants. Measures must be put in place around sensitive areas to protect these from sediment and contaminants.
- 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.
- 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 Veld 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.
- Establish and maintain a fire break around the perimeter of all construction sites prior to the commencement of construction activities.
- All Contractors should contact all of the adjacent farm owners prior to the commencement of the construction phase and ensure that he/she has the contact numbers so that they can be contacted in the event of a fire.
- 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.
- In the event of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate private landowners for any damage caused by the fire. The contractor should bear the costs associated with fighting the fire
- All Contractors to ensure that the necessary firefighting equipment is on site in accordance with relevant legislative requirements.

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 at any of the sites.
- Establish and maintain a fire break around the perimeter of the sites.

- Lines of communication should be maintained with all of the adjacent farm owners so that they can be contacted in the event of a fire.
- Fire-fighting training is to be provided to selected operational staff.
- Custodians are 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

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

Sensitivity screening of the proposed Bakubung Reservoir, Pilanesberg National Park, North-West Province (Ecorex). McCleland, W., 2017.

Cultural Heritage Impact Assessment: Phase 1 Investigation of the Proposed 1 Ml Reservoir at Bakubung Lodge, Pilanesberg National Park, Bojanala District Municipality, Moses Kotane Local Municipality, North West Province. Coetzee, F.P., 2017.

Visual Screening for the proposed development of a 1Ml reservoir at the Bakubung Lodge, Pilanesberg National Park, North West Province. NuLeaf Planning and Environmental (Pty) Ltd. 2016.

APPENDICES

Appendix A: Curriculum Vitae of the Environmental Assessment Practitioner
Appendix B: Site Layout

APPENDIX A: CURRICULUM VITAE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

CURRICULUM VITAE FOR
PETER GERARD VELCICH

PERSONAL INFORMATION

Full Name:	Peter Gerard Velcich
Date of Birth:	1967-12-23
Gender:	Male
Identity number:	6712235113085
Nationality:	South African
Race:	White
Language(s):	English and Afrikaans (written and spoken)
Marital Status:	Married (20 January 1996)
Dependents:	3
Drivers License:	Code EB
Residential Address:	8a Trevor Street, Murrayfield, 0184
Postal Address:	8a Trevor Street, Murrayfield, 0184
Telephone number:	082 442 0220
Email address:	peter@nuleafsa.co.za

FORMAL EDUCATION

Grade 12
- *Christian Brothers College, Pretoria, 1985*

Baccalaureus in Landscape Architecture
- *University of Pretoria, 1989*

Masters in Landscape Architecture
- *University of Pretoria, 2000*

AWARDS & GRANTS

"Bez Bezuidenhout Design Award".3rd yr.
- *University of Pretoria Dept. L.A, 1988*

"ILASA Merit Award for Excellence in the Study of Landscape Architecture"
- *4th yr. University of Pretoria Dept. L.A, 1988*

"Dayson, de Villiers and Van de Merwe Best Student Award – Final Year Design".
- *4th yr. University of Pretoria Dept. L.A., 1990*

Eppic Award for Best SA Technical Paper.
- *South African Manual for Outdoor Advertising Control (SAMOAC), 1999*

Institute of Landscape Architects of South Africa.
- *Award of Merit. South African Manual for Outdoor Advertising Control (SAMOAC), 1999*

MEMBERSHIPS & AFFILIATIONS

- Professional Landscape Architect: South African Council for the Landscape Architectural Profession (SACLAP).
- Member: Institute of Landscape Architects of South Africa (ILASA)

TECHNICAL SKILLS

- MSWord operation (proficient)
- MSExcel operation (proficient)
- MSOutlook operation (proficient)
- MS PowerPoint operation (proficient)
- Internet operation and navigation (capable)
- CorelDRAW operation (proficient)
- CorelPHOTOPAINT (proficient)
- Global Mapper GIS (proficient)

OTHER STRENGTHS

- Logical and analytical thinker; able to strategise and plan for an outcome;
- Creative and lateral thinker, able to think out of the box;
- Able to work individually, as part of a team and as a manager;
- Able to work under pressure and meet deadlines;
- Excellent communication and interpersonal skills;
- Organised, reliable, punctual and efficient;
- Ethical, honest and trustworthy;
- Committed to positive change and upliftment of individuals, society and the environment.

CAREER HISTORY

1. ***2012 – Present day:***
   Company:
   - *NuLeaf Planning and Environmental*

   Position:
   - *Partner / Director*

2. ***2006 –2012:***
   Company:
   - *V&L Landscape Architects CC*

   Position:
   - *Partner / Director*

3. ***1999 –2008:***
   Company:
   - *Wet-Ink Design (Pty) Ltd*

   Position:
   - *Partner / Director*

4. ***1999 – present:***
Company:
- *Innovative Geographic Information Systems (Pty) Ltd*

Position:
- *Partner / Director*

5. ***1997 – 2006:***
Company:
- *Van Riet and Louw Landscape Architects CC*

Position:
- *Partner / Director*

6. ***1991 – 1997:***
Company:
- *Van Riet and Louw Landscape Architects CC*

Position:
- *Landscape Architect*

7. ***1993:***
Company:
- *University of Pretoria*

Position:
- *Part Time Lecturer (Technical Writing)*

8. ***1990 - 1991:***
Company:
- *South African Defence Force Environmental Services.*

Position:
- *Environmental Officer. Chief of Staff, Logistics*

9. ***1989 - 1990:***
Company:
- *Willem Van Riet Landscape Architects CC.*

Position:
- *Landscape Architect*

RELEVANT WORK EXPERIENCE

COMPANY	YEAR	PROJECT NAME	CLIENT	DESCRIPTION OF DUTIES
Nuleaf Planning & Environmental	2015	Rainbow Junction Mixed Use Development	Rainbow Junction Company (Pty) Ltd	Peer review of Environmental Impact Assessment Process on adjacent competing development.
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	Treefems Trout Lodge Development Master Plan and Management Plan	Treefems Trout Lodge(Pty) Ltd	Preparation of a master plan and management plan for the development of trails, tourist accommodation, bird habitat, interpretation centers and access roads on a fly fishing farm, Dullstroom.
Nuleaf Planning & Environmental	2015	IMP: Greater Lakenvlei Protected Environment (GLPE).	Mpumalanga Tourism and Parks Agency	Preparation of an Integrated Management Plan, including zoning, tourism master plan and management plan, for the GLPE, Dullstroom area.
Nuleaf Planning & Environmental	2014-2015	IMP: Mabola Protected Environment (MPE).	Mpumalanga Tourism and Parks Agency	Preparation of Integrated Management Plan, including zoning, tourism master plan and management plan, for the MPE, Wakkerstroom area.
Nuleaf Planning & Environmental	2014-2015	IMP: Mabusa, Manyeleti & Mthethomusha Nature Reserves	Mpumalanga Tourism and Parks Agency	Preparation of Integrated Management Plans, including zoning, tourism master plan and management plan, for three provincial reserves in Mpumalanga.
Nuleaf Planning & Environmental	2014	IMP: Mkhombo and Mdala Nature Reserves.	Nkangala District Municipality.	Preparation of Integrated Management Plans, including zoning, tourism master plan and management plan, for two provincial reserves in Mpumalanga.
Nuleaf Planning & Environmental	2014	Marataba Section of the Marakele National Park:	Marakele Park (Pty) Ltd	Design and printing of tourist brochures and management maps for the reserve (Geographic Information Systems based)..
Nuleaf Planning & Environmental	2014	Peace Foundation: Mapping	Peace Foundation (Pty) Ltd & Elephant Rhino People (ERP)	Conservation and community resource mapping (Geographic Information Systems based).
Nuleaf Planning & Environmental	2014	Proposed Tshivhase Nature Reserve: Master planning	Naledzi Consulting (Pty) Ltd	Preparation of a master plan and management plan for the declaration of the proposed Tshivhase Nature Reserve, and the development of tourist activities and facilities. Thohoyandou, Limpopo Province.

Nuleaf Planning & Environmental	2014	Marataba Section of the Marekele National Park	CCG 108 Investments (Pty) Ltd	Environmental Assessment Process for the development of the 12 bed Marataba Trails Lodge, in the Marakele National Park.
Nuleaf Planning & Environmental	2013-2014	Thaba Chitja Island Leisure Development Plan	Great Lesotho Experience (Pty) Ltd	Preparation of a bid submission (including master plan, management plan, phasing, community beneficiation, marketing and business plan) for the leisure development of Thaba Chitja Island, Lesotho.
Nuleaf Planning & Environmental	2013	Renosterberg / Vanderkloof Dam: Rolfontein and Doornkloof Nature Reserves development.	Northern Cape Development Agency (NCEDA)	Preparation of a Tourism Master Plan, and Trails Implementation Plan for the two provincial reserves.
Nuleaf Planning & Environmental	2013	Rietvley 28 KU: Basic Assessment Report	Ndlophu Share Block (Pty) Ltd	EIA process for the development of 5 houses on the property Rietvley 28 KU Rem. Ptn. 4 and Ptn. 8, Umbabat Game Reserve, Mpumalanga.
Nuleaf Planning & Environmental	2012	IMP: Songimvelo, Blyde Canyon, Loskop Dam Nature Reserves (Continuation of 2010 contract)	Mpumalanga Tourism and Parks Agency	Preparation of Integrated Management Plans, including zoning, tourism master plan and management plan, for three provincial reserves in Mpumalanga.
V&L Landscape Architects	2012	Integrated Management Plan for the Marakele Contractual National Park	Marakele Private Park (Pty) Ltd	Management Planning for the Marakele Contractual National Park.
V&L Landscape Architects	2012	Liuwa Plains National Park Commercialization Strategy	African Parks Foundation	Development of a business strategy and commercial plan for the purposes of self-sustainability of the Liuwa Plains National Park: Zambia.
V&L Landscape Architects	2012	Gateway design: Rhenosterpoort Nature Reserve	Rhenosterpoort Management Committee.	Design of a gateway entrance for the Rhenosterpoort Nature Reserve, Gauteng, RSA.
V&L Landscape Architects	2011-2012	BATOBIC Tourism development projects	BATOBIC / Barberton Chamber of Business	Development and implementation of a tourism route, geological trail, entrance designs and branding and marketing in and around the town of Barberton and the proposed Makonjwa World Heritage Site
V&L Landscape Architects	2011	Visual impact assessments	Various	Various visual impact assessments for alternative energy installations including PV plants and wind turbines throughout RSA.
V&L Landscape Architects	2011	Waterkloofspruit	Waterkloof Boulevard Homeowners Association	Master plan design of an open space recreation / conservation area along the Waterkloofspruit, Pretoria

V&L Landscape Architects	2010-2011	Veld Condition and Management Unit Mapping	Francois de Wet	Mapping for grassland ecologist, Francois de Wet, for various farmland and natural grassland areas.
V&L Landscape Architects	2010-2011	Cedar junction master plan	JIC Construction	Development master planning of an adventure park, flea-market, tea garden, play area, mini railway system, water rides area and party area.
V&L Landscape Architects	2011	House Roodt	Mr & Mrs Nic Roodt	Design of rustic farm house and application for approvals (building, environmental and aesthetic), Rhenosterpoort Nature Reserve.
V&L Landscape Architects	Ongoing	Mutlumuvi Concession Kruger National Park	Rhino Walking Safaris	6 monthly environmental monitoring and auditing of the 3 lodges and concession activities
V&L Landscape Architects	Ongoing	Lwakahle Concession Kruger National Park	Lukimbi Pty Ltd	6 monthly environmental monitoring and auditing of the Lukimbi Lodge and concession activities
V&L Landscape Architects	2010	MTPA Protected Areas: Songimvelo, Blyde Canyon, Mthethomusa, Manyeleti, Loskop Dam, Mabusa & Mdala	MTPA	Tourism Plans and Integrated Management Plans
V&L Landscape Architects	2009	St Paulus School recycling village	St Paulus School	Architectural and landscape design and construction supervision of a recycling village and educational facility for the school. *Pro-bono* work
V&L Landscape Architects	2009	Modder B Conservation plan	KIRON Pty Ltd	Conservation master plan for pans / wetlands within a proposed housing development.
V&L Landscape Architects	2009	Wildebeestkuil Rock Art Centre Planning	Northern Cape Economic Development Agency, Kimberley	Master planning
V&L Landscape Architects	2008	Greater Mapungubwe TFCA	PPF and DEAT	Integrated Tourism Master Plan
V&L Landscape Architects	2008	Rainbow Junction Multiple Use Development, Pretoria	RBJ	Concept master planning
V&L Landscape Architects	2008-2009	SAMOAC update	DEAT	Update of the South African Manual for Outdoor Advertising Control
V&L Landscape Architects	2008	Elsburg spruit	Erkuhuleni Metropolitan Municipality	Master planning of the Elsburg spruit open space corridor, East Rand. Recreation and housing.
V&L Landscape Architects	2007	Lakefield Manor Estate	VLDC Pty Ltd	Master conservation planning of pan within the housing estate
V&L Landscape Architects	2007	Viewpoint Road Estate	Cross-Point Trading	Master conservation planning of pan within the housing estate

V&L Landscape Architects	2006	Songimvelo-Malolotja Transfrontier Conservation Area	Peace Parks Foundation	Development of an integrated management plan
V&L Landscape Architects	2006	El Maha Hunting Estate, Morocco	H.H. Sheikh Mohammad Bin Zayed Al Nahyan. Crown Prince Abu Dhabi	Compilation of a development master plan for a 5000ha boar and bird hunting estate. Included proposals for security, management and development of infrastructure such as roads, dams, lodges.
V&L Landscape Architects	2006	Knysna TR2 road EIA	MetroGis (Pty)Ltd	Visual Impact Assessment
V&L Landscape Architects	2006	SALU Building EIA	Elevated Outdoor (Pty)Ltd	Impacts assessment of a 1100m² Skysign billboard on top of the SALU building, Pretoria CBD
V&L Landscape Architects	2006	Waterkloof Air Force Base EIA	Dept. Public Works	EIA for runaway upgrade, and associated works.
V&L Landscape Architects	2005	Makuya Game Reserve	Peace Parks Foundation	Tourism planning
V&L Landscape Architects	2005	Lapalala Private Game Reserve	Lapalala PGR	Tourism Planning
V&L Landscape Architects	2005	Limpopo Provincial Reserves	Limpopo Province	Imagery, maps and plans for concessioning process
V&L Landscape Architects	2005-2006	Ai-Ais / Richtersveld Transfrontier Park	Peace Parks Foundation	Joint Management Plan and Business Plan
V&L Landscape Architects	2005-2006	Songimvelo-Malolotja Transfrontier Conservation Area	Peace Parks Foundation	Development of an integrated tourism development plan and zoning plan.
V&L Landscape Architects	2005	Foutanie – Clarens Country Estate	Mr At Botha	Master planning of country estate in the Free State Drakensberg
V&L Landscape Architects	2004	Environmental Best Practice Manual	SANParks	Co-author
V&L Landscape Architects	2004	Outdoor Advertising Policy: City of Tshwane	City of Tshwane: Streetscape Management	Development of council policy on outdoor advertising control
V&L Landscape Architects	2004	Arthurs Estate	Mr. Arthur Tassopoulis	Residential garden design, Waterkloof, Pretoria
V&L Landscape Architects	2004	Rhenosterpoort Private Nature Reserve	Rhenosterpoort Owners Society	Environmental and development synopsis
V&L Landscape Architects	2003	Nwanetsi Concession Area, Kruger National Park	Singita Pty(Ltd)	Environmental Impact Assessment (airstrip) and Management, Monitoring and Auditing Plan
V&L Landscape Architects	2003	Schmidtsdrift Alluvial Diamond Mine Northern Cape	New Diamond Corporation (Pty)Ltd	EMPR for active, large scale alluvial mine
V&L Landscape Architects	2003	West End Diamond Mine,	REX Diamond Mining	EMPR for an existing underground diamond mine

		Postmasburg, Northern Cape	Corporation (Pty) Ltd	
V&L Landscape Architects	2002	Vienna – Antwerpen Private Game Reserve, Hoedspruit	Antwerpen No4 Shareblock Company (Pty)Ltd.	EIA, Development of lodge accommodation & access roads
V&L Landscape Architects	2002	Makapanspoort, Northern Province	Falconbridge Ventures of Africa (Pty)Ltd.	EMPR for prospecting (group elements)
V&L Landscape Architects	2002	Windsorton Erf 1 Diamond Mine, Northern Cape	Freid Delverye BK	EMPR for alluvial mine
V&L Landscape Architects	2002	Slypklip Diamond Mine, Northern Cape	Freid Delverye BK	EMPR for alluvial mine
V&L Landscape Architects	2002	Niewejaarskraal Diamond Mine, Northern Cape	Transhex Operations Pty)Ltd.	EMPR for alluvial mine
V&L Landscape Architects	2001	Mutlumuvi Concession Area, Kruger National Park	Kosi Forest Camp Pty(Ltd)	Environmental Impact Assessment and Management, Monitoring and Auditing Plan
V&L Landscape Architects	2001	Lwakahle Concession Area, Kruger National Park	Lukimbi Safari Lodge Pty(Ltd),	Environmental Impact Assessment and Management Plan, Monitoring and Auditing Plan, ECO work
V&L Landscape Architects	2000	Lubombo Spatial Development Initiative		Development of Tourism Master Plans for Nsubane WR, Mlawula GR (Swaziland) & Ponta do Oura (Mozambique)
V&L Landscape Architects	2000	Newlands Diamond Mine, Northern Cape	Kophia Diamonds (Pty)Ltd	EMPR for re-opened diamond mine
V&L Landscape Architects	1999	Outdoor Advertising Control Scheme for the Pretoria Municipal Area (OACSPMA)	City Council of Pretoria	Development of a GIS based Outdoor Advertising Control Scheme for the Pretoria Municipal Area
V&L Landscape Architects	1998	Goukou River, Stillbaai, Western Cape	Regional Services Council, George	Environmental Structure Plan guiding development and land use along the river and lagoon.
V&L Landscape Architects	1998	Misverstand Dam, Western Cape	Western Cape Department of Water Affairs and Forestry	Dam Zoning Plan, tourism and land use planning
V&L Landscape Architects	1997	Emerald Safari Resort and Casino, Vanderbijlpark	London Clubs International and Samrand Property	Environmental impact assessment and management plan for the then Emfuleni development complex.
V&L Landscape Architects	1996	Mooikloof Equestrian Centre, Pretoria	Mooikloof Estates Pty(Ltd)	Development Master Plan
V&L Landscape Architects	1996	Mardadi Golf Resort, Hazyview	Stocks Leisure, Sandton	Environmental Synopsis & Development Concept Plan
V&L Landscape Architects	1996	Mahango Game Reserve &	Branch Energy,	Environmental Synopsis & Development Concept Plan

		Kavango National Park, Caprivi	Namibia	
V&L Landscape Architects	1994	Etosha National Park (Namibia), Caprivi Strip (Namibia), Okavango Delta, Linyanti Swamps and Chobe National Park (Botswana)	Private and corporate clients including Wilderness Safaris, Desert & Delta, Lloyd Wilmot.	Compilation of technical applications for the development of photo-safari tourism plans in the wilderness areas of Northern Botswana and Namibia.
V&L Landscape Architects	1994	South African Manual for Outdoor Advertising Control (SAMOAC)	RSA Dept. Transport & Dept Environmental Affairs & Tourism	Development of a National Code of Practice for Outdoor Advertising and the South African Manual for Outdoor Advertising Control
V&L Landscape Architects	1994	Castleburn Holiday Resort, Natal Drakensberg	Stocks Leisure Developments	Environmental Planning, Environmental Impact Assessment and Management Plan
V&L Landscape Architects	1992	Natal Drakensberg:- Babangibone, Garden Castle and Cathkin Peak Development Nodes	Natal Town and Regional Planning Commission	Environmental & tourism Planning – compilation of a development control scheme for various tourist nodes.
V&L Landscape Architects	1991	Kruger-Banhine Transfrontier National Park (RSA – Mozambique)	World Wildlife Foundation, Mozambique	Environmental & tourism Planning

APPENDIX B: SITE LAYOUT