



**ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)  
AND MAINTENANCE MANAGEMENT PLAN**

*for*

**PROPOSED SHANGONI GATE DEVELOPMENT WITHIN THE  
KRUGER NATIONAL PARK.**

**FEBRUARY 2016**

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## DEFINITIONS AND TERMINOLOGY

**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:** Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, processes or technology alternatives, temporal alternatives or the 'do nothing' alternative.

**Construction Activity:** Any action taken by the Contractor, his subcontractors, suppliers or personnel during the construction process.

**Cumulative impacts:** Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

**Direct impacts:** Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

**Drainage line:** A drainage line is a lower category or order of watercourse that does not have a clearly defined bed or bank. It carries water only during or immediately after periods of heavy rainfall i.e. non-perennial and riparian vegetation may or may not be present

**'Do nothing' alternative:** The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

**Ecosystem:** A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

**Environment:** the surroundings within which humans exist and that are made up of:

- i. The land, water and atmosphere of the earth;
- ii. Micro-organisms, plant and animal life;
- iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

**Environmental impact:** An action or series of actions that have an effect on the environment.

**Environmental impact assessment:** Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting,

organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

**Environmental management:** Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

**Environmental management programme:** A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

**General waste:** Waste which does not pose an immediate hazard or threat to health or to the environment' and includes the following waste flows: domestic waste, construction and demolition waste, business waste, inert waste.

**Habitat:** The place in which a species or ecological community occurs naturally.

**Hazardous waste:** Waste that has the potential to cause a negative threat/impact to humans and/or the environment. It includes, but is not limited to, batteries, neon lights, fluorescent lights, printer cartridges, oil, paint, paint containers, oil filters, IT equipment etc.

**Indirect impacts:** Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

**Interested and affected party:** Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public

**Pollution:** A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances. place

**Significant impact:** An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

**Waste:** As per National Environmental Management: Waste Act means-

- a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or
- b) disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or
- c) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste.

**Watercourse:** as per the National Water Act means -

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and

- (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

## ACRONYMS & ABBREVIATIONS

<b>BA:</b>	Basic Assessment
<b>BAR:</b>	Basic Assessment Report
<b>CDF:</b>	Conservation Development Framework
<b>CMP:</b>	Construction Management Plan
<b>DEA:</b>	Department of Environmental Affairs
<b>LEDET:</b>	Limpopo Department of Economic Development, Environment and Tourism
<b>DWS:</b>	Department of Water Affairs and Sanitation
<b>EA:</b>	Environmental Authorisation
<b>ECO:</b>	Environmental Control Officer
<b>EIA:</b>	Environmental Impact Assessment
<b>EMPr:</b>	Environmental Management Programme
<b>EMS:</b>	Environmental Management System
<b>I&amp;AP:</b>	Interested and Affected Party
<b>IEM:</b>	Integrated Environmental Management
<b>KNP:</b>	Kruger National Park
<b>LED:</b>	Local Economic Development
<b>NEMA:</b>	National Environmental Management Act, Act No. 107 of 1998
<b>NEMPAA:</b>	National Environmental Management: Protected Areas Act, Act No. 57 of 2003
<b>SAHRA:</b>	South African Heritage Resources Agency
<b>SANParks:</b>	South African National Parks

## 1. INTRODUCTION AND BACKGROUND

South African National Parks (hereafter "SANParks") is proposing the Shangoni Gate Development. This development will consist of the Shangoni visitor's entrance gate into the Kruger National Park (KNP), a reception facility; a new surfaced road of approximately 50,6 km in length with a road reserve wider than 13,5 m and three high level bridges where the road will span the Shingwedzi River twice and once over the Tshanga tributary. The development is coupled with a picnic site; camping site and tented rest camp. The entire activity is collectively referred to as "the Shangoni Gate Development". In terms of the National Environmental Management Regulations 2014, under sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) the proposed development requires authorisation from the Department of Environmental Affairs as the competent authority, as the proposed development triggers the activities and thresholds listed in Government Notice R983 and R985 of the Environmental Impact Assessment Regulations, 2014. The aforesaid development is located within the Kruger National Park.

- **Shangoni Visitors' Entrance Gate**

The entrance gate will include a visitors waiting lane of at least 200 m in length just before (i.e. West) of the gate; a small office, guard house and low-usage toilet facilities. The entire entrance gate facility with its associated infrastructure will occupy a footprint of approximately 10000 m<sup>2</sup> (1 hectare). Three locational alternative sites have been proposed by SANParks for the placement of the Shangoni visitor's entrance gate position and for assessment in this basic assessment process.

- **Reception facility**

The visitor's reception facility will include a public reception area, offices, security structures, a shop, public toilet facilities, visitors parking, ablution facilities and an education centre. The entire reception facility will occupy a footprint of approximately 1 ha.

- **New tarred Access Road and its associated bridge crossings (gravel road to be upgraded)**

The road will start from the Shangoni Gate Entrance and cross over the Shingwedzi river for the first time by means of a high level single lane bridge to join the same alignment as that of the existing gravel road to run approximately 1.9 km, from here it transects through woodland

vegetation in a south east direction for approximately 1,2 km and then continues to run on the existing gravel Shangoni Rangers' road for approximately 35 km before it links into the existing S52 gravel public road between Shingwedzi and Bateleur bush camp where it once again crosses the Shingwedzi River (red pin) and then crosses the Tshanga Tributary (red pin) in approximately 800 m to then end at its juncture with the H1-6 tourist road. The entire road will have width of 6m. The road will also cross many other smaller drainage lines throughout its course by means of low level bridges and crossings. The entire new tarred access road is approximately 50.6km in length with a road reserve of 13.5 metres. No Alternatives have been considered for the road alignment upgrade due to the fact that approximately 90% of the road to be upgraded already exists as a gravel road.

- **Shangoni Loop road**

This road will be intended to provide access to the proposed tourism facilities of the picnic site, tented camp, and camping sites. The road will be tarred and will be approximately 8 km in length and will have a width of 6m. It will start from the road to be upgraded near the Picnic site Alternative 1 and travel along the northern bank of the looping section of the Shingwedzi River in the vicinity of the proposed tourist amenities and re-join the road to be upgraded again. No Alternatives have been considered for the loop road alignment as this road will be starting from the ranger road to be upgraded going on the northern bank of the Shingwedzi loop of which is the most practical route of access to all the proposed tourist amenities along this river loop.

- **Picnic sites**

The picnic site will have the following infrastructure:

- Thatched umbrellas
- Braai areas
- Outdoor kitchens
- Car and bus parking areas
- Water boreholes and central ablution facilities.

The picnic site will occupy a footprint of approximately 1 hectare (ha). These sites are proposed to be fenced with standard electrified solar assisted KNP fencing infrastructure. Three alternative sites have been proposed by the developer for assessment in this basic assessment process as detailed below. The proposed development is a low-profile and low impact development that does not include permanent structures. The picnic sites would be above the flood line during normal seasonal high water but they would be inaccessible during extreme flood events. The southern bank of the river opposite the proposed picnic site is classified by SANParks as a "wilderness

area". The site is preferred because of its close proximity to the proposed Shangoni gate (approximately 10 km) and easy accessibility for day visitors.

- **Tented camps**

A maximum of 12 self-catering tents with en-suite bathrooms on timber platforms will be erected on high ground overlooking the Shingwedzi river bend. Staff housing and a reception office will be located nearby. Additional infrastructure includes water sourced from existing underground boreholes, a soak away septic tank and reed bed for onsite treatment of sewage. Access will be via a short (approximately 600m) dirt road from the existing two spoor management road that is linked to the proposed road to be upgraded (Shangoni – Shingwedzi road).

Tents would be positioned to have river and woodland views. The rustic tented camps and the camping site will be located approximately 10 m from each other within the Shingwedzi River loop. These sites are proposed to be fenced with standard electrified solar assisted KNP fencing infrastructure. Staff accommodation will be based on the outer edges of tented camp site area and low impact modular style structures will be built on concrete flooring. Further infrastructure will include central ablution facilities and outdoor kitchen.

The sites would be above the flood line during normal seasonal high water but it would be vulnerable to flooding during extreme flood events. The southern bank of the river opposite the proposed tented camp sites is classified by SANParks as a wilderness area. The proposed sites are located amongst riverine woodland and close to forest patches.

- **Camping sites**

A maximum of 20 camping and/or caravan sites will be located about 200m away on the high bank of the Shingwedzi River. Fencing of the sites is intended. The proposed sites are located among riverine woodland and close to forest patches. The camps would be positioned to have river and woodland views, similar to the tented camps site. These sites are proposed to be fenced with standard electrified solar assisted KNP fencing infrastructure. Staff accommodation will be based on the outer edges of camp site area and will be and low impact modular style structures, and built on concrete flooring. Further infrastructure will include central ablution facilities and outdoor kitchen.

In terms of the National Environmental Management Regulations 2014, under sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) the proposed development requires authorisation from the Department of Environmental Affairs as the competent authority, since the proposed development triggers the activities and thresholds listed in Government Notice R983 and R985 of the Environmental Impact Assessment Regulations,

2014. The aforesaid development is located in the Limpopo Province, and within the Kruger National Park, which is a National asset. The Limpopo Department of Economic Development, Environment and Tourism (LEDET) will be a commenting authority.

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 purpose of this EMPr is to formulate mitigating measures that should be made binding to all contractors and suppliers during construction of the proposed development, as well as measures that should be implemented during the operational phase. The point of departure for this EMPr is to take a pro-active route by addressing potential problems before they occur. The EMPr will also provide management responses that will ensure that the impacts of the development are minimised. This should limit corrective measures needed during the construction and operational phases of the development. Additional mitigation will be included throughout the project's various phases as necessary. This EMPr is therefore a stand-alone document, which must be used on site during each phase of the development (planning, construction and operational phases).

The Environmental Management Programme (EMPr) and Maintenance Plan (MP) must be disseminated to and used by the contractor, lodge manager and others involved in the construction and/or operational phases of the development. This document is in line with Kruger National Park Management Plan. Any parties responsible for transgression of the underlying management measures outlined in this document will be held responsible of non-compliances and will be dealt with accordingly.

### **Aims and objectives of the EMPr**

The purpose of this EMPr and MP is to provide an easily interpreted reference document that ensures that the project environmental commitments, safeguards and mitigation measures from the environmental planning documents, project approvals, and Scope of Works are implemented. It aims to minimise impacts associated with the development of the Shangoni Gate development in the KNP during the construction phase of the development and make sure the impacts on the environment are kept to a minimum. This includes ensuring that the mitigation measures described in the Basic Assessment Report and in the specialist studies are implemented.

The objectives for the EMPr and MP are:

- To develop, implement and maintain effective management systems for the environmental aspects of the maintenance works;
- To document details of environmental protection infrastructure and controls so that they are able to provide long term protection for the natural environment;
- To ensure compliance with relevant legislation (National, Provincial and Local), regulatory requirements and environmental documents;
- To maximise the value and outcomes of environmental monitoring activities so that the information can be applied to the planning and implementation of future projects;
- To ensure that all Environmental Management considerations are implemented during the operational and maintenance phases of the project.

The EMPr has been developed based on the findings of the on site assessment undertaken by Envirolution and the following specialist studies undertaken during the basic assessment process of this project:

- Wetland Delineation and Functional Assessment Report undertaken by Limosella Consulting, June 2016.
- A Vegetation Assessment Report undertaken by EcoAgent (Commissioned by Limosella Consulting), May 2016.
- A Fauna and Habitat Assessment Report undertaken by I. L Rautenbach *et al*, April 2016.
- Heritage Impact Assessment undertaken by Heritage Consultant, J van Schalkwyk (D Litt et Phil), May 2016.
- Visual Impact Assessment undertaken by I-Scape, May 2016.

All the Environmental specifications and the procedures discussed in this document were also developed in accordance with the relevant legislation applicable to the development.

The EMPr and MP is in line with the Kruger National Park management plan as it will tie in with the KNP Management Plan's mission of maintaining biodiversity in all its natural facets and fluxes, to provide human benefits and build a strong constituency and preserve as far as possible the wilderness qualities and cultural resources associated with the Park.

## 2. PREPARATION OF THE EMPr and MP

This Environmental Management Programme was compiled by:

Company Name: Envirolution Consulting (Pty) Ltd  
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### Expertise of Environmental Practitioner

Mr. Thabang Sekele forms part of the project team and acts as the Project Manager for all phases of the project. Thabang holds a Bachelor's degree in Environmental Management in which he majored in Geography and is a member of the International Association for Impact Assessment South Africa (IAIASa). He is an Environmental Professional with good exposure to the Environmental Management field. Thabang's key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; environmental auditing and compliance reporting; the identification of environmental management solution and mitigation/risk minimising measures; environmental auditing, monitoring and reporting compliance. Thabang has been an Environmental Assessment Practitioner and Environmental Control Officer for various projects involving Environmental Authorisations in Gauteng, Mpumalanga and Free State provinces of South Africa. Thabang is currently a Project Manager and Environmental Professional at Envirolution Consulting (Pty) Ltd.

## 3. DESCRIPTION OF THE IMPACTS

The Shangoni Gate Development will have potential vegetation, wetland (watercourses), fauna, avifauna, visual, heritage and socio-economic impacts.

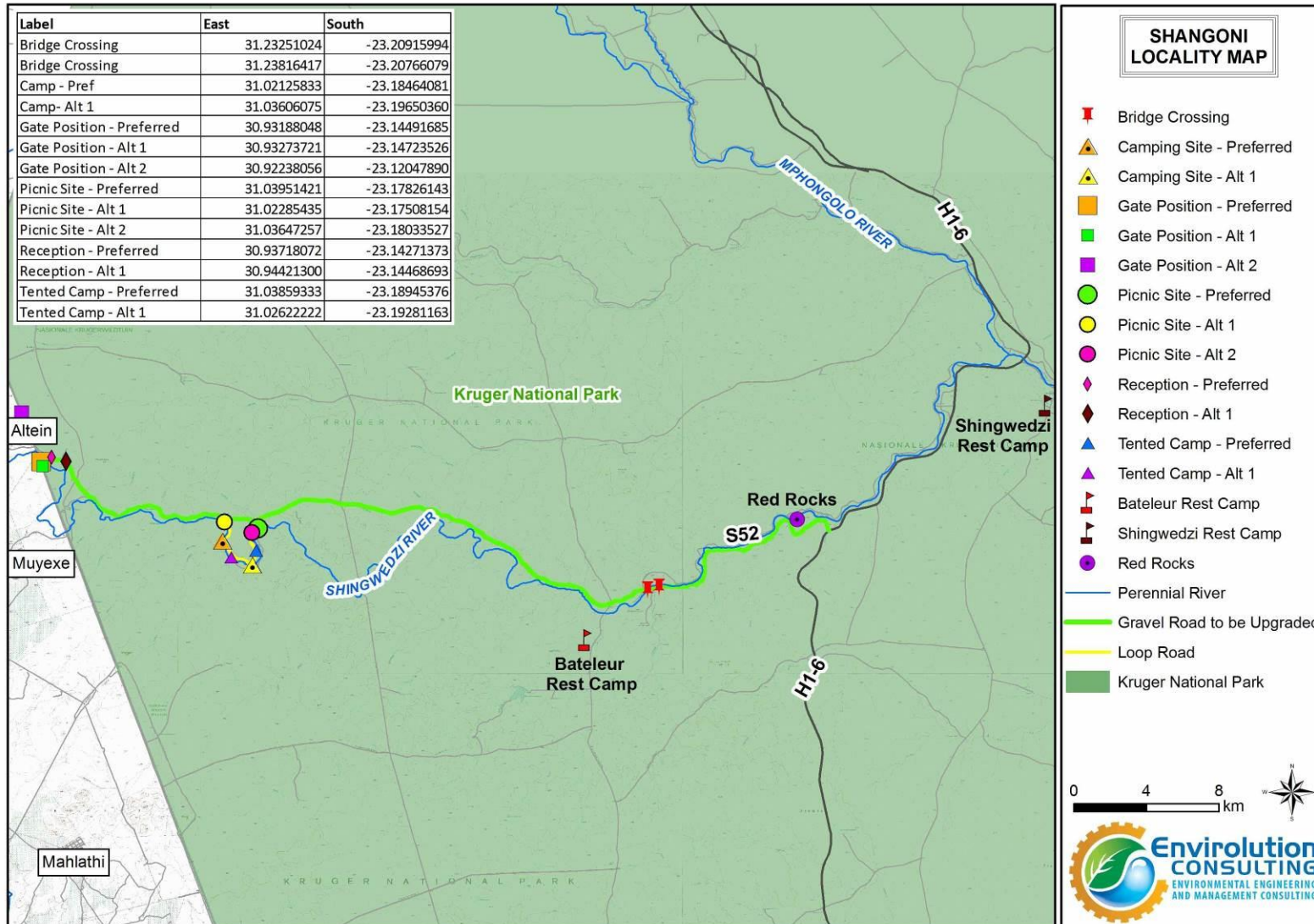


Figure 1: Shangoni Gate Development locality map.

### **3.1. Vegetation Impacts**

In terms of vegetation impacts, a loss of indigenous vegetation or indigenous plant species due to clearing for construction for the new Shangoni Gate and the related developments. The disturbance of indigenous vegetation during construction and during the operation phase

will result in bare areas, suitable for invasive plants to get established. The new entrance road and people moving through the gate will cause a transport system for seeds and other propagules of plants, particularly of alien invasive plant species. Should disturbance occur, an increase in alien species can be expected within the disturbed areas. It is important to note that Alien invader plant species pose an ecological threat as they alter habitat structure; lower biodiversity, change ecosystem services and processes e.g. change nutrient cycling and productivity, and modify food webs. Allowing invasive plant species to establish and expand their distribution range without control may have vast accumulative effects. The establishment and increase of woody alien species can pose an ecological threat. However, these species are not anticipated provided that the mitigation measures are implemented correctly and rehabilitation of the site is undertaken.

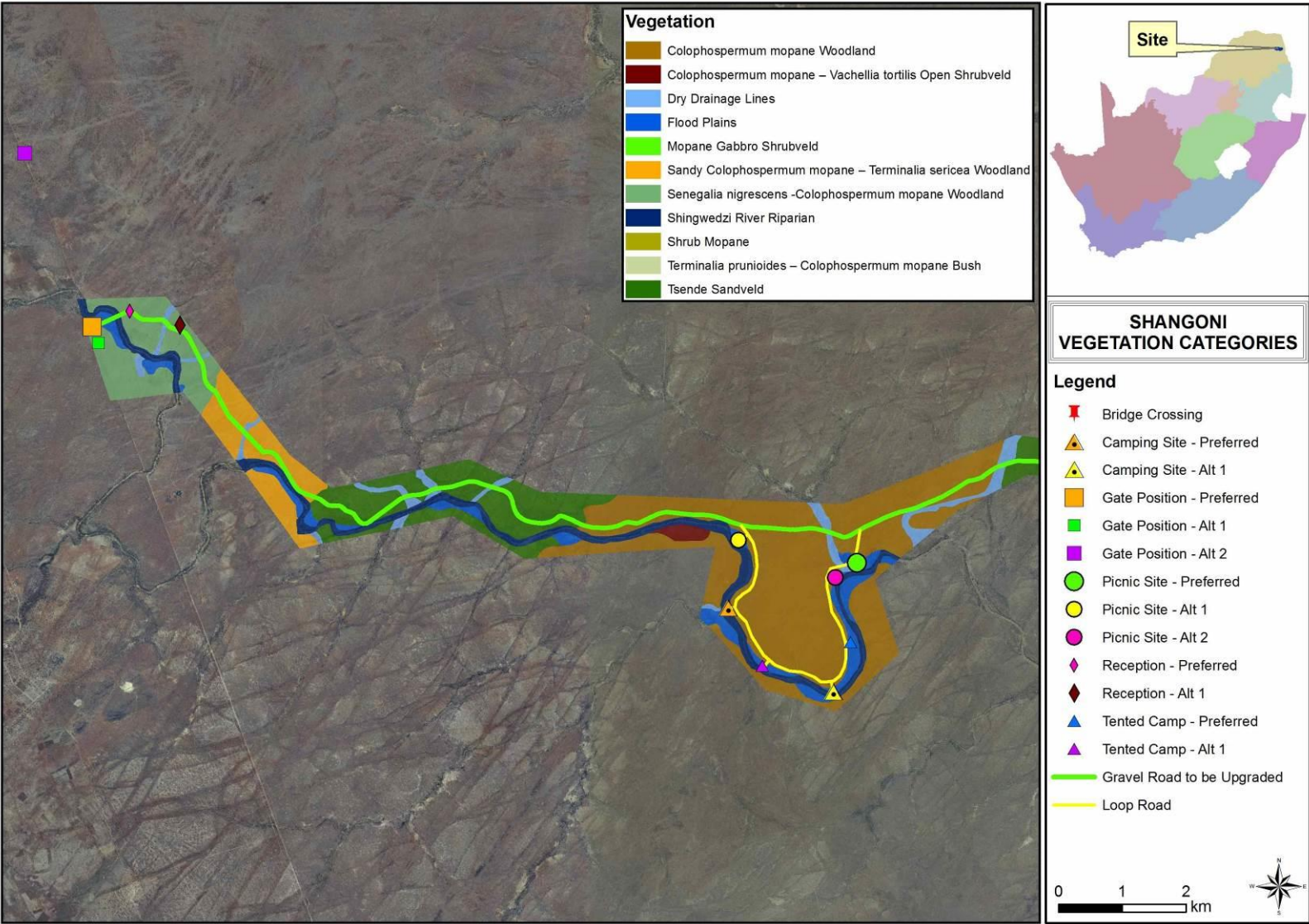


Figure 2: Vegetation map of study site Part 1 - (West)

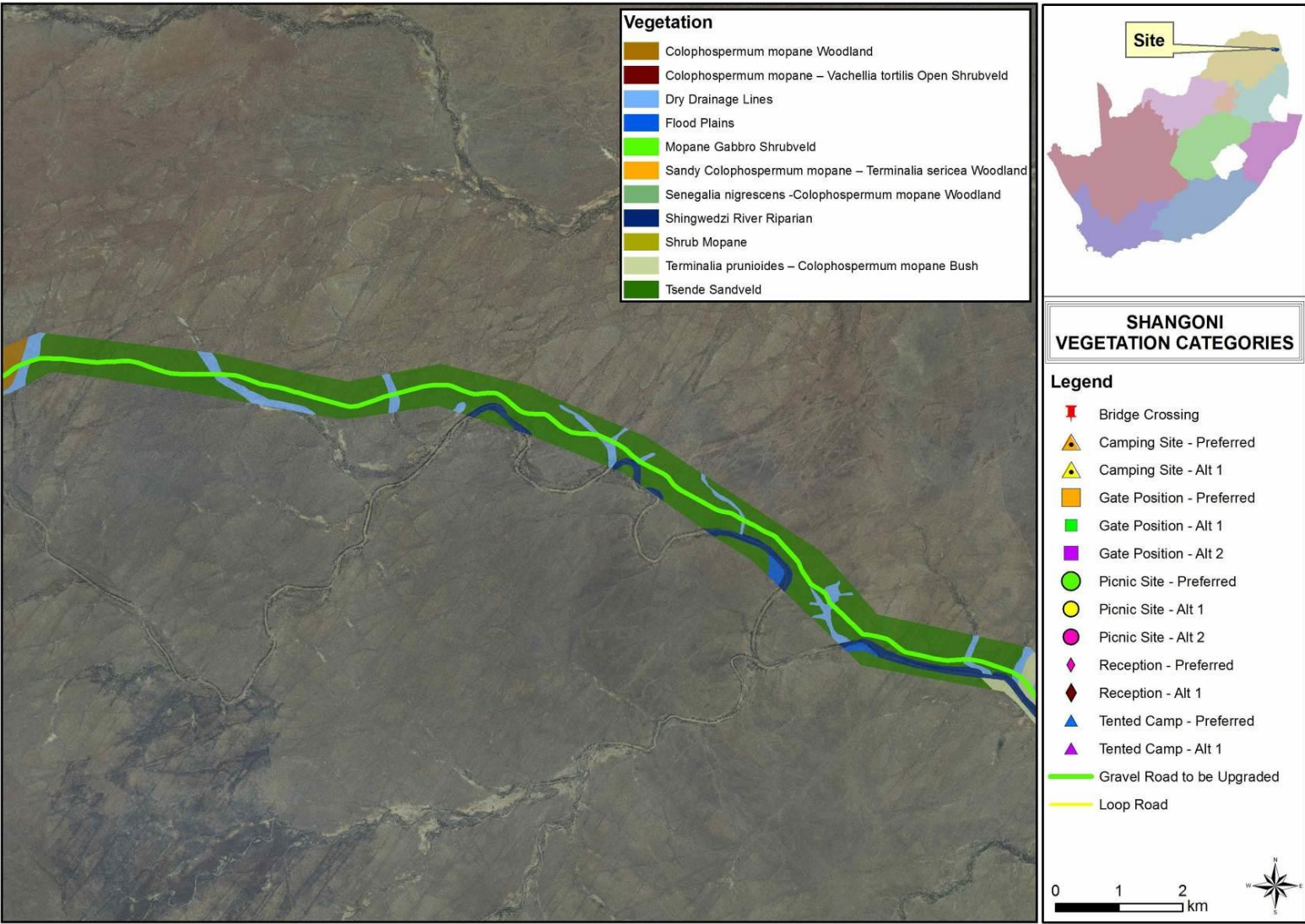


Figure 3: Vegetation map of the study site - part 2 (central)

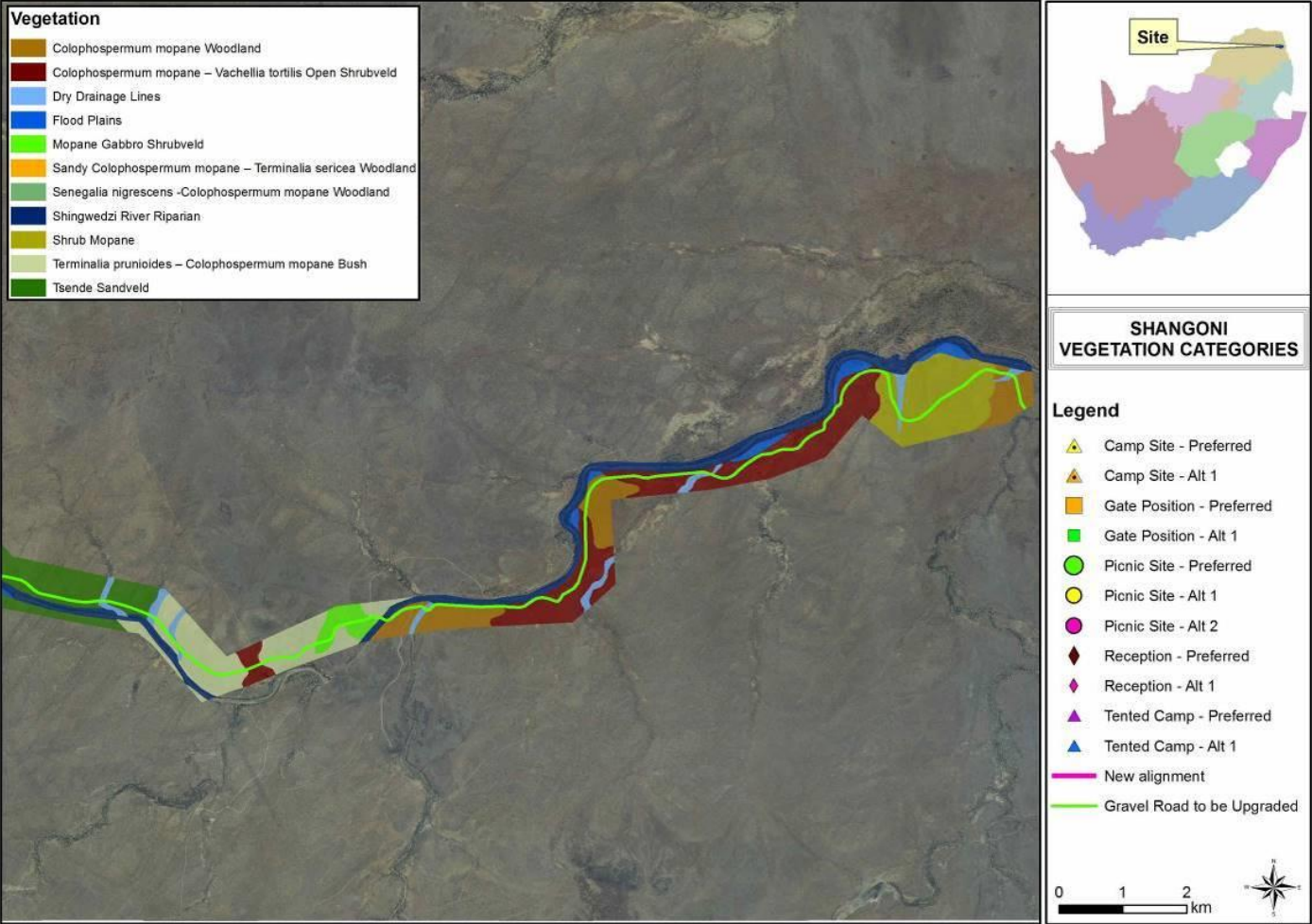


Figure 4: Vegetation map of the study site - part 3 (east)

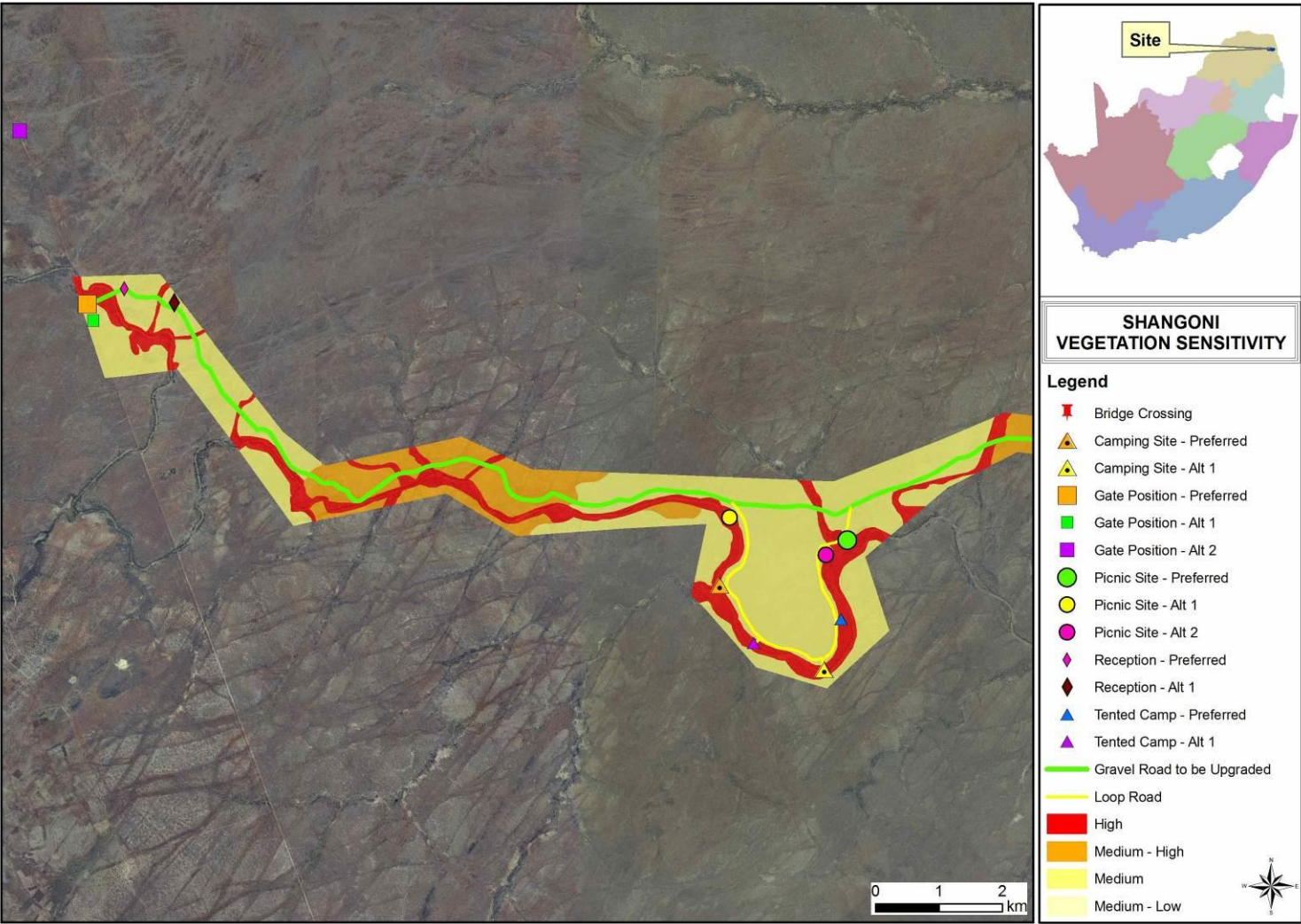


Figure 5: Sensitivity map of the study site

3.2. Watercourse Impacts

With regards to watercourse impacts, the main watercourse likely to be affected by the proposed activities is the Shingwedzi River. This river is classified as a non-perennial river, ephemeral in nature. Non-perennial ephemeral rivers are defined as rivers that have no active water flow for between 3 – 6 months in a year. A large number of smaller non-perennial rivers are also likely to be impacted by the proposed activities. The majority of these smaller rivers are also classified as non-perennial rivers although they are more likely to be episodic in nature. Episodic rivers are defined as rivers without active water flow for 9 months of the year or more. Both Ephemeral Rivers and Episodic Rivers are further characterised by high variability and high unpredictability as is evident in the occasional flooding of the Shingwedzi River. Riparian vegetation found along the banks of the Shingwedzi River are regarded as ecologically highly sensitive, as it is associated with a river, and all rivers (wetlands) in South Africa are regarded as ecologically sensitive. The removal of vegetation will also expose soil increasing the risk of erosion of the river banks. Large trees, including protected trees, do occur scattered within the riparian zone.

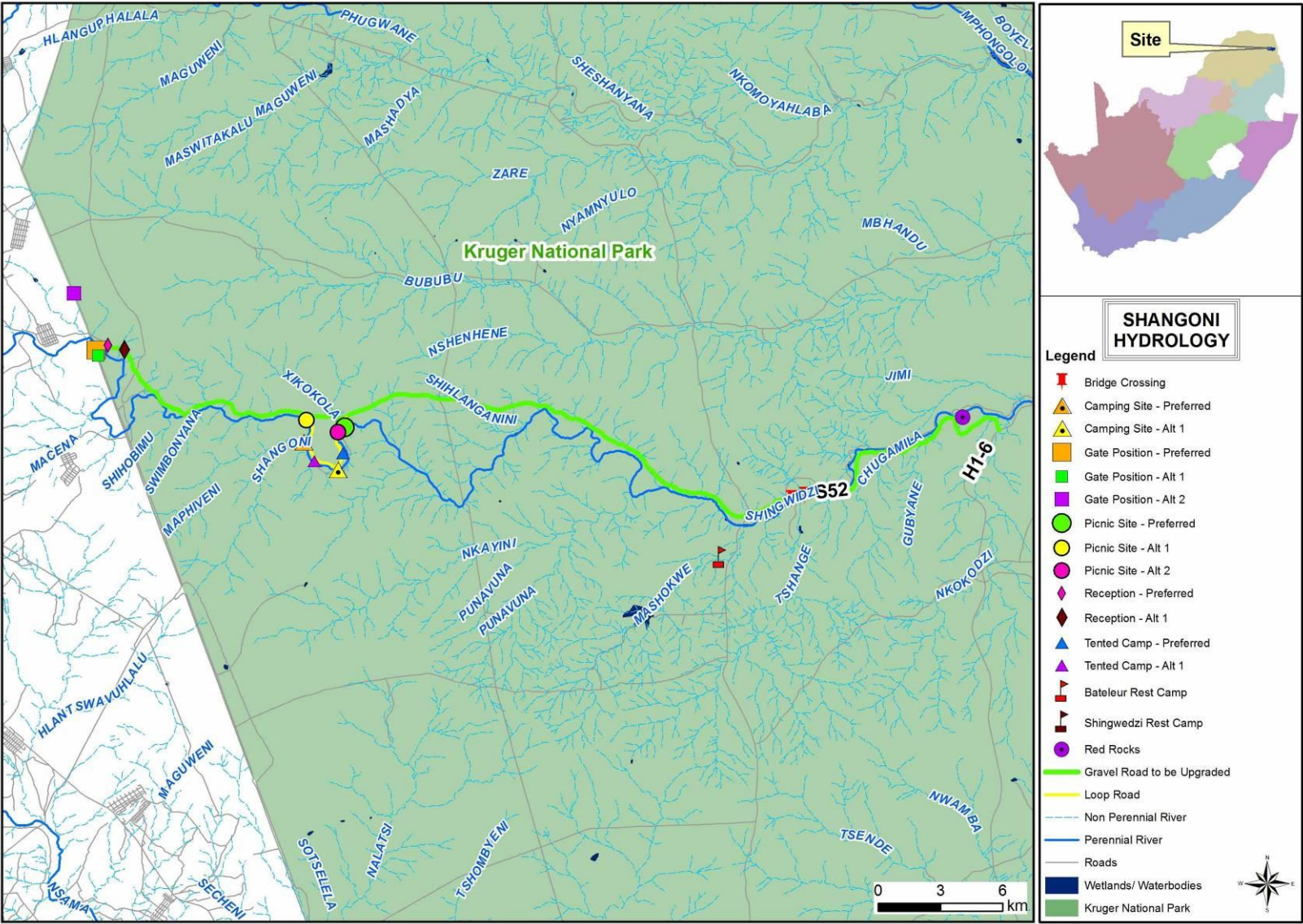


Figure 6: Hydrology map of study area.

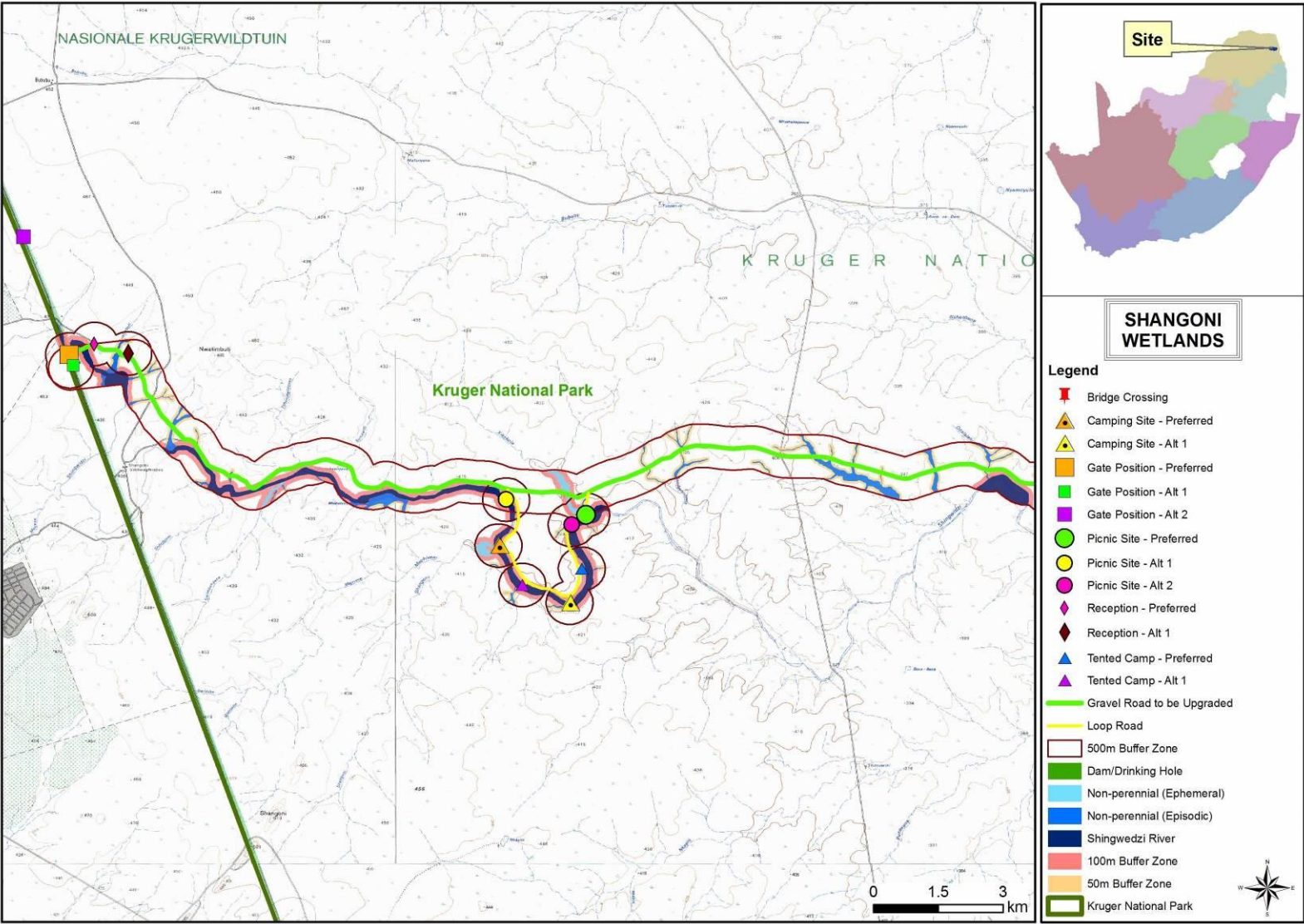


Figure 7: Watercourse sensitivity areas delineated together with associated buffer zones

### **3.3. Fauna, avifauna and habitat Impacts**

The conservation status of the study area to be affected by the development and adjacent land is rated as Medium-High, i.e. Land where sections are disturbed but that is still ecologically sensitive to development/disturbance. The numerical significance (impact) values for the tourist amenities and for the upgraded road fall within the Moderate Environmental Significance class, in the case of public amenities only marginally. The proposed development will yield no noticeable influence of species richness given the extensive nature of the area where the improvements are planned. No threatened species will be fatally impacted by the proposed development since their survival potential is accommodated in the rest of the extensive natural areas of the park, contingent on heeding our proposals to safeguard vulture nests against disturbances. Two issues are red-flagged as sensitive. The first is the riparian zone which is normally regarded as no-go areas. The second issue to address is the proximity of three White-backed Vulture nests in the vicinity of the five southernmost proposed development sites. The increase in traffic along the road will result in an increased risk of mortality for mammals, birds, reptiles and amphibians. This issue is particularly pertinent to SANParks staff members who will be using the road to travel to and from Giyani, Thohoyandou and surrounding areas, and who may use this road at night when the risk of road kill is far greater, particularly when speeding is involved. Groups of birds at particular risk include owls, nightjars and Bronze-winged Coursers. The specialists contend that given mitigation measures, there will be no impact on either species richness or overall conservation interests.

### **3.4. Visual Impacts**

Within the study area, observers experience and interact differently with their environment and therefore value it differently. They may be affected by the proposed project due to additions or alterations in the visual environment which may influence their experience and views of the visual resource. Tourists will have a minimal exposure to the road construction. They will pass the most western section of the road when travelling on the H1-6. Their exposure to the construction activity will be limited to that specific location, and will be brief. Tourists are users of the roads passing the road construction and their main purpose for visiting, is to enjoy the pristine character of the landscape. They are classified as observers of high sensitivity. Once the development is in the operational phase all the facilities and infrastructure will be similar in appearance and function compared to most of the other facilities in the park. It will be familiar additions that can be described as compatible with the KNP's existing infrastructure. This is considered in accordance with the KNP internal vision and planning strategy for the northern part of the park.

### **3.5. Heritage Impacts**

As Stone Age material was identified on the surface in areas where sheet erosion is taking place, the material is viewed to have very little significance, as it is not in its original context any more. A natural site revered by people from the local community is located some distance off from the road that is to be upgraded and would therefore not be impacted on by the proposed development.

### 3.6. Socio-economic Impacts

The envisaged total investment in construction costs for the entire Shangoni Development (incl external related developments) of approximately R43.8 million, could create an additional R86.1 million in new business sales, R19.4 million in additional GGP, as well as an additional 194 once-off employment opportunities. Total impact includes direct, indirect as well as induced effects. If the proposed Shangoni Gate Development were not to occur, the above benefits in terms of additional business sales, GGP, employment, as well as rates and taxes payable to the local fiscus, would be lost to the Greater Giyani Local Municipality and Thulamela Local Municipality, Mopani District and provincial economies. The proposed development will potentially provide numerous economic possibilities which will mainly benefit the surrounding communities and fits the Tourism strategy of development of underdeveloped nodes and one of the nearby communities have also been identified as a presidential poverty node. It must be noted that this proposed Shangoni Gate development inside the Kruger National Park forms part of a larger tourism development plan in the region that includes improved road access from Malamulele up to the proposed gate position, three star lodges outside the park, heritage sites with business opportunities (old gold mine and other heritage sites).

## 4. APPLICABLE LEGISLATION

Several laws and regulations apply to the protection of the environment and contain environmental principles and standards that need to be applied and permits and licences that need to be obtained. This EMPr will be subject to regulatory control under a range of State, Provincial and Local regulations. Such legislation largely embraces pollution prevention, resource use and conservation, and socio cultural (heritage) protection. This chapter reviews legislation pertaining to the proposed Shangoni Gate Development, Kruger National Park.

According to Section 2 (1, 2 & 3) of the National Environmental Management Act No. 107 of 1998 (NEMA), all organs of state have to apply certain principles set out in NEMA when taking decisions that may significantly affect the environment. The key principles of this Act include that all “actions” that they approve must be economically, socially and environmentally sustainable. It further states that “people and their needs” must be at the forefront of “its concern” and their interests must be served equitably. The intent of this EMPr is to ensure that the developer conducts all its activities related to the construction and maintenance of this erosion protection measure in accordance with the provisions of the NEMA, and has taken into account the provisions of the Constitution and the principles of Integrated Environmental Management.

Key environmental legislations that are applicable to the project are described below:

#### **4.1 The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)**

The Constitution is the most important piece of legislation that provides a framework for environmental management in South Africa. There are various sections that have implications for environmental management, hence for sustainable development. The Bill of Rights is fundamental to the Constitution of South Africa and in, section 24 of the Act. Other sections in the Constitution that are of importance are section 32 which deals with the right of access to information; section 33 which provides for just administrative action; section 38 which deals with the extended *locus standi* provisions.

Section 24 therefore places a duty on all spheres of government to take reasonable steps, including to make laws, prevent pollution, promote conservation and ensure sustainable development.

*While no permitting or licensing requirements arise from this legislation. However, this Act will find application during the construction phase of the project in proper management of the environment. An EMP has been compiled for this purpose, to ensure that the environment is protected throughout the phases of the development.*

#### **4.2 National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended)**

The National Environmental Management Act (Act 107 of 1998) generally known as “NEMA” is South Africa’s overarching framework for environmental legislation. The NEMA Act sets out the principles of Integrated Environmental Management (IEM). NEMA aims to promote sustainable development, with wide-ranging implications for national, provincial, and local government. Included amongst the key principles is that all development must be environmentally, economically and socially sustainable and that environmental management must place people and their needs at the forefront, and equitably serve their physical, developmental, psychological, cultural and social interest. Section 24 provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment. While Section 28 of NEMA creates a general duty of care on every person, and “person” is very widely defined, to take reasonable measures to prevent significant pollution or degradation of the environment from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

*In terms of Section 19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent significant pollution or degradation of the environment from occurring, continuing or recurring, or, in so far as such harm to the environment*

is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment

#### **4.3 National Environmental Management: Biodiversity Act 2004 (Act 10 of 2004)**

Provides management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act 107 of 1998; the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.

#### **4.4 The National Environmental Management Waste Act 2008 (Act 59 of 2008)**

The National Environmental Management Waste Act (NEMWA) reforms the law regulating waste management in order to protect health and the environment providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

#### **4.5 The Occupational Health and Safety Act 1993 (No 85 of 1993)**

The Occupational Health and Safety Act makes provision in regulation Section 8 for the general duties of employers to their employees. Section 9 of the Regulations makes provision for general duties of employers and self employed persons to persons other than their employees.

While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project. Healthy and safety precautions measures must be put in place for the construction crew and the general public

#### **4.6 The National Environmental Management: Air Quality Act 2004 (No 39 of 2004)**

National Environmental Management: Air Quality Act (NEM:AQA) which provides for the control of dust, noise and offensive odours.

While no permitting or licensing requirements arise from this legislation, this Act will find application during the demolition phase of the project. Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan.

#### **4.7 The National Environmental Management: Water Act, 1998 (Act No. 36 of 1998)**

The National Water Act aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled.

Of specific importance to this application is Section 19 of the National Water Act, 1998 (Act No. 36 of 1998), which states that an owner of land, a person in control of land or a person who occupies or uses the land which thereby causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring and must therefore comply with any prescribed waste standard or management practices. Section 20 outlines the control of emergency incidents.

*For the purpose of this project a Water Use Licence is required in terms of Section 21 (c) impeding or diverting the flow of water in a watercourse and (i) altering the bed, banks, course or characteristics of a watercourse.*

## **5. PHASES OF THE PROJECT**

The point of departure for this EMPr is to take a pro-active route by addressing potential problems before they occur. This should limit corrective measures needed during the construction and operational phases of the development. Additional mitigation will be included throughout the project's various phases, as required and if necessary.

The EMPr deals with the following phases as detailed below:

### **5.1. The Pre construction, Planning and Design Phase**

The EMPr offers an ideal opportunity to incorporate pro-active environmental management measures with the goal of attaining sustainable development.

Pro-active environmental measures minimize the chance of impacts taking place during the construction and operational phase. There is still the chance of accidental impacts taking place; however, through the incorporation of contingency plans (e.g. this EMPr) during the planning phase, the necessary corrective action can be taken to further limit potential impacts.

### **5.2. The Construction Phase**

The bulk of the impacts during this phase will have immediate effect (e.g. noise-, dust- and water pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the contingency plans identified in the planning phase, together with a commitment to sound environmental management from the developer.

### **5.3. Rehabilitation Phase**

This phase will involve restoring the land impacted during the construction phase as close as possible back to its original state. This process will mainly on rectifying the negative impacts that have been caused during construction by the removing pollution or contaminants and other dangerous substances from groundwater, sediment, or surface water and improvement of the soil. Some mitigation measures listed in the construction and operational phase include immediate rehabilitation measures on disturbed areas, therefore this phase is interlinked with the construction and operational phase.

#### **5.4. The Operational Phase**

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete.

#### **5.5. The Decommissioning Phase**

The decommissioning phase would entail the dismantling of the Shangoni entrance gate, Bridge over Shingwedzi River, Reception Facility, Picnic sites, Camping sites, Tented Sites, associated roads and the transportation of rubble from the site. It is anticipated that the Shangoni Gate development will be dismantled and removed and a rehabilitation plan (removal of all foreign material from park and provision of recycling plans) approved by the relevant authorities will be implemented.

## **6. ROLES AND RESPONSIBILITIES**

The implementation of this EMPr requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the construction phase. The stakeholders are discussed below.

### **6.1. Developer / Applicant**

The developer remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMPr. Although the developer appoints specific role players to perform functions on his/her behalf, this responsibility is delegated. The developer is responsible for ensuring that sufficient resources (time, financial, human, equipment, etc.) are available to the other role players (e.g. the ECO, ELO and contractor) to efficiently perform their tasks in terms of the EMPr. The developer is liable for restoring the environment in the event of negligence leading to damage to the environment.

The developer must ensure that the EMPr is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMPr.

The developer must appoint an independent Environmental Control Officer (ECO) during the construction phase to oversee all the environmental aspects relating to the development.

### **6.2. Contractor**

The Contractor must ensure adherence to, and compliance with, the Construction EMPr in a legal and timely manner. The Contractor must 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. The Contractor must designate a permanent Environmental Officer (EO) to monitor environmental compliance on a day-to-day basis on the construction site. The Contractor must 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. The Contractor must ensure that training is undertaken for construction supervisors and crews to recognise environmental 'red flags' and ensure that these will not be disturbed, damaged or removed and to be brought to the immediate attention of the EO or ECO to determine an action plan and way forward.

In addition the Contractor must:

- 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.

### **6.3 The Environmental Control Officer (ECO)**

The Environmental Control Officer (ECO) is appointed by the developer as an independent monitor of the implementation of the EMPr. He/she must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site. The ECO must attend relevant project meetings, conduct monthly inspections to assess compliance with the EMPr and Environmental Authorisation and be responsible for providing feedback on potential environmental problems associated with the development. In addition, the ECO is responsible for:

- Assisting in ensuring that the necessary environmental authorisations and permits have been obtained prior to construction commencing.
- Reviewing the Contractor's construction Method Statements.
- Monthly site inspections of all construction areas with regard to compliance with the EMPr.
- Monitoring and verifying adherence to the EMPr, the EA and approved Method Statements at all times.
- Monitoring and verifying that environmental impacts are kept to a minimum.
- Taking appropriate action if the specifications are not followed.
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel coming onto site.

- Advising on the removal of person(s) and/or equipment not complying with the specifications.
- Auditing the implementation of the EMPr and compliance with the EA on a monthly basis.
- Compiling a final audit report regarding the EMPr and its implementation during the construction period after completion of the contract and submitting this report to the Employer and the authorising authority.

The ECO has the right to enter the site and do monitoring and auditing at any time, subject to compliance with health and safety requirements applicable to the site (e.g. wearing of safety boots and protective head gear).

**(a) Liaison with Authorities**

The ECO will be responsible for liaising with the Department of Environmental Affairs (DEA). The ECO must submit monthly environmental audit reports to the authorities (if required). These audit reports must contain information on the contractor and developer's levels of compliance with the EMPr. The audit report must also include a description of the general state of the site, with specific reference to sensitive areas and areas of non-conformance. The ECO must indicate suggested corrective action measures to eliminate the cause of the non-conformance incidents. In order to keep a record of any impacts, an Environmental Log Sheet (refer to Appendix 1) is to be kept on a continual basis.

**(b) Liaison with Contractors**

The ECO is responsible for informing the contractors of any decisions that are taken concerning environmental management during the construction phase. This would also include informing the contractors of the necessary corrective actions to be taken.

**6.4 Project Engineer (PE)**

The Project Engineer (PE) will be appointed by the 'Developer' and will be required to oversee the construction programme and construction activities performed by the Contractor. The PE is expected to liaise with the Contractor and ECO on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences. He/she will oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications. The PE will also be required to be familiar with the EMPr specifications and further monitor the Contractor's compliance with the Environmental Specifications on a daily basis, through the Site Diary, and enforce compliance.

## 6.5 Environmental Liaison Officer (ELO)

The contractor must appoint an Environmental Liaison Officer (ELO) to assist with day-to-day monitoring of the construction activities. Any issues raised by the ECO will be routed to the ELO for the contractors' attention. The ELO shall be permanently on site during the construction phase to oversee the Contractor's internal compliance with the EMPr requirements and ensuring that the environmental specifications are adhered to. The ELO should ideally also be a senior and respected member of the construction crew.

The ELO will be responsible for keeping detailed records of all site activities that may pertain to the environment and include all these aspects in an environmental register. This register must be presented at each EMC meeting and be made available to the ECO during his/her monthly audits. In addition to the environmental register the ELO must keep a register of complaints from any community members on environmental issues. Finally, the ELO will be required to keep a record of all on-site environmentally related incidents and how these incidents were dealt with. Past experience has revealed that, ELO's that can relate to the work force are the most effective for information transfer and ensuring compliance with the EMPr.

## 7. ENVIRONMENTAL AWARENESS PLAN

**OBJECTIVE:** Ensure all construction and operation personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm (Environmental Awareness Plan)

To achieve effective environmental management, it is important that Contractors and site employees are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The developer is responsible for informing its employees and contractors (transportation contractor) of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The developer's obligations in this regard include the following:

- Employees must have a basic understanding of the key environmental features of the site and its surrounding environment.
- Ensuring that a copy of the EMPr is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees must be familiar

with the requirements of the EMPr and the environmental specifications as they apply to the operation of the facility.

- Ensuring that, prior to commencing any new site works, all employees have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Awareness of any other environmental matters, which are deemed to be necessary by the Environmental Control Officer.
- Ensuring that appropriate communication tools are used to outline the environmental “do’s” and “don’ts” (as per the environmental awareness training course) to employees.
- Records must be kept of those that have completed the relevant training.
- Refresher sessions must be held to ensure the operating staffs are aware of their environmental obligations.

Prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

### **7.1 Environmental Awareness Training**

Environmental Awareness Training must be undertaken by the Contractor and must take the form of an on-site talk and demonstration by the Contractor before the commencement of construction activities on site. This Environmental Awareness Training should include the Kruger National Park Code of Conduct. A record of attendance of this training must be maintained by the Contractor on site.

### **7.2 Induction Training**

Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations.

This induction training should be undertaken by the Contractor and should include discussing the SANPark's environmental policy and values, the function of the EMPr and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the repercussions of not complying with these. The reporting procedure must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the Contractor on site.

### **7.3 Toolbox Talks**

Toolbox talks should be held on a scheduled and regular basis (at least once a month) where the Contractor and all employees on site hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

## **8. ENVIRONMENTAL MANAGEMENT PROGRAM (EMPr)**

The following table forms the core of this EMPr for the pre-construction, planning and design construction, operational and rehabilitation phases of the development. This table should be used as a checklist on site, especially during the construction phase. Compliance with this EMPr must be audited monthly during the construction phase and once immediately following completion of construction.

**8.1. PRE CONSTRUCTION, PLANNING AND DESIGN PHASE.**

**Table 1: Pre construction, planning and design phase: Environmental Management Programme for the proposed project**

Activity / issue	Action required during pre-construction, planning and design phase	Frequency	Responsible party
<p align="center"><b>Final Specialist Walk-through</b></p>	<p>a) An ecological specialist, fauna specialist, surface water specialist, visual specialist and heritage specialist must be commissioned to perform a final walkthrough of the site. Recommendations by the specialists must be made regarding the final positioning of the respective proposed developments. These recommendations must cover buffer identification, sensitive sites identification, no-go areas identification, fine scale mapping and site specific mitigation measures within the development footprint.</p>	<p align="center">Once-off</p>	<p align="center">Developer, Contractor, ECO</p>
<p align="center"><b>8.1.1 Appointment and Duties of ECO</b></p>	<p>b) The Developer must appoint an independent Environmental Control Officer (ECO) who must monitor the contractor's compliance with the EMPr.                      c) The developer must provide the ECO and contractor with a copy of the EMPr.                      d) The priority of the ECO is to maintain the integrity of the development conditions outlined in the EMPr.                      e) The ECO must form part of the project management team and attend all project meetings.                      f) The contractor must ensure that the construction crew attend an environmental briefing and training session presented by the ECO prior to commencing activities on site.                      g) Report on environmental compliance at the monthly site meetings</p>	<p align="center">Once-off</p>	<p align="center">Developer, Contractor, ECO</p>

Activity / issue	Action required during pre-construction, planning and design phase	Frequency	Responsible party
<p><b>8.1.2. Appointment and Duties of ELO</b></p>	<p>a) The contractor must appoint an Environmental Liaison Officer (ELO). This person will be required to monitor the situation with a direct hands-on approach, and ensure compliance and co-operation of all personnel. He/She should be fluent in the languages of the employees.</p> <p>b) This EMPr must be made binding to the main contractor as well as individual contractors and should be included in tender documentation for the construction contract.</p>	<p>Once-off</p>	<p>Contractor , Developer, ECO</p>

Activity / issue	Action required during pre-construction, planning and design phase	Frequency	Responsible party
<p><b>8.1.3. Training for Site Personnel</b></p>	<p>a) All Contractor teams involved in construction work are to be required to undergo some form of environmental induction on their obligations towards environmental controls and methodologies in terms of this EMP, prior to commencing of the works.</p> <p>b) The Contractor shall ensure that all site personnel have a basic level of environmental awareness training. Topics covered should include;</p> <ul style="list-style-type: none"> <li>• What is meant by “Environment”</li> <li>• Why the environment needs to be protected and conserved</li> <li>• How construction activities can impact on the environment</li> <li>• What can be done to mitigate against such impacts</li> <li>• Awareness of emergency and spills response provisions</li> <li>• Social responsibility during construction of the fire station</li> </ul> <p>c) It is the Contractor’s responsibility to provide the site foreman with environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.</p> <p>d) Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary.</p> <ul style="list-style-type: none"> <li>• Use should be made of environmental awareness posters on site.</li> <li>• The need for a “clean site” policy also needs to be explained to the workers.</li> <li>• Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.</li> </ul> <p>e) The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed.</p> <p>f) Environmental inductions may take the form of onsite talks and demonstrations by the Contractor and the ECO. Induction report will be signed by the Contractor as well as the Employee undergoing Induction, and records kept for auditing purposes and copies given to the ECO for filing. The education / awareness programme should be aimed at all levels of management and staff within the Contractor’s team, and particularly labour drawn from surrounding communities.</p>	<p>Once-off, As necessary</p>	<p>Developer, ECO, Contractor</p>

Activity / issue	Action required during pre-construction, planning and design phase	Frequency	Responsible party
<p><b>8.1.4. Record Keeping</b></p>	<p>a) It is recommended that photographs are taken of the site prior to, during and immediately after construction as a visual reference. These photographs should be stored with related documents and other records related to this EMP.</p> <p>b) All specialists reports (Vegetation, Wetland Delineation, Fauna, Geotechnical, Socio-economic, Heritage Impact Assessment must be kept on site.</p> <p>c) The Contractor shall ensure that all pertinent permits, certificates and permissions have been obtained prior to any activities commencing on site and ensure that they are strictly enforced / adhered to. This includes, for example, updating the Department of Water Affairs and Sanitation (DWS) Water Use licence and other monitoring programs.</p> <p>d) All records related to the implementation of this management plan (e.g. site instruction book, ECO reports, induction records, method statements, must be kept together in an office where it is safe and can be retrieved easily.</p> <p>e) All relevant records should be kept for a minimum of two years after construction and should at any time be available for scrutiny by any relevant authorities or stakeholder.</p>	<p>Continuous</p>	<p>Developer, ECO, Contractor</p>
<p><b>8.1.5. Layout Plan</b></p>	<p>a) The Environmental sensitivity maps compiled during the Basic Assessment and present in the vegetation report, fauna and wetland report should be used as a decision tool to guide the final layout design of the proposed development.</p> <p>b) The extent of the construction sites and access roads should be demarcated on site layout plans and should be restricted to disturbed areas or those identified with low conservation importance. Therefore, no construction personnel or vehicle may leave the demarcated area except those authorised to do so. Those areas surrounding the construction site that are not part of the demarcated development area should be considered as “no-go” areas for employees, machinery</p>	<p>Once-off</p>	<p>Developer, Contractor</p>

Activity issue /	Action required during pre-construction, planning and design phase	Frequency	Responsible party
	or even visitors;		

Activity / issue	Action required during pre-construction, planning and design phase	Frequency	Responsible party
<p><b>8.1.6. Environmental Protection Plan</b></p>	<p>a) Within 21 days of the Commencement Date, the Site Contractor shall prepare and submit to the Project Manager for approval in consultation with the ECO an Environmental Protection Plan. The Plan shall cover all environmental protection works and shall also include descriptions of environmental safeguards and emergency procedures.</p> <p>b) The Plan shall include a description of the administrative structure and lines of communication which shall be established between the Contractor's and his subcontractors' workforce for the implementation of environmental protection procedures. Details of the expertise available for the implementation of environmental protection procedures must also be provided.</p> <p>c) In addition this plan must have a site layout plan and showing the final positions and extent of all permanent and temporary site structures and infrastructure, including:</p> <ul style="list-style-type: none"> <li>• Buildings</li> <li>• Contractors' camp</li> <li>• Roads and access routes, gates and fences.</li> <li>• Essential services (permanent and temporary water, electricity and sewage)</li> <li>• Rubble and waste rock storage and disposal sites.</li> <li>• Site toilets and ablutions.</li> <li>• Firebreaks.</li> <li>• Excavations and trenches.</li> <li>• Topsoil stockpiles.</li> <li>• Spoil areas.</li> <li>• Construction materials stores.</li> <li>• Vehicle and equipment stores.</li> <li>• Sensitive and No go areas &amp; applicable buffers. This must include all areas of Environmental sensitivity (natural environment, sensitive habitats wetland areas and protected species)</li> <li>• All temporary and permanent water management structures including bunds and sumps</li> </ul>	<p>Once-off</p>	<p>Developer, Contractor</p>

Activity / issue	Action required during pre-construction, planning and design phase	Frequency	Responsible party
<b>8.1.7. Existing Services and Infrastructure</b>	a) The Contractor shall ensure that existing essential services (e.g. solar hybrid structures, boreholes etc) are not damaged or disrupted unless required by the contract and with the permission of the PE. b) The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted. c) Such repair or reinstatement will be to the Contractor's cost and shall receive top priority over all other activities. d) A time limit for the repairs may be stipulated by the RE in consultation with the Contractor.	As necessary	Developer, Contractor
<b>8.1.8. Emergency Preparedness</b>	a) If chemicals in sufficient quantity and toxicity have the potential to be released on the construction sites, emergency contingency plans should be prepared as safety measures (Bunded areas). These safety measures should be communicated to the relevant personnel on the construction site. All hazardous installations require a Risk Assessment in terms of the Occupational Health and Safety Act, (Act No.85 of 1993) for construction sites.	As necessary	Developer, Contractor
<b>8.1.9. Method Statements</b>	a) The Contractor shall submit written Method Statements to the RE for the activities identified by the RE or ECO. Activities that will require method statements include: <ul style="list-style-type: none"> <li>• Logistics for the Environmental Awareness Training Course</li> <li>• Location and Layout of Construction camp</li> <li>• Construction procedures</li> <li>• Cement and concrete batching</li> <li>• Solid and Hazardous Waste Management</li> <li>• Drainage and Storm water planning</li> <li>• Dust Control</li> </ul>	As necessary	Developer, Contractor, ECO

Activity / issue	Action required during pre-construction, planning and design phase	Frequency	Responsible party
<p><b>8.1.9. Method Statements</b></p>	<ul style="list-style-type: none"> <li>• Stockpiling area</li> <li>• Vegetation removal</li> <li>• Materials and equipment to be used</li> <li>• Getting the equipment to and from the site</li> <li>• How the equipment material will be moved while on site</li> <li>• How and where material will be stored</li> <li>• The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur</li> <li>• Timing and location of activities</li> <li>• Compliance/non compliance with Specifications</li> <li>• Site camp establishment</li> <li>• Concrete pre-cast and batching operation</li> <li>• Emergency procedures</li> <li>• Materials, equipment and staffing requirements</li> <li>• Transporting the materials and/or equipment to, from and within the site</li> <li>• Stockpiling of rubble</li> <li>• General and Hazardous waste management on site</li> <li>• The storage provisions for the materials and/or equipment</li> <li>• The proposed construction procedure designed to implement the relevant Environmental Specifications</li> <li>• Other information deemed necessary by the RE and/or ECO.</li> </ul>		

Activity issue /	Action required during pre-construction, planning and design phase	Frequency	Responsible party
	<ul style="list-style-type: none"> <li>b) Method Statements shall be submitted at least ten working days prior to the proposed commencement of work on an activity to allow the RE (and/or ECO) time to study and approve the method statement.</li> <li>c) Contractor shall not commence work on that activity until such time as the Method Statement has been approved in writing by the RE contract.</li> <li>d) The Contractor shall carry out the activities in accordance with the approved Method Statement.</li> <li>e) Under certain circumstances, the RE may require changes to an approved Method Statement. In such cases the proposed changes must be agreed upon in writing between the Contractor and the RE, and appropriate records retained.</li> <li>f) Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the EMPr specifications.</li> </ul>		

Activity / issue	Action required during pre-construction, planning and design phase	Frequency	Responsible party
<p><b>8.1.10. Site Establishment</b></p>	<ul style="list-style-type: none"> <li>a) The contractor shall establish his construction camp, office/s and any other infrastructure as per the agreed site layout plan in a manner that does not adversely affect the environment.</li> <li>b) The contractor shall submit a method statement for site clearance for approval by the RE in consultation with the ECO. Site establishment shall take place in an orderly manner and all required amenities shall be installed at Camp site before the main workforce move onto site.</li> <li>c) Designate access roads during the planning phase allowing only wetland crossing at designated points</li> <li>d) The Construction camp shall have the necessary ablution facilities with chemical toilets at commencement of construction activities to the satisfaction of the Project Manager. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.</li> <li>e) Safe drinking water for human consumption shall be available at the site offices and at other convenient locations on site. All water used on site must be taken from a legal source and comply with the recognised standards for potable and other uses.</li> <li>f) No fires on site will be allowed. Activities which may pose a risk of fire must be identified and suitable measures must be put in place to prevent any possible damage by fire. Contractors must inform the staff of the risk of fires and fire prevention and emergency procedures in the event of a fire. Fire fighting equipment shall be supplied by the Contractor at suitable locations</li> <li>g) The construction camp must preferably be positioned where it will not visually impact on adjacent landowners and should not be located in an environmentally sensitive area</li> <li>h) All sensitive areas, heritage (if encountered), wetland, drainage lines, should be demarcated and fenced off before development commences. These areas should be treated as “no go” areas.</li> <li>i) Invasive alien plant species should be treated in an appropriate manner.</li> <li>j) Alien plant eradication and follow-up control activities prior to construction.</li> </ul>	<p>Once-Off</p>	<p>Developer, Contractor, ECO</p>

## 8.2. CONSTRUCTION PHASE

**Table 2: Construction Phase: Environmental Management Programme for the proposed project**

\*some mitigation measures listed in this section below include immediate rehabilitation measures on disturbed areas.

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
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Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.1. Protection of Vegetation</b></p>	<ul style="list-style-type: none"> <li>a) Limit disturbance of natural vegetation to a minimum.</li> <li>b) Avoid removal of large trees.</li> <li>c) No protected trees or plants may be removed without the relevant permits from the Department of Agriculture, Forestry and Fisheries (DAFF).</li> <li>d) Do not plant any non-indigenous trees or shrubs or any garden ornamentals at the gate, use KNP indigenous plant species only.</li> <li>e) Remove and control all alien woody plant species that may appear during construction.</li> <li>f) The clearing of vegetation must be kept to a minimum and remain within the footprint of the particular picnic site, camping and tented camp site.</li> <li>g) The clearing of vegetation must be kept to a minimum and remain within the footprint of the bridge – erosion of the river banks must be avoided at all times.</li> <li>h) The clearing of vegetation must be kept to a minimum and remain within the footprint of the road.</li> <li>i) Disturbed areas must be rehabilitated immediately after construction has been completed in that area by sowing appropriate indigenous grass species, this is to avoid erosion of the river banks.</li> <li>j) Disturbed areas on road shoulder must be rehabilitated immediately after construction has been completed in that area (e.g. by sowing appropriate indigenous grass species).</li> <li>k) During the construction phase workers must be limited to areas under construction and access to the undeveloped riparian areas must be strictly controlled.</li> <li>l) Areas which have been disturbed will be quickly colonised by invasive alien species. An ongoing management plan must be implemented for the clearing/eradication of alien species.</li> <li>m) Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.</li> </ul>	<p>Continuous</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
	<ul style="list-style-type: none"> <li>k) Implement fines for the damage or destruction of marked and protected specimens.</li> <li>l) Staff may not tamper or remove flora and neither may anyone collect seed from the plants without permission from the local authority.</li> </ul>		
<p><b>8.2.2. Protection of Fauna and Habitat</b></p>	<ul style="list-style-type: none"> <li>a) The standard SANParks speed restrictions (50km/h on tar roads and 40km on dirt roads) are deemed adequate if it is enforced.</li> <li>b) The tented camp, camp site and picnic site terrain should preferably be planned according to the “light footprint” / rustic principle.</li> <li>c) Normal precautionary measures included in the SANParks construction and operational modus operandus would suffice viz. unwarranted use of natural resources (viz. poaching, trapping, harvesting plant materials).</li> <li>d) Impacts can be offset by providing extraordinary opportunities such as bat hotels, sufficiently-sized drainage pipes supporting bridges to coincidentally serve as daytime roosts for cave-dwelling bats, nooks and crannies as refuge for reptiles, nesting, educational amenities (such as at the reception facility), bird baths etc.</li> <li>e) All staff and contractors must undergo an environmental induction course held by the ECO as well as faunal education and awareness programmes.</li> <li>f) None other than the standard precautionary measures incorporated in SANParks best-practice development protocol in a conservation area.</li> <li>g) Runoff rain water from the black-topped road will influence grass and seedling germination that in turn will require the standard maintenance procedures developed by SANParks over time.</li> <li>h) Education and awareness campaigns on faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors.</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
	<ul style="list-style-type: none"> <li>i) The spatial extent of construction activities must be minimized, and as far as possible must be restricted to the areas on which buildings, roads etc will actually be located.</li> <li>j) No poaching or snaring of any game is permitted. The operator must implement fines in this regard.</li> <li>k) The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area.</li> <li>l) The development should maintain connectivity between ecologically important habitats by retaining natural corridors for the movement of fauna.</li> <li>m) Pets and livestock are not allowed on site.</li> <li>n) Any bird nests that are found during the construction period must be reported to the Environmental Control Officer (ECO).</li> <li>o) Movement of construction vehicles and workers beyond the boundary of the site must be minimized. In addition, workers must be instructed to minimize disturbance of birds at all times, and steps must be taken to ensure that no illegal hunting occurs.</li> <li>p) The Critically Endangered White-backed Vultures that are breeding in the vicinity of the proposed camp site and tented camp site require special consideration in terms of mitigation. A 500-m buffer zones must be maintained around each nest site, within which no activity takes place.</li> <li>q) Driving at night on the new road by SANParks staff must be kept to a minimum.</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.3. Protection of Wetlands and other Watercourses</b></p>	<ul style="list-style-type: none"> <li>a) Construction affecting watercourses must be restricted to the dryer winter months.</li> <li>b) A temporary fence or demarcation must be erected around No-Go Areas outside the proposed works area prior to any construction taking place as part of the contractor planning phase when compiling work method statements to prevent access to the adjacent portions of the watercourse.</li> <li>c) Effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMP. High energy stormwater input into the watercourses should be prevented at all cost. Changes to natural flow of water (surface water as well as water flowing within the soil profile) should be taken into account.</li> <li>d) No impeding water flow during construction.</li> <li>e) Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses.</li> <li>f) Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should thus be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water thus reducing the risk of erosion. Effective sediment traps should be installed.</li> <li>g) Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area.</li> <li>h) Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
	<ul style="list-style-type: none"> <li>i) Rehabilitation plans must be submitted and approved for rehabilitation of damage during construction and that plan must be implemented immediately upon completion of construction.</li> <li>j) During the construction phase measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation.</li> <li>k) Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.</li> <li>l) Runoff from the construction area must be managed to avoid erosion and pollution problems.</li> <li>m) Where construction occurs in the demarcated watercourse and buffer, extra precautions should be implemented to so as to minimise watercourse loss.</li> <li>n) Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone.</li> <li>o) Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse.</li> <li>p) The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.</li> <li>q) Maintenance of construction vehicles / equipment should not take place within the watercourse or watercourse buffer.</li> <li>r) The wetland rehabilitation- and monitoring plan must be used in conjunction with this EMPr to mitigate the construction related impacts.</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>
<p><b>8.2.4. Erosion and Sedimentation</b></p>	<ul style="list-style-type: none"> <li>a) Do not allow erosion to develop on a large scale before taking action.</li> <li>b) Increased run-off during construction must be managed using berms and other suitable structures as required to ensure flow velocities are reduced; this must be done in consultation with the ECO</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
	<ul style="list-style-type: none"> <li>c) Where possible, no construction activities should be undertaken within the moist grasslands.</li> <li>d) The extent of wetland conditions should be verified by a wetland specialist and no activities should take place within these areas without that a Water Use License was granted by the Department of Water Affairs (DWA) for these activities</li> <li>e) Make use of existing roads and tracks where feasible, rather than creating new routes through vegetated areas.</li> <li>f) Leave as much natural vegetation as possible intact during construction.</li> <li>g) Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area.</li> <li>h) Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. The grassland can be removed as sods and re-established after construction is completed.</li> <li>i) Colonisation of the disturbed areas by plants species from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, then the areas need to be rehabilitated with a grass seed mix containing species that naturally occur within the study area.</li> <li>j) Protect all areas susceptible to erosion (especially the sloped rocky grassland) and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.</li> </ul>		<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.5. Alien Invasive Plant Species</b></p>	<ul style="list-style-type: none"> <li>a) An alien invasive management programme must be incorporated into the Environmental Management Programme.</li> <li>b) Ongoing alien plant control must be undertaken during construction.</li> <li>c) Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.</li> <li>d) The clearing of vegetation must be kept to a minimum and remain within the footprint of the bridge – erosion of the river banks must be avoided at all times.</li> <li>e) Disturbed areas must be rehabilitated immediately after construction has been completed in that area by sowing appropriate indigenous grass species, this is to avoid erosion of the river banks.</li> <li>f) During the construction phase workers must be limited to areas under construction and access to the undeveloped riparian areas must be strictly controlled.</li> <li>g) Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas.</li> <li>h) An on-going management plan must be implemented for the clearing/eradication of alien species.</li> <li>i) The clearing of vegetation must be kept to a minimum and remain within the footprint of the new road;</li> <li>j) Disturbed areas on road shoulder must be rehabilitated immediately after construction has been completed in that area (e.g.by sowing appropriate indigenous grass species).</li> <li>k) During the construction phase workers must be limited to areas under construction and access to the undeveloped areas must be strictly controlled</li> <li>l) No large trees may be removed (they are needed for shade)</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.6. Hazardous materials storage and protection of soil and ground water</b></p>	<ul style="list-style-type: none"> <li>a) Materials storage areas should not be allowed in close proximity to ecologically sensitive areas.</li> <li>b) 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.</li> <li>c) Ensure that all hazardous substances (chemicals, oils, etc.) are stored in appropriate, tamper proof containers in locked stores.</li> <li>d) Petroleum, chemical, harmful and hazardous materials must be stored in enclosed, bunded areas. The bunded areas shall be clearly marked.</li> <li>e) 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.</li> <li>f) The slab must be sloped towards a sump to enable any spilled fuel and water to be removed.</li> <li>g) Any wastewater collected at the sump shall be disposed of as hazardous waste</li> <li>h) Ensure that all hazardous substances are used and handled by qualified personnel on bunded surfaces.</li> <li>i) Ensure that no oil, petrol, diesel etc. is discharged onto the ground.</li> <li>j) All hazardous products to be dispensed from 200 litre drums shall be transferred by pump, and not dispensed by tipping of the drum.</li> <li>k) Tanks containing fuel must have lids, which are to remain firmly shut.</li> <li>l) Gas and liquid fuel may not be stored in the same storage area.</li> <li>m) No smoking is allowed inside the stores or within 3m of a bund</li> <li>n) The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores.</li> <li>o) Fuels and chemicals may not be stored under trees.</li> <li>p) Exercise extreme care with the handling of diesel and other toxic solvents so that spillage is minimised.</li> <li>q) Vehicles and machinery may not veer from the dedicated roads and tracks.</li> <li>r) Once construction is complete, obsolete roads should be obliterated by breaking the surface crust and erecting earth embankments to prevent erosion, while the natural species composition should be re-established.</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>
		<p><i>Compiled by Envirolution Consulting (Pty) Ltd</i></p>	

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.8. Concrete and cement mixing</b></p>	<ul style="list-style-type: none"> <li>a) Ensure that concrete and cement works are undertaken in specified areas only.</li> <li>b) 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.</li> <li>c) Use plastic trays or liners when mixing cement and concrete: Do not mix cement and concrete directly on the ground.</li> <li>d) Excess concrete from mixing must be deposited in a designated area awaiting removal to an approved landfill site.</li> <li>e) 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.</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>
<p><b>8.2.9. Handling and disposal of contaminated water</b></p>	<ul style="list-style-type: none"> <li>a) No discharge of pollutants such as cement, concrete, lime, chemicals, fuels or oils will be allowed into any water resource.</li> <li>b) Only above ground temporary storage tanks will be allowed on site</li> <li>c) Contaminated or potentially contaminated water will be kept separated from unpolluted stormwater and no unpolluted stormwater will be allowed into the conservancy tank</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.10. Visual Impacts</b></p>	<ul style="list-style-type: none"> <li>a) Buildings are to be simple in form and deliberately separated to lessen impact on the environment and allow for placement adjustments during construction to preserve large trees and protected specimens.</li> <li>b) Subtle walkways between buildings to connect without overpowering.</li> <li>c) Locate construction camps outside the borders of the KNP in areas that is already disturbed to avoid additional disturbance inside the park.</li> <li>d) In the event that construction camps are located in the KNP, put stringent restrictions in place to contain the footprint of the camp by temporarily fencing it and clearly demarcating the entire construction area to minimise disturbance of areas outside the construction site.</li> <li>e) Keep the construction camp and construction area neat and tidy at all times. Remove any waste products from the site or contain it in an enclosed area to avoid wind blowing waste into the bush.</li> <li>f) Implement dust suppression measures during earthworks to minimise the impact of dust clouds.</li> <li>g) Appoint a suitable architect and landscape architect to design the infrastructure and the adjoining surroundings with sensitivity towards the environment and its current character.</li> <li>h) No structure may exceed the height of the surrounding vegetation.</li> <li>i) Additional trees and shrubs can be planted around the structures as an offset measure to the loss in vegetation in the footprint of the infrastructure.</li> <li>j) All signage should be non-intrusive but clear. No sign boards will be placed on separate frameworks higher than 2 m above the ground level to avoid it exceeding the height of the vegetation.</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.11. Lighting</b></p>	<p>a) Working hours shall generally be restricted to daylight hours                      b) Security lights shall be directed from the perimeter wall towards the centre of the camp with a down angle</p>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>
<p><b>8.2.12. Solid Waste management</b></p>	<p>a) Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites.                      b) Where feasible, collect waste paper, glass and metal waste separately and arrange for collection by recycling contractors.                      c) Litter bins must be equipped with a closing mechanism to prevent their contents from blowing out or being scavenged on by the surrounding animals.                      d) Ensure that personnel make use of the litter bins provided. Keep all Work Sites and at the Contractors camp tidy and litter free at all times.                      e) All building rubble, solid and liquid waste etc must be disposed of as necessary at an appropriately licensed refuse facility.                      f) Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires will be allowed on site.                      g) The construction site must be kept in a clean and orderly state at all times.                      h) Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the site be placed, dumped or deposited on adjacent/surrounding veld during or after the construction period of the project and that they are disposed of an approved at an approved registered waste facility.</p>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.13. Storm water Management</b></p>	<ul style="list-style-type: none"> <li>a) No stockpiles or construction materials may be stored or placed within any drainage lines.</li> <li>b) Should a freak storm displace the temporary earth embankments or other erosion control structures, a visual inspection of the site must be made and any damage be recorded. Any damage and loss of soil resulting from a storm is to be remedied immediately. Should the temporary walls collapse due to construction error, the contractor is to fund the remediation process.</li> <li>c) Storm water at the construction crew camp must be managed so as to reduce the silt loads into the ecological environment. Measures must be implemented to distribute storm water as evenly as possible to avoid point sources of erosion.</li> <li>d) The site must be managed in a manner that prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids, silt or chemicals.</li> <li>e) 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.</li> <li>f) 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.</li> <li>g) Remove only vegetation essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.</li> <li>h) Ensure that measures are in place to control the flow of excess water so that it does not impact on the surface vegetation.</li> <li>i) 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.</li> <li>j) Do not allow surface water or storm water to canalize or be concentrated.</li> <li>k) Storm water outflows should not be allowed to enter directly into watercourses.</li> <li>l) Runoff from roads must be managed to avoid erosion and pollution problems.</li> <li>m) Place and maintain erosion control barriers as appropriate to prevent sedimentation.</li> <li>n) Prevent storm water or contaminated water directly entering any watercourse.</li> <li>o) Install waste traps to catch litter conveyed by surface runoff.</li> <li>p) All waste traps within the storm water system will be emptied / cleaned regularly to ensure their efficient functioning</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.13. Storm water Management</b></p>	<ul style="list-style-type: none"> <li>q) 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.</li> <li>r) Repair all erosion damage as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.</li> <li>s) 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.</li> <li>t) 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.</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>
<p><b>8.2.14. Noise management</b></p>	<ul style="list-style-type: none"> <li>a) Construction activities must be limited to normal KNP hours and according to KNP policy.</li> <li>b) The contractor must ensure that noise levels remain within acceptable limits.</li> <li>c) Complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon.</li> <li>d) The operational layout shall be designed so as to control noise at source by the selection and positioning of temporary and permanent plant. Appropriate directional and intensity settings should be maintained on hooters and sirens.</li> <li>e) Silencer units on plant and vehicles shall be maintained in good working order where feasible for use.</li> <li>f) Where required, the Contractor shall provide noise attenuation measures in the form of cladding and earth beams between sources of on-site noise and surrounding fauna and avifauna.</li> <li>g) Ensure that employees and staff conduct themselves in an acceptable manner while on site, both during Work hours and after hours.</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
	h) No loud music is permitted on site or in the Camp.		
<b>8.2.15. Dust control</b>	a) Wet all unprotected cleared areas and stockpiles with water to suppress dust pollution during dry and windy periods. b) Ensure proper rehabilitation of disturbed areas in order to minimise bare patches.	Continuous	Developer, Contractor, ECO, ELO
<b>8.2.16. Crime, safety and security</b>	a) Ensure that the construction vehicles are under the control of competent personnel and are in proper working order. b) Ensure that only suitably qualified personnel use construction vehicles c) Ensure that the contact details of the police or security company and ambulance services are available on site. d) Limit access to the construction crew camp to construction workers through access control. e) Comply with the requirements of the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) requirements. f) Ensure that the handling of equipment and materials is supervised and adequately	Continuous,	Developer, Contractor, ECO, ELO

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
	<p>instructed.</p> <ul style="list-style-type: none"> <li>g) Vehicular traffic during construction activities must be limited to a maximum speed limit of 30 km/hr.</li> <li>h) Site notices informing the tourists of the planned activities must be placed at visible locations a few days prior to new sections being started.</li> <li>i) The safety and security fence around the development site must be completed before construction commences internally.</li> <li>j) Security fence is to be inspected daily to ensure no illegal entry points are created.</li> <li>k) The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) and the National Building Regulations.</li> <li>l) The contractor must supply his own security arrangements in consultation with SANParks for the construction camp within the framework of the EMPr.</li> <li>m) Equipment and materials must be handled by staff that have been supervised and adequately trained.</li> <li>n) Staff must be regularly updated about the safety procedures.</li> <li>o) Emergency facilities must be available and adequately supplied for use by staff and tourists.</li> <li>p) Ensure that the handling of equipments and materials is supervised and adequately instructed.</li> <li>q) Limit access to the construction crew camp only to the workforce.</li> <li>r) Do not allow the movement of public within the development site by posting notices at the entrance gates, and where necessary on the boundary fence.</li> <li>s) Appropriate notification signs must be erected, warning the residents and visitors about the hazards around the construction site and presence of heavy vehicles</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.17. Fire Prevention</b></p>	<ul style="list-style-type: none"> <li>a) The Contractor must take all the necessary precautions to ensure that fires are not started as a result of activities on site.</li> <li>b) No open fires will be permitted anywhere on site.</li> <li>c) No incineration or burning of waste will be permitted anywhere on site.</li> <li>d) Provide personnel and staff with gas for cooking purposes in demarcated, safe areas within the construction camp.</li> <li>e) Establish and maintain a fire break around the perimeter of the construction site prior to the commencement of construction activities. The input of SANParks must be sought in terms of required width and timing. The actual execution of the firebreak must be co-ordinated with SANParks. The contractor may not act independently in this regard.</li> <li>f) The Contractor 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.</li> <li>g) Contractor 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.</li> <li>h) 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.</li> <li>i) The Contractor shall supply all site offices, kitchen areas, workshop areas, material stores and any other areas identified with suitable, tested and approved fire-fighting equipment</li> <li>j) All equipment shall be maintained in good operating order.</li> <li>k) Contractor to provide fire-fighting training to selected construction staff.</li> <li>l) In the event of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate SANParks and private lodge owners for any damage caused by the fire. The contractor should bear the costs associated with fighting the fire.</li> <li>m) The control of fires within the KNP is the responsibility of SANParks. The contractor should not attempt to control natural fires without the consent and direction of SANParks.</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>
<p><i>Compiled by Envirolution Consulting (Pty) Ltd</i></p>			

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>8.2.18. Excavation work</b></p>	<ul style="list-style-type: none"> <li>a) Topsoil is to be handled twice only – once to strip and stockpile, and once to replace and level.</li> <li>b) Position topsoil stockpiles on the higher side of a disturbed area, and above a 1:50 year flood line wherever possible.</li> <li>c) Ensure that all topsoil is stored in such a way and in such a place that it will not cause the damming up of water, erosion gullies, or wash away itself.</li> <li>a) Undertake excavations carefully, incorporating appropriate drainage.</li> <li>b) For significant trees (as indicated by the ELO / ECO), trenching must 3m away from the stem.</li> <li>c) Excavate and backfill trenches on a progressive basis.</li> <li>d) Ensure that no trench longer than 1000m is exposed at any one time.</li> <li>e) Do not allow excavations to stand open for longer than 2 days where at all possible. Excavations should preferably be opened and closed on the same day.</li> <li>f) Trenching through wetlands and drainage lines may only be undertaken upon instruction by the ELO / ECO. In such a situation be sure to return the profile of the wetland / drainage line to one similar to the pre-construction profile. No ridge or channel feature may remain.</li> <li>g) During construction through a wetland, the majority of the flow of the wetland must be allowed to pass down the stream (i.e. no damming must be allowed to take place). In-stream diversions should be used rather than the construction of new channels.</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>
<p><b>8.2.19. Stockpiling soil</b></p>	<ul style="list-style-type: none"> <li>a) The areas where excavated soil will be stockpiled must be bordered by berms to prevent soil loss caused by rain.</li> <li>b) Do not stockpile topsoil in drainage lines.</li> <li>c) Do not stockpile topsoil in heaps exceeding 2m in height.</li> <li>d) Protect topsoil stockpiles from erosion.</li> <li>e) Remove exotic / invasive plants and broad leaf weeds that emerge on topsoil stockpiles.</li> <li>f) Ensure that topsoil is at no time buried, mixed with spoil (excavated subsoil), rubble or building material, or subjected to compaction or contamination by vehicles or machinery.</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
	<p>This will render the topsoil unsuitable for use during rehabilitation.</p> <p>g) The Contractor will be held liable for the replacement of any topsoil rendered unsuitable for use during rehabilitation, for reasons due to his negligence or mismanagement on site.</p>		
<b>8.2.20. Heritage Impacts</b>	<p>a) Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.</p> <p>b) Upon receipt of such notification, the heritage practitioner will arrange for the excavation to be examined by an Archaeologist as soon as possible</p> <p>c) Under no circumstances shall archaeological artefacts be removed, destroyed or interfered.</p> <p>d) Any archaeological sites exposed during construction activities may not be disturbed prior to authorisation by the South African Heritage Resources Agency or Archaeologist.</p>	Continuous,	Developer, Contractor, ECO, ELO
<b>8.2.21. Sewage and effluent</b>	<p>a) Ensure that the facility sewage system is maintained in a sanitary and operational state.</p> <p>b) Ensure that the facility sewage system is not overloaded, and that it functions within its design capacity.</p> <p>c) Take action to reduce output or increase capacity if necessary.</p> <p>d) Ensure that measures are put in place to prevent all leaks and spills.</p> <p>e) Repairs to the sewage system must be done immediately.</p> <p>f) 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.</p> <p>g) Regular removal of sludge from the septic tanks by a licenced contractor (if required).</p> <p>h) Ensure that all treated effluent meets or exceeds South African water quality regulations prior to discharge or reuse.</p> <p>i) Undertake monthly wastewater monitoring to ensure that the output quality of the water complies with the minimum standards as prescribed by DWA. Ensure that these records are kept up to date and are available upon request.</p>	Continuous,	Developer, Contractor, ECO, ELO
<b>8.2.21. Hazardous</b>	<p>a) The disposal of hazardous waste must comply with all relevant Regulations, Norms and</p>	Continuous	Developer,

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
<p><b>waste</b></p>	<p>Standards pertaining to waste classification in order to ensure disposal at the correct landfill class.</p> <ul style="list-style-type: none"> <li>b) Avoid the generation of hazardous waste wherever possible through procurement processes e.g. purchasing of less toxic / environmentally friendly products.</li> <li>c) 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.</li> <li>d) 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.</li> <li>e) Forecast and prevent potential situations in which accidents and spills can mitigate against unwarranted waste emissions.</li> <li>f) 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.</li> <li>g) Effective grease traps should be installed at all kitchen or cooking facilities and these should be regularly serviced and checked for functionality.</li> <li>h) 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.</li> <li>i) 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.</li> <li>j) Load and unload any solid hazardous materials in a manner that reduces potential spills.</li> <li>k) Ensure that a spills containment kit is available on site and that personnel are trained in spills clean up procedures.</li> <li>l) No spills may be hosed down into the surrounding natural environment.</li> </ul>	<p>where necessary</p>	<p>Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
	<ul style="list-style-type: none"> <li>m) Immediately clean leaks and spills of hazardous substances and dispose of as hazardous waste.</li> <li>n) The EO and ECO should be notified immediately if a hazardous waste spill occurs, to ensure proper cleanup and disposal.</li> <li>o) Any contaminated soil / substrate must be removed and stored in a skip until it can be disposed of at a permitted disposal site.</li> <li>p) Report major spills to the regional DWS office.</li> <li>q) 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.</li> <li>r) 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.</li> </ul>		
<p><b>8.2.22 Socio-economic impact</b></p>	<ul style="list-style-type: none"> <li>a) Where possible, the applicant should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks.</li> <li>b) Maximise the use of local labour from surrounding communities for low – semi skilled jobs far as possible.</li> <li>c) The appointment of local suppliers and contractors.</li> <li>d) Implement mitigation measures to monitor and control the activities of construction workers and for the control of nuisance impacts.</li> <li>e) Access to the construction site must be strictly controlled.</li> <li>f) Where feasible, training and skills development programmes for surrounding community locals should be run throughout the construction period.</li> <li>g) The Contractor shall provide sanitation facilities in the form of chemical toilets, at all camps, offices, workshops and construction sites for staff and visitors. No other form of sanitation will be permitted unless a connection with a local sewer main is possible. The provision of</li> </ul>	<p>Continuous,</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Mitigation required during Construction Phase	Frequency	Responsible party
	this facility will comply with current legislation. A minimum of one toilet per 11 people or within 100 meters of the work site in order to prevent any breach of sanitary bylaws or offence to public decency.		
<b>8.2.23. Traffic impact</b>	a) Appropriate traffic control and warning signage must be implemented during the entire construction phase. b) No vehicles will be allowed within the 30m buffer of sensitive environments (wetland, pans, drainage lines) c) Sufficient maintenance of roads. d) Establish a speed reduction awareness campaign to the contractor to keep speeds below 40 km/h.	Continuous,	Developer, Contractor, ECO, ELO

**8.3. REHABILITATION PHASE**

**Table 3: Construction Phase: Environmental Management Programme for the proposed project**

Activity / issue	Action required in Rehabilitation Phase	Frequency	Responsible party
<b>8.3.1 Removal of construction phase structures and infrastructure</b>	a) Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, fixtures and any other temporary Works. b) Materials that will not be used again must be sold if possible or rehabilitated to blend in with the surrounding landscape. c) Ensure that all access roads utilised during construction (which are not earmarked for closure and rehabilitation) are returned to a usable state and / or a state no worse than prior to construction.	Continuous,	Developer, Contractor, ECO, ELO

Activity / issue	Action required in Rehabilitation Phase	Frequency	Responsible party
<p><b>8.3.2. Inert waste, rubble and hazardous waste removal</b></p>	<ul style="list-style-type: none"> <li>a) Clear the site of all inert waste and rubble, including surplus rock, foundation and batching plant aggregates.</li> <li>b) Load and haul excess spoil and inert rubble to fill in borrow pits / dongas or to dump sites indicated / approved by the EO / ECO.</li> <li>c) Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site.</li> <li>d) Remove from site all temporary fuel stores, hazardous substance stores,</li> <li>e) Hazardous waste stores and pollution control sumps. Dispose of hazardous waste in the approved manner.</li> <li>f) Remove from site all pollution containment structures. Dispose of materials that will not be used again as hazardous waste.</li> <li>g) Remove from site all temporary sanitary infrastructure and waste water disposal systems. Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.</li> </ul>	<p>Where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Action required in Rehabilitation Phase	Frequency	Responsible party
<p><b>8.3.3 Vegetation Rehabilitation</b></p>	<ul style="list-style-type: none"> <li>a) Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.</li> <li>b) Ensure that maintenance work does not take place haphazardly, but according to a fixed plan.</li> <li>c) Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to.</li> <li>d) Introduce adequate sedimentation control measures at watercourse crossings and when excavation or disturbance within moist grasslands takes place.</li> <li>e) Address erosion donga crossings, applying soil erosion control and bank stabilisation procedures as specified by the ECO.</li> <li>f) Do not allow erosion to develop on a large scale before effecting repairs. When in doubt, seek advice from the ECO.</li> <li>g) Repair all erosion damage as soon as possible and in any case not later than six months before the termination of the Maintenance Period to allow for sufficient rehabilitation growth</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>

Activity / issue	Action required in Rehabilitation Phase	Frequency	Responsible party
<p><b>8.3.4. Wetland / Watercourse Rehabilitation</b></p>	<ul style="list-style-type: none"> <li>a) Rehabilitation plans must be submitted and approved for rehabilitation of damage during construction and that plan must be implemented immediately upon completion of construction.</li> <li>b) Implementation of best rehabilitation/management practices.</li> <li>c) Rehabilitate or revegetate disturbed areas.</li> <li>d) Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish.</li> <li>e) Rehabilitation procedures must be as per the Wetland Specialists' Wetland Rehabilitation and Monitoring Plan.</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor, ECO, ELO</p>

## 8.4. Specific Specialist mitigation measures as per each Specialist report

### 8.4.1. VEGETATION IMPACTS MITIGATION

**Frequency: Continuous where necessary**

- Limit disturbance of natural vegetation to a minimum;
- Avoid removal of large trees;
- Rehabilitate disturbances immediately after construction;
- Do not plant any non-indigenous trees or shrubs or any garden ornamentals at the gate, use KNP indigenous plant species only;
- Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas;
- Remove and control all alien woody plant species that may appear during construction and operational phases.
- An alien invasive management programme must be incorporated into the Environmental Management Programme;
- Ongoing alien plant control must be undertaken during construction and operational phases;
- Areas which have been disturbed will be quickly colonised by invasive alien species. An ongoing management plan must be implemented for the clearing/eradication of alien species during the operational phase;
- Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.
- The clearing of vegetation must be kept to a minimum and remain within the footprint of the bridge – erosion of the river banks must be avoided at all times;
- Disturbed areas must be rehabilitated immediately after construction has been completed in that area by sowing appropriate indigenous grass species, this is to avoid erosion of the river banks;
- During the construction phase workers must be limited to areas under construction and access to the undeveloped riparian areas must be strictly controlled;

- Disturbed areas on road shoulder must be rehabilitated immediately after construction has been completed in that area (e.g. by sowing appropriate indigenous grass species);
- During the construction phase workers must be limited to areas under construction and access to the undeveloped areas must be strictly controlled

#### **8.4.2. FAUNA IMPACTS MITIGATION**

##### **Frequency: Continuous where necessary**

- The standard 50km/h SANParks speed restriction is deemed adequate if it is enforced;
- The tented camp, camp terrain and picnic site should preferably be planned according to the “light footprint” / rustic principle;
- Visitors are only allowed on the road between sunrise and sunset to avoid night-time fatalities;
- Normal precautionary measures included in the SANParks construction and operational modus operandus would suffice viz. unwarranted use of natural resources (viz. poaching, trapping, harvesting plant materials);
- Impacts can be offset by providing extraordinary opportunities such as bat hotels, sufficiently-sized drainage pipes supporting bridges to coincidentally serve as daytime roosts for cave-dwelling bats, nooks and crannies as refuge for reptiles, nesting, educational amenities (such as at the reception facility), bird baths etc;
- All staff and contractors must undergo an environmental induction course held by the ECO as well as faunal education and awareness programmes;
- Residents must be made aware of the value of fauna;
- None other than the standard precautionary measures incorporated in SANParks best-practice development protocol in a conservation area;
- Runoff rain water from the black-topped road will influence grass and seedling germination that in turn will require the standard maintenance procedures developed by SANParks over time;
- SANParks modus operandus for storm water management will suffice;
- Education and awareness campaigns on faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff and contractors;

- The spatial extent of construction activities must be minimized, and as far as possible must be restricted to the areas on which buildings, roads etc will actually be located;
- The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area;
- Provide adequate briefing for site personnel and residents;
- Any bird nests that are found during the construction period must be reported to the Environmental Control Officer (ECO);
- The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area;
- Disturbance by residents of birds breeding and foraging in the area should be minimized;
- The normal rules applicable to visitors to Kruger NP must be strictly enforced at the campsite, tented camp, picnic area, etc;
- The Critically Endangered White-backed Vultures that are breeding in the vicinity of the proposed campsite and tented camp require special consideration in terms of mitigation. As stipulated elsewhere in this report, 500-m buffer zones must be maintained around each nest site, within which no activity takes place;
- Driving at night on the new road by SANParks staff must be kept to a minimum;
- Speed limits must be strictly enforced. The author's opinion is that the usual speed limit of 65 km/h applicable to SANParks staff is too high to avoid road kills of nocturnal birds, as these birds are often dazzled by oncoming lights. It is thus recommended that a speed limit of 40 km/h be applied to anyone using the new road at night.

#### **8.4.3. WATERCOURSE IMPACTS MITIGATION**

##### **Frequency: Continuous where necessary**

- Mitigation of the possible impacts will require engineering design in collaboration with river basin hydrologists and ecologists. In particular, the hydrological disturbance around anchor points in the river basin will need to be avoided.
- Water-wise plumbing and landscaping;

- Aesthetic architectural design to accommodate visual impacts;
- The design of systems for the control of storm water runoff from hard surfaces (paving and roofs);
- Solid waste will need to be stored in a container out of sight and protected from scavengers. Waste should be removed from the site to a central facility or an approved municipal dump on a routine basis, e.g. once a week;
- Careful siting of tents to minimise disturbance to trees;
- Construction of boardwalks for all pedestrian traffic;
- Good information and control of behaviour by contractors and visitors;
- Water-wise plumbing, sewage treatment and landscaping;
- Aesthetic architectural design to accommodate visual impacts;
- Solid waste will need to be stored in a container out of sight and protected from scavengers. Waste should be removed from the site to a central facility or an approved municipal dump on a routine basis, e.g. once a week;
- Careful siting of picnic sites to minimise disturbance to trees;
- Construction of boardwalks for all pedestrian traffic;
- Good information and control of visitor behaviour, especially with regard to wild animals;
- Road building material should be sourced from outside of the park wherever possible and borrow pits should be avoided.;
- Only the minimum amount of vegetation should be removed to allow for the road alignment. Construction vehicles and machinery should not be driven outside of the road alignment footprint;
- Culverts and drainage systems must be constructed to specification standards that avoid concentrations of flow energy and erosion of drainage line banks. Protective gabions or other structured should be used to prevent turbulence and undercutting;
- Lodges and other permanent structures should not be constructed on or near the river banks. Development should be confined to tented camps on timber platforms with inter-leading boardwalks;
- Cognizance should be taken of recent flood impacts – not merely the flood levels but also silt deposits, scouring, vegetation damage, etc;
- Trails and other public access along the banks should be on boardwalks;
- Bridges should be designed in consultation with specialist river basin hydrologists;
- The development of the gate could be used to initiate opportunities for community education on water and river use;

**Impact - Changing the quantity and fluctuation properties of the watercourse by for example restricting water flow.**

- Construction affecting watercourses must be restricted to the dryer winter months.
- A temporary fence or demarcation must be erected around No-Go Areas outside the proposed works area prior to any construction taking place as part of the contractor planning phase when compiling work method statements to prevent access to the adjacent portions of the watercourse.
- Effective storm water management should be a priority during both construction and operational phase. This should be monitored as part of the EMPr. High energy storm water input into the watercourses should be prevented at all cost. Changes to natural flow of water (surface water as well as water flowing within the soil profile) should be taken into account.

**Impact - Changes in sediment entering and exiting the system impact ratings**

- Consider the various methods and equipment available and select whichever method(s) that will have the least impact on watercourses.
- Water may seep into trenching and earthworks. It is likely that water will be contaminated within these earthworks and should thus be cleaned or dissipated into a structure that allows for additional sediment input and slows down the velocity of the water thus reducing the risk of erosion. Effective sediment traps should be installed.
- Construction in and around watercourses must be restricted to the dryer winter months where possible.
- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area (DWAF, 2005).
- Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover.
- Rehabilitation plans must be submitted and approved for rehabilitation of damage during construction and that plan must be implemented immediately upon completion of construction.
- Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- During the construction phase measures must be put in place to control the flow of excess water so that it does not impact on the surface vegetation.

- Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.
- Runoff from the construction area must be managed to avoid erosion and pollution problems.
- Implementation of best management practices
- Source-directed controls
- Buffer zones to trap sediments
- Monitoring should be done to ensure that sediment pollution is timeously dressed

#### **Impact - Introduction and spread of alien vegetation.**

- Weed control
- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area and returning it where possible afterwards.
- Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish.
- Rehabilitate or revegetate disturbed areas

#### **Impact - Loss and disturbance of watercourse habitat and fringe vegetation impact ratings**

- Where construction occurs in the demarcated watercourse and buffer, extra precautions should be implemented to so as to minimise watercourse loss.
- Other than approved and authorized structure, no other development or maintenance infrastructure is allowed within the delineated watercourse or associated buffer zones.
- Demarcate the watercourse areas and buffer zones to limit disturbance, clearly mark these areas as no-go areas
- Weed control in buffer zone

- Monitor rehabilitation and the occurrence of erosion twice during the rainy season for at least two years and take immediate corrective action where needed.
- Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish
- Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas
- Operational activities should not impact on rehabilitated or naturally vegetated areas

**Impact - Changes in water quality due to foreign materials and increased nutrients impact ratings**

- Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone.
- Implementation of appropriate storm water management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse.
- Provision of adequate sanitation facilities located outside of the watercourse area or its associated buffer zone
- The development footprint must be fenced off from the watercourses and no related impacts may be allowed into the watercourse e.g. water runoff from cleaning of equipment, vehicle access etc.
- After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use.
- Maintenance of construction vehicles / equipment should not take place within the watercourse or watercourse buffer.
- Control of waste discharges
- Maintenance of buffer zones to trap sediments with associated toxins
- Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.
- Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse
- Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.
- Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse
- Regular independent water quality monitoring should form part of operational procedures in order to identify pollution

- Treatment of pollution identified should be prioritized accordingly.

#### **8.4.5. HERITAGE IMPACTS MITIGATION**

##### **Frequency: Continuous where necessary**

- Known sites should be clearly marked in order that they can be avoided during construction activities;
- The contractors and workers should be notified that archaeological sites might be exposed during the construction activities;
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1);
- A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage;
- Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above;
- In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures;

#### **8.4.5. VISUAL IMPACTS MITIGATION**

##### **Frequency: Continuous where necessary**

- Locate construction camps outside the borders of the KNP in areas that is already disturbed to avoid additional disturbance inside the park;
- In the event that construction camps are located in the KNP, put stringent restrictions in place to contain the footprint of the camp by temporarily fencing it and clearly demarcating the entire construction area to minimise disturbance of areas outside the construction site;
- Keep the construction camp and construction area neat and tidy at all times. Remove any waste products from the site or contain it in an enclosed area to avoid wind blowing waste into the bush;
- Implement dust suppression measures during earthworks to minimise the impact of dust clouds;
- Appoint a suitable architect and landscape architect to design the infrastructure and the adjoining surroundings with sensitivity towards the environment and its current character;
- No structure may exceed the height of the surrounding vegetation;
- Additional trees and shrubs can be planted around the structures as an offset measure to the loss in vegetation in the footprint of the infrastructure;
- All signage should be non-intrusive but clear. No sign boards will be placed on separate frameworks higher than 2 m above the ground level to avoid it exceeding the height of the vegetation;
- Working hours shall generally be restricted to daylight hours;
- Security lights shall be directed from the perimeter wall towards the centre of the camp with a down angle
- Set up a temporary hessian or shade cloth barrier at the T-junction with the H1-6 to conceal the construction activity from this tourist road;
- Provide clear signage at the H1-6 and S52 roads to inform tourists to the purpose of the construction. Tourists are generally more tolerant to construction if they know the purpose thereof;
- Maintain the road surface periodically and control erosion along the shoulder to avoid unsightly damages to the road and surrounds.

**8.4.5. SOCIO-ECONOMIC IMPACTS MITIGATION**

**Frequency: Continuous where necessary**

- Goods and services should as far possible be procured locally;
- Where possible, the applicant should make it a requirement for contractors to implement a ‘locals first’ policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks;
- Maximise the use of local labour from surrounding communities for low – semi skilled jobs far as possible.

**8.5 OPERATIONAL PHASE**

**Table 4: Operational Phase: Environmental Management Programme and Maintenance plan for the proposed project**

Please note that the Operational Phase of this document is to be used in conjunction with the Kruger National Park Management Plan and Maintenance Plan.

Activity / issue	Action required during operational phase	Frequency	Responsible party
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Activity / issue	Action required during operational phase	Frequency	Responsible party
<p><b>8.5.1. Protection of vegetation</b></p>	<ul style="list-style-type: none"> <li>a) Do not plant any non-indigenous trees or shrubs or any garden ornamentals at the gate, use KNP indigenous plant species only.</li> <li>b) Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas.</li> <li>c) Remove and control all alien woody plant species that may appear during operational phase.</li> <li>d) Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.</li> <li>e) Ongoing alien plant control must be undertaken during operational phase.</li> <li>f) An alien invasive management programme must be incorporated during operation.</li> <li>g) Maintenance workers and guests may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.</li> <li>h) No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.</li> <li>i) No wood may be collected for firewood or any other purpose.</li> <li>j) Guests and staff should be provided with information explaining different types of vegetation and sensitive species and why disturbance should be avoided, as well as rules regarding commuting. KNP policy and rules should not be disregarded or violated e.g. no person shall pick, disturb, remove or destroy and plant.</li> <li>k) Camp management need to keep their staff aware that moving outside of the lodge site into natural bush is strictly forbidden and disciplinary action should be taken against staff that do so.</li> </ul>	<p>Continuous</p>	<p>Developer, Contractor</p>
<p><b>8.5.2. Protection of</b></p>	<ul style="list-style-type: none"> <li>a) In the event that maintenance must be carried out, all equipment should be parked overnight</li> </ul>	<p>Continuous</p>	<p>Developer,</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
<p><b>Wetlands / Watercourses</b></p>	<p>and/or fuelled at least 500 meters from a watercourse.</p> <p>b) The contractor shall ensure that a method statement is prepared prior to maintenance work to ensure that excessive quantities of sand, silt and silt-laden water do not enter watercourses.</p> <p>c) Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses must be taken.</p> <p>d) Plan monitoring during the operational phase to ensure that the construction footprint is adequately rehabilitated</p> <p>e) During maintenance or emergencies in areas that slope toward wetlands, install sediment barriers along the edge of the maintenance activity as necessary to prevent sediment flow into wetlands.</p> <p>f) Monitoring should be done to ensure that sediment pollution is timeously dressed.</p> <p>g) Monitor the establishment of alien invasive species within the areas affected by the construction and take immediate corrective action where invasive species are observed to establish.</p> <p>h) Operational activities should not take place within watercourses or buffer zones, nor should edge effects impact on these areas.</p> <p>i) Operational activities should not impact on rehabilitated or naturally vegetated areas.</p> <p>j) Regular independent water quality monitoring should form part of operational procedures in order to identify pollution.</p> <p>k) Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse.</p>	<p>where necessary</p>	<p>Contractor</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
	<ul style="list-style-type: none"> <li>l) Ensure that no operational activities impact on the watercourse or buffer area. This includes Continuous where necessary edge effects</li> <li>m) Control of waste discharges and do not allow dirty water from operational activities to enter the watercourse.</li> <li>n) Ensure that no operational activities impact on the watercourse or buffer area. This includes edge effects.</li> <li>o) Drip trays must be utilised during repairs and maintenance of all machinery. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle.</li> </ul>		
<p><b>8.5.4. Preventing spread of alien invasive species</b></p>	<ul style="list-style-type: none"> <li>a) Plan an alien invasive plant work group that can carry out follow-up alien plant control for at least three years after construction</li> <li>b) Ensure that contractors can identify the relevant plants and are aware of the removal procedures.</li> <li>c) SANParks 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.</li> <li>d) Follow manufacturer's instruction when using chemical methods, especially in terms of quantities, time of application etc.</li> <li>e) Management measures to eradicate and control alien plants need to be informed by the Park's invasive species management program.</li> </ul>	<p>Continuous</p>	<p>Developer, Contractor</p>
<p><b>8.5.5. Protection of</b></p>	<ul style="list-style-type: none"> <li>a) Normal precautionary measures included in the SANParks construction and operational</li> </ul>		<p>Developer,</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
<p><b>Fauna</b></p>	<p>modus operandus would suffice viz. unwarranted use of natural resources (viz. poaching, trapping, harvesting plant materials).</p> <p>b) Impacts can be offset by providing extraordinary opportunities such as bat hotels, sufficiently-sized drainage pipes supporting bridges to coincidentally serve as daytime roosts for cave-dwelling bats, nooks and crannies as refuge for reptiles, nesting, educational amenities (such as at the reception facility), bird baths etc.</p> <p>c) All staff and maintenance contractors must undergo an environmental induction course held by the ECO as well as faunal education and awareness programmes.</p> <p>d) Guests and visitors must be made aware of the value of fauna.</p> <p>e) No raw, wild-animal derived products such as meat, bones, organs and hides may be brought into or removed from the Kruger National Park.</p> <p>f) Education and awareness campaigns on faunal species and their habitat are recommended to help increase awareness, respect and responsibility towards the environment for all staff.</p> <p>g) The normal rules applicable to visitors to KNP must be strictly enforced at the campsite, tented camp, picnic area, etc.</p> <p>h) Disturbance by residents of birds breeding and foraging in the area should be minimized.</p> <p>i) No plant, animal, wildlife or any natural or cultural items may be removed from the park without permission. To cut, damage, destroy or be in possession of any plant or part thereof, including dry wood or firewood is a serious offence. Importing of any specimen of an alien or listed invasive species into a national park is prohibited</p>		<p>Contractor</p>
<p><b>8.5.6. General Waste</b></p>	<p>a) Waste must be transported from the point of generation directly to the centralised waste</p>		<p>Developer,</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
<p><b>Management</b></p>	<p>storage area where it can be safely stored prior to offsite disposal.</p> <p>b) It is permissible to establish intermediate storage areas / collection points. All such areas would have to comply with safe storage requirements.</p> <p>c) Duty of care obligations should be adopted and enforced, meaning that only reputable waste transport companies and permitted waste disposal facilities are used.</p> <p>d) Recordkeeping of the waste types and quantities must be as accurate as possible. Landfill waybills must be obtained and kept on file.</p> <p>e) Arrangements must be in place for the regular maintenance and cleaning of waste/recycling storage areas.</p> <p>f) Develop a comprehensive system for waste separation at the relevant generation points.</p> <p>g) Staff should be made aware of the aim to recycle waste by means of posters, training and staff meetings.</p> <p>h) Guests should be made aware of the park’s recycling programmes by means of recycling instructions in rooms, foyers and in strategic locations</p> <p>i) 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.</p> <p>j) Recycling bins should be placed in strategic and convenient locations throughout the entire Shangoni Development and in sizes suitable to their location. They should be lidded and appropriately labelled or colour coded.</p> <p>k) Waste storage receptacles must be covered or lidded to prevent scavenging by wild animals</p>		<p>Contractor</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
	and vermin, and to prevent waste from being windblown into the adjacent sensitive areas.		
<b>8.5.7. Hazardous Waste Management</b>	<ul style="list-style-type: none"> <li>a) 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 Greater Giyani Waste facility in its correct landfill class.</li> <li>b) Avoid the generation of hazardous waste wherever possible through procurement processes e.g. purchasing of less toxic / environmentally friendly products.</li> <li>c) 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.</li> <li>d) 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.</li> <li>e) 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.</li> <li>f) 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.</li> <li>g) 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.</li> </ul>	Continuous where necessary	Developer, Contractor.

Activity / issue	Action required during operational phase	Frequency	Responsible party
<p><b>8.5.8. Sewage and Effluent</b></p>	<ul style="list-style-type: none"> <li>a) Ensure that the sewage system/facilities are maintained in a sanitary and operational state.</li> <li>b) Ensure that the sewage system/facilities are not overloaded, and that it functions within its design capacity. Take action to reduce output or increase capacity if necessary.</li> <li>c) Ensure that measures are put in place to prevent all leaks and spills.</li> <li>d) Repairs to the sewage system must be done immediately.</li> <li>e) 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.</li> <li>f) Regular removal of sludge from the septic tanks by a licenced contractor.</li> </ul>	<p>Continuous</p>	<p>Developer, Contractor.</p>
<p><b>8.5.9. Storm water management</b></p>	<ul style="list-style-type: none"> <li>a) 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.</li> <li>b) Porous paving surfaces should be used in place of hard paved surfaces in order to promote and encourage the infiltration of storm water.</li> <li>c) 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.</li> <li>d) Ensure that measures are in place to control the flow of excess water so that it does not impact on the surface vegetation.</li> <li>e) 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.</li> <li>f) Do not allow surface water or storm water to canalize or be concentrated.</li> </ul>	<p>Continuous</p>	<p>Developer, Contractor</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
	<ul style="list-style-type: none"> <li>g) Runoff from roads must be managed to avoid erosion and pollution problems.</li> <li>h) Place and maintain erosion control barriers as appropriate to prevent sedimentation.</li> <li>i) Prevent storm water or contaminated water directly entering any watercourse. Install waste traps to catch litter conveyed by surface runoff.</li> <li>j) All waste traps within the storm water system will be emptied / cleaned regularly to ensure their efficient functioning.</li> <li>k) Dissipate concentrated storm water flows through energy dissipaters or vegetated areas.</li> <li>l) Repair all erosion damage as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.</li> <li>m) 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.</li> </ul>		
<p><b>8.5.10. Socio-economic management</b></p>	<ul style="list-style-type: none"> <li>a) SANParks is responsible for making the necessary arrangements for transporting staff to and from site on a daily basis.</li> <li>b) Where reasonable and practical, the Operator should appoint local employees and implement a 'locals first' policy, especially for semi and low-skilled job categories.</li> <li>c) Where feasible, efforts should be made to employ local employees that are compliant with Black Economic Empowerment (BEE) criteria.</li> <li>d) Where feasible, training and skills development programmes for locals should be initiated and maintained throughout the operational phase.</li> <li>e) The recruitment selection process should seek to promote gender equality and the</li> </ul>	<p>Continuous</p>	<p>Developer, Contractor.</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
	<p>employment of women wherever possible.</p> <p>f) 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.</p> <p>g) The operator of the facility should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project.</p>		
<p><b>8.5.11. Fire management</b></p>	<p>a) Fires must be made at a designated SANParks provided braai place provided at the respective areas, or in another area approved by the SANParks Section Ranger or Fire Manager.</p> <p>b) In all cases, the ground within a minimum radius of 4 m from where the fire is to be made must be clear of all combustible material, to reduce the possibility of the veld igniting.</p> <p>c) In instances where there a 'social' fire is made e.g. in a lapa, the fire may only be made where the ground is cleared of all combustible material for a radius of at least 5 m from the fire place. During windy conditions, the fire must be kept small or be extinguished.</p> <p>d) The fire must at all times be under the control of an adult.</p> <p>e) Ensure that fires do not jump into the veld and start a veld-fire.</p> <p>f) Inform guests about the dangers of making large fires, especially on windy conditions because fires can also ignite the thatching of huts etc.</p> <p>g) No incineration or burning of waste is permitted on the site.</p>	<p>Continuous where necessary</p>	<p>Developer, Contractor</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
	<ul style="list-style-type: none"> <li>h) Establish and maintain a fire break around the perimeter of the site.</li> <li>i) Fire-fighting training is to be provided to selected operational staff.</li> <li>j) SANParks is to ensure that the necessary fire fighting equipment is on site in terms of relevant legislative requirements.</li> <li>k) Appropriate fire fighting equipment to be provided, and clearly marked. Emergency numbers to be displayed. Report incidents to KNP's Emergency Call Centre on 013 735 4325</li> </ul>		

**8.6 DECOMMISSIONING PHASE**

**Table 4: Decommissioning Phase: Environmental Management Programme for the proposed project**

Activity / issue	Action required during operational phase	Frequency	Responsible party

Activity / issue	Action required during operational phase	Frequency	Responsible party
<p><b>8.6.1. Buildings structures demolition and transportation of debris and rubble</b></p>	<ul style="list-style-type: none"> <li>a) A demolition schedule must be developed taking into consideration breeding seasons of important fauna species and any other KNP conservation requirements.</li> <li>b) The identification of a suitable rubble and debris disposal site must be conducted in consultation with the local municipality.</li> <li>c) Definition of boundaries around work areas to control access and construction vehicular traffic</li> <li>d) Electricity cables must be terminated or rerouted away from the site to be decommissioned.</li> <li>e) An Occupational and Safety plan must be prepared and implemented measures to be used.</li> <li>f) Scheduling and Planning for transportation of debris and rubble not coinciding with peak visitor traffic movement.</li> <li>g) During the demolition, manual works will be preferred. However the Mechanical work (use of excavators etc.) will also be done as per requirement, but considering safety measures and noise considerations.</li> <li>h) The transportation of the waste and other materials should be in safe manner considering the SANParks traffic rules.</li> <li>i) Truck loads must be covered with plastic sheets to prevent dust pollution and other hazards.</li> </ul>	<p>Continuous where necessary</p>	<p>Developer, Contractor</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
<p><b>8.6.2. Air, Noise and Dust &amp; Watercourse Pollution during the dismantling of the buildings</b></p>	<ul style="list-style-type: none"> <li>a) Sufficient Water spraying at the decommissioning site must be conducted.</li> <li>b) Avoid usage of machines/equipment with extra noise.</li> <li>c) Do not accumulate and burn waste at the site.</li> <li>d) Carry out decommissioning activities in stages; give adequate notice and information of activities to potentially affected visitors in the park.</li> <li>e) Precaution will be taken while using the machines and equipment, during demolition.</li> <li>f) Prohibit the contamination of ground water and surrounding watercourses</li> <li>g) Identify proper location to dispose wastewater from demolition and other activities in consultation with Limpopo (LEDET) Provincial Authority.</li> <li>h) Store hazardous wastes in safe place and make the provision for appropriate management.</li> <li>i) Seepage coming from buildings and demolition waste that contains hazardous materials must be strictly controlled as they can transport hazardous substances which has the potential to contaminate the soil and as well as pollute groundwater.</li> </ul>	<p>Continuous</p>	<p>Developer, Contractor</p>

Activity / issue	Action required during operational phase	Frequency	Responsible party
<p><b>8.6.3. Waste Management</b></p>	<ul style="list-style-type: none"> <li>a) The waste from the demolition activities will be disposed on the prescribed area in consultation with local municipality authority.</li> <li>b) Temporary rubble/spoil stockpile areas should not be near to the any type of watercourse or environmentally sensitive area.</li> <li>c) The disposal of waste should not further deteriorate the surrounding environment.</li> <li>d) The practice of waste minimisation must be implemented</li> <li>e) Waste classification and recycling is recommended.</li> <li>f) The reuse and recycling of building and demolition waste as far as possible is encouraged.</li> </ul>	<p>Continuous</p>	

Activity / issue	Action required during operational phase	Frequency	Responsible party
<p><b>8.6.4. Vegetation Protection</b></p>	<ul style="list-style-type: none"> <li>a) Retain and protect plant species within the decommissioning footprint, especially endangered species.</li> <li>b) Promote the systematic eradication of invasive plant species infestations, especially in protected areas and close to watercourses (riparian areas).</li> <li>c) Minimise threats to vegetation communities or plant species (e.g. through firewood collection, vandalism, off-road driving etc.). Promote proper veld and fire management.</li> <li>d) Limit disturbance of natural vegetation to the decommissioning footprint.</li> <li>e) Avoid any damage of large trees.</li> <li>f) No protected trees or plants may be removed without the relevant permits from the Department of Agriculture, Forestry and Fisheries (DAFF).</li> <li>g) Disturbed areas must be rehabilitated immediately after decommissioning has been completed in that area by sowing appropriate indigenous grass species, this is to avoid erosion of the river banks.</li> </ul>	<p>Continuous</p>	

**APPENDIX 1: PROJECT LAYOUT MAPS**

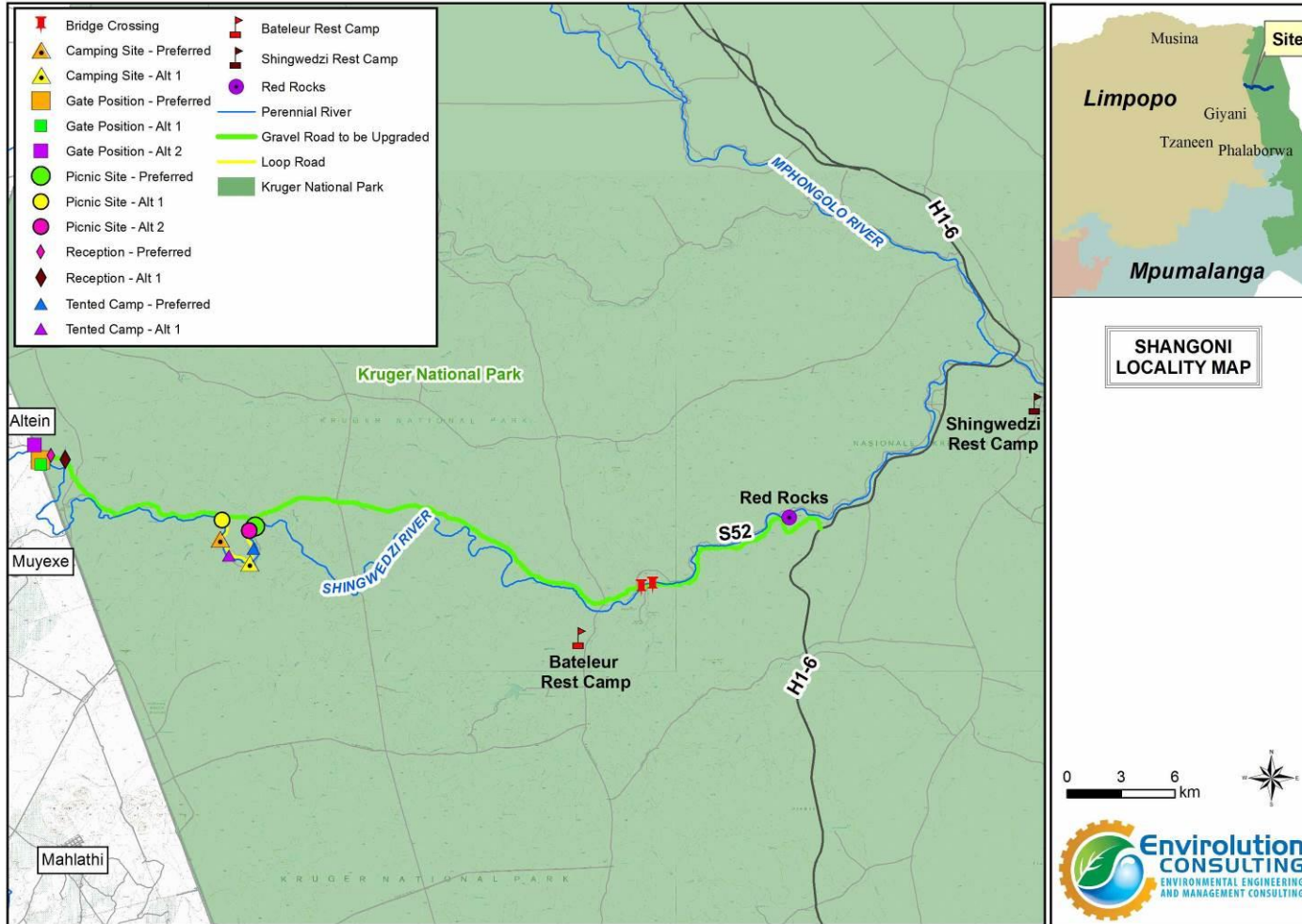


Figure 7: Locality map

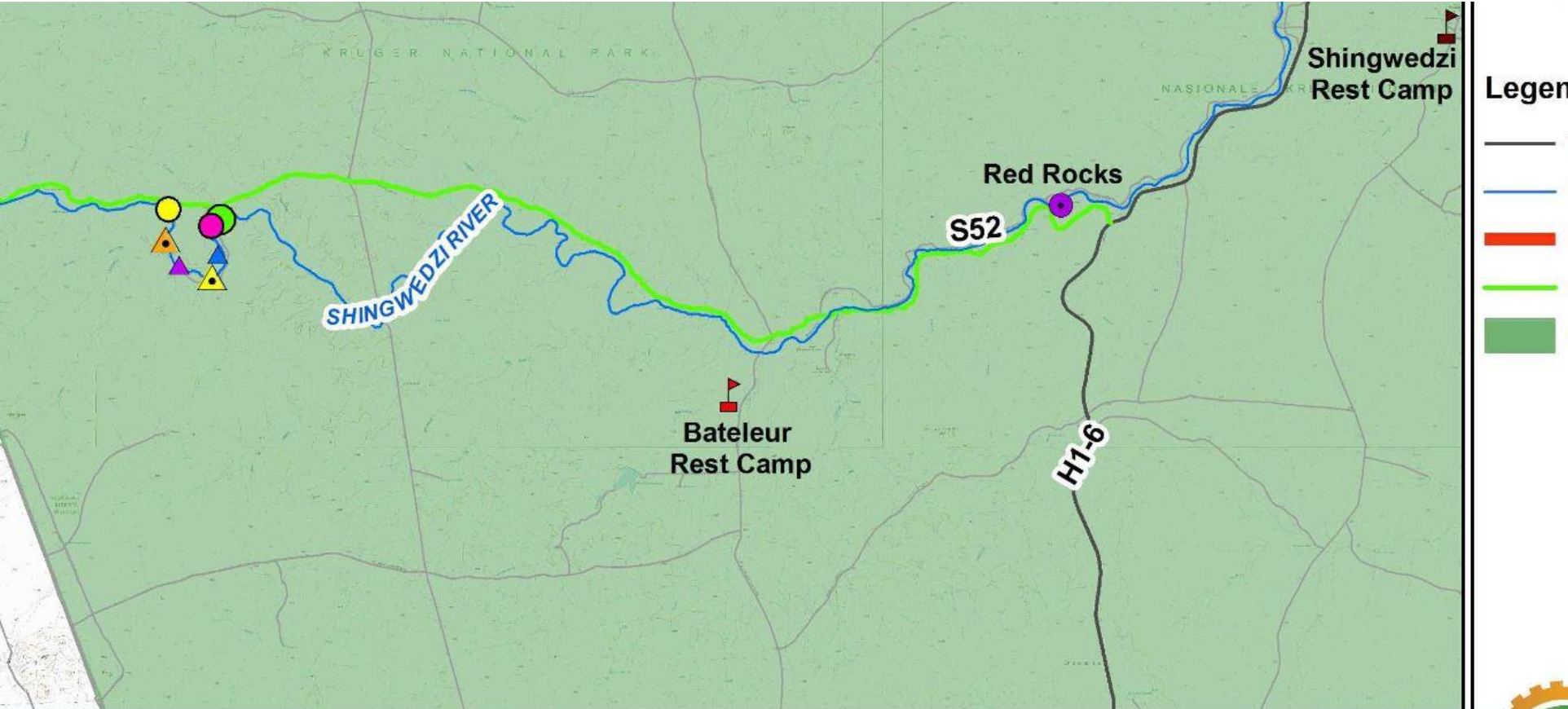


Figure 8: Locality map continued

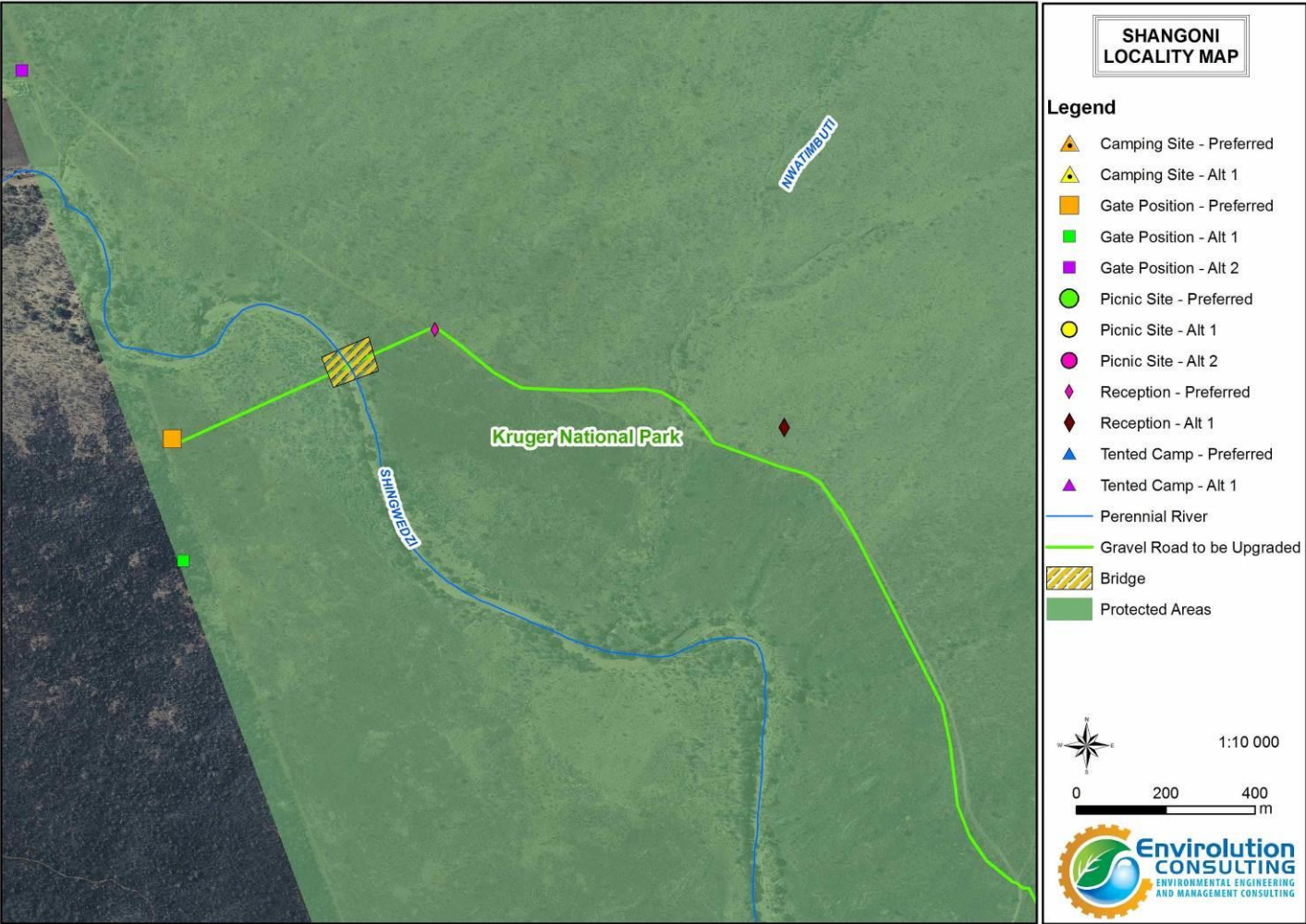


Figure 9: Entrance gate area (Zoomed)

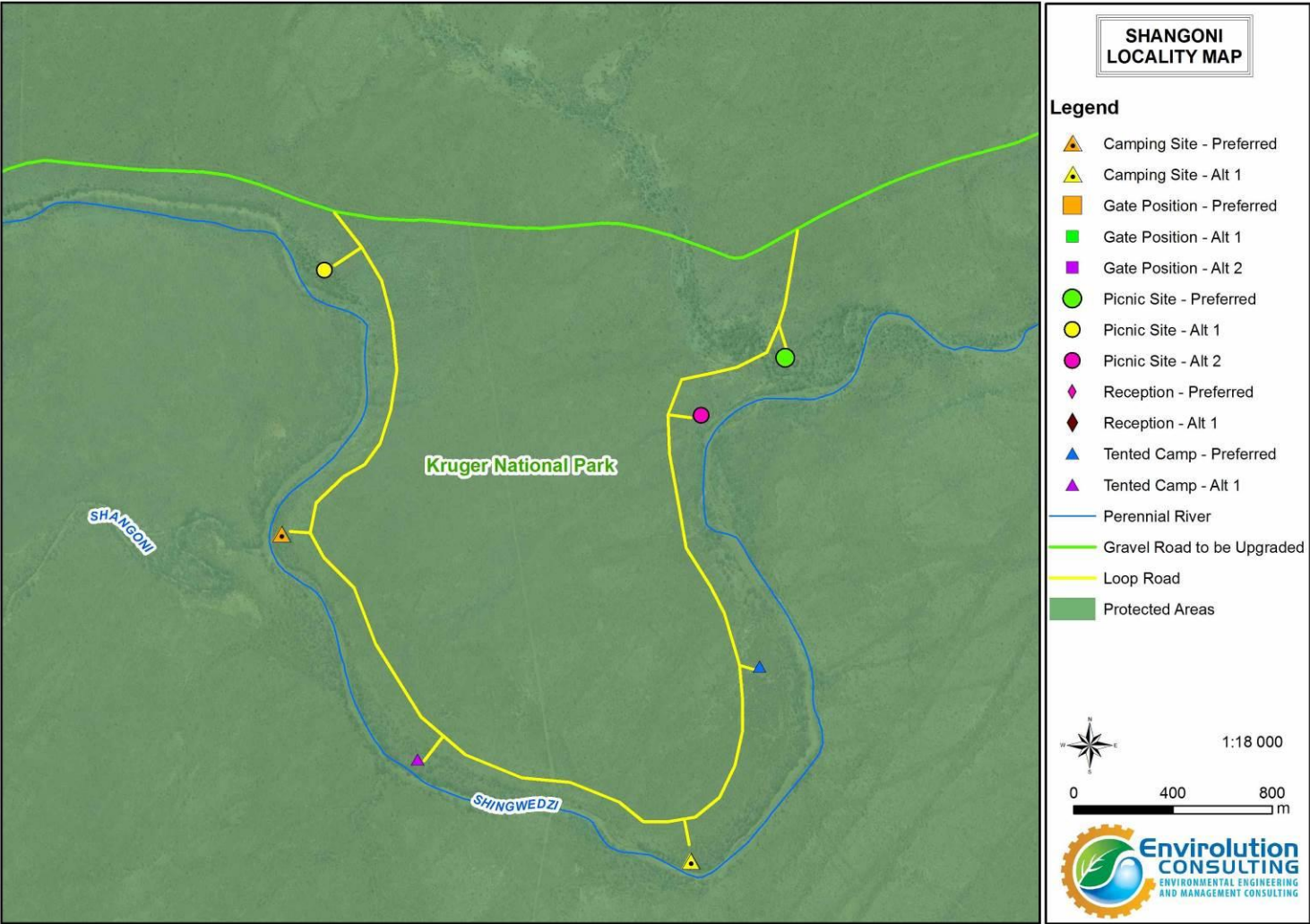


Figure 10: Shangoni loop road (Zoomed)

**APPENDIX 1: INCIDENT AND ENVIRONMENTAL LOG**

<b>ENVIRONMENTAL INCIDENT LOG</b>				
<b>Date</b>	<b>Env. Condition</b>	<b>Comments</b> <i>(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)</i>	<b>Corrective Action Taken</b> <i>(Give details and attach documentation as far as possible)</i>	<b>Signature</b>



**APPENDIX 3: CURRICULUM VITAE OF EAP: THABANG SEKELE**

Name: **THABANG AMOS SEKELE**

Name of Firm: ENVIROOLUTION CONSULTING (PTY) LTD

Position: Project Co-ordinator and Environmental Control Officer

Date of Birth: 23 March 1988

Nationality: South African

Languages: English, Afrikaans, Sepedi, Setswana, Zulu

**EDUCATIONAL QUALIFICATIONS**

BA, University of South Africa (Geography, Environmental Management), 2014

**PROFESSIONAL AFFILIATIONS**

Member of International Association for Impact Assessment South Africa (IAIAsa)

**EMPLOYMENT EXPERIENCE****1. ENVIROOLUTION CONSULTING**

Envirolution Consulting is a specialist consulting company, focusing on Environmental Engineering and Management Consulting.

**FEBRUARY 2015 - PRESENT: ENVIRONMENTAL CONSULTANT**

Environmental Control Officer for the following projects (current/in process):

- Environmental Control Officer for Broadacres Residential Development, Fourways (Gauteng)
- Environmental Control Officer for Eskom construction of Bophirima Substation and associated 132 kV power line, Vryburg (North West)
- Environmental Control Officer for Eskom construction of Freedom Park Substation and associated power line, Rustenburg (North West)
- Environmental Control Officer for Fairlands Rehabilitation and Embankment Protection of the Spruit River, Fairlands, Randburg (Gauteng)
- Environmental Control Officer for Khayalitsha Extension 11 Housing Project, Tembisa (Gauteng)
- Environmental Control Officer for Kruisfontein Phase 3 Bulk Water Supply Pipeline, Soshanguve, Tshwane (Gauteng)
- Environmental Control Officer for Stinkwater Water Reticulation and Yard Connections, Hammanskraal. Tshwane (Gauteng)

- Environmental Control Officer for Tsakane Housing Project, (Gauteng)
- Environmental Control Officer for Tsakane Bulk Water Services and Pump Station, (Gauteng)
- Environmental Control Officer for Villa Liza Sewage Pipe and Storm Water system installation, Boksburg (Gauteng)
- Environmental Control Officer for Gautrain Rapid Rail Link Project at Rhodesfield and Centurion Stations (Gauteng)
- Environmental Control Officer for Rainbow Chicken Expansion of farming operations at Bronkorstspruit (Gauteng)
- Environmental Control Officer for Johannesburg Development Agency Alexandra Automotive Industrial Park (Gauteng)
- Environmental Control Officer for Johannesburg Development Agency, Upgrade and Redevelopment of Paterson Park Recreational centre (Gauteng)
- Environmental Control Officer for Zamdela Civils Installations Project at Sasolburg (Free State)
- Environmental Control Officer for Reconstruction of Abbes Road and Ancillary works at Braamfisherville (Gauteng)
- Environmental Control Officer for Construction of Stormwater System along Ballyclaire Road, Bryanston (Gauteng)

Trainee Environmental Auditor for the following project(s):

- Eskom Kusile Power Station Bi-Annual Audit (July 2015) at eMalahleni (Mpumalanga)

Project Co-ordinator for the following projects (current/in process):

- Basic Assessment for the development of Shangoni Gate reception facilities and associated infrastructure, Kruger National Park (SANParks)
- Basic Assessment for the construction of Plaatjies 132kV Substation and rebuilding of Plaatjies 88kV powerline, Braamfisherville, City of Johannesburg Municipality, Gauteng Province (Eskom)
- Basic Assessment for the construction Tarlton-Westgate SAR Millsite 132kV line and expansion of the SAR Millsite substation, Krugersdorp, Gauteng Province (Eskom)
- Basic Assessment for the construction of 132 kV Westgate Ntshona substation and 132 kV powerline, Krugersdorp, Gauteng Province (Eskom)
- Basic Assessment for the construction of 132 kV Taunus-Diepkloof powerline and two 132 kV substations, Soweto, Gauteng Province (Eskom)
- Basic Assessment for the construction of 123kV Blue Hills Crowthorne Powerline and associated substation, Midrand (Eskom)

Compiled Environmental Management Plans/Programmes for the following projects:

- Stormwater System along Ballyclaire Road, Bryanston (Gauteng).

- Construction of the Parking Bay opposite Gautrain Station, Centurion (Gauteng)
- Reconstruction and Upgrade of Crownwood Road and Intersections, Johannesburg, Gauteng Province.
- Rehabilitation of Bridges on M1 over Oxford Road and Federation Road.
- Development of Sidewalks, Cycle Lanes and Storm Water Infrastructure in Meadowlands East, Soweto, Gauteng Province.

## **2. MYEZO ENVIRONMENTAL MANAGEMENT SERVICES (PTY) LTD**

Myezo Environmental Management Services (Pty) Ltd, is a company that provides a range of environmental services mainly specialising in mining, since 2005. Responsibilities: environmentally related issues and administration.

2014 - 2015: ENVIRONMENTAL ADMINISTRATOR

Myezo projects included:

- Alexkor Sea Concession exploration - Compiling background information document and general administration.
- Clover Alloys – Maintaining and administering the project file and monitoring environmental compliance with the Environmental Management Programme

## **3. MOKGOBELA TRADING CC**

Mokgobela Trading is a company mainly involved in providing building maintenance and minor construction services.

2013 – 2014: JUNIOR OPERATIONS ASSISTANT

Mokgobela duties included:

- Observing external service providers in water-use licence applications
- Drafting reports from public participation meetings
- Occasionally supervising artisans on site
- Observing senior colleagues in drafting reports
- Gathering information about residents surroundings
- Attending community forum meetings
- Data capturing and creating spread sheets
- Answering telephone queries
- Booking meetings
- Drafting of memos

**REFERENCES:**

Mr Gesan Govender  
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Ms Babalwa Fatyi  
Managing Director: Myezo Environmental Management Services  
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Cell: 082 772 2418  
Tel: 012 998 7642  
E-Mail Address: babalwa@myezo.co.za

Mrs. Perpetua Mokgobela Malebane  
Managing Director:  
Mokgobela Trading cc  
Tel: 011 985 1132  
Cell: 072 575 6338

**APPENDIX 4: SPECIALIST DECLARATIONS AND CV'S**



**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

File Reference Number:	(For official use only) 12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 58 of 2008) and Government Notice 921, 2013

**PROJECT TITLE**

Shangoni Gate Development, Kruger National Park

Specialist:	* Limosella Consulting
Contact person:	A Booisma
Postal address:	11 Villa Maria, Maria St 177
Postal code:	0182
Telephone:	012 543 9982
E-mail:	antonette@limosella.co.za
Professional affiliation(s) (if any)	SACNASP # 400222-09

Project Consultant:	Envirolution Consulting
Contact person:	Thabang Setete
Postal address:	PO BOX 1898, Sunninghill
Postal code:	2157
Telephone:	0861 444699
E-mail:	thabang@envirolution.co.za

4.2 The specialist appointed in terms of the Regulations\_

( Antoinette Booisma ) declare that -

General declaration:

I act as the independent specialist in this application;  
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;  
I declare that there are no circumstances that may compromise my objectivity in performing such work;  
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;  
I will comply with the Act, Regulations and all other applicable legislation;  
I have no, and will not engage in, conflicting interests in the undertaking of the activity;  
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;  
all the particulars furnished by me in this form are true and correct; and  
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Antoinette Booisma  
Signature of the specialist  
Limosilla Consulting  
Name of company (if applicable)  
28/07/2016  
Date



**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

File Reference Number:	12/12/2017 or 12/9/11/L
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- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

**PROJECT TITLE**

Shangoni Gate Development, Kruger National Park

Specialist:	Dr I.L. Rautenbach	
Contact person:		
Postal address:	Helgaard Street 45, Kilner Park, Pretoria	
Postal code:	0186	Cell: 082 3351288
Telephone:	012 3334112	Fax:
E-mail:	naasruten@mvweb.co.za	
Professional affiliation(s) (if any):	SACNASP # 400300/05	

Project Consultant:	Envirolution Consulting	
Contact person:	Thabang Setseje	
Postal address:	PO Box 7898, Sunninghill	
Postal code:	2157	Cell: 0828610747
Telephone:	0861444499	Fax:
E-mail:	thabang@envirolution.co.za	

4.2 The specialist appointed in terms of the Regulations,

I, L.L. Rautenbach \_\_\_\_\_, declare that --

General declaration:

I act as the independent specialist in this application;  
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;  
I declare that there are no circumstances that may compromise my objectivity in performing such work;  
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;  
I will comply with the Act, Regulations and all other applicable legislation;  
I have no, and will not engage in, conflicting interests in the undertaking of the activity;  
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;  
all the particulars furnished by me in this form are true and correct; and  
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Name of company (if applicable):

23/07/2016

Date:



**environmental affairs**

Department  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

File Reference Number:  
NEAS Reference Number:  
Date Received:

(For official use only)


Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

*Shangoni Gate Development within Kruger National Park*

Specialist:  
Contact Person:  
Postal address:  
Postal code:  
Telephone:  
  
E-mail:  
Professional affiliation(s) (if any)

Andrew McKechnie		
P.O. Box 12445, Hatfield		
0028	Cell:	0727777572
0124203232	Fax:	
aemckechnie@gmail.com		
SACNASP (400205/05)		

Project Consultant:  
Contact person:  
Postal address:  
  
Postal code  
Telephone  
E-mail:

Envirolution Consulting		
Thabang Sekela		
P.O. Box 1898, Sunninghill		
2157		
0861 44 44 99		
thabang@envirolution.co.za		

I, Andrew Edward McKeechnie \_\_\_\_\_, declare that – General

declaration:

I act as the independent specialist in this application;  
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;  
I declare that there are no circumstances that may compromise my objectivity in performing such work;  
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;  
I will comply with the Act, Regulations and all other applicable legislation;  
I have no, and will not engage in, conflicting interests in the undertaking of the activity;  
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;  
all the particulars furnished by me in this form are true and correct; and  
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist: \_\_\_\_\_

\_\_\_\_\_  
Name of company (if applicable):

2016-07-29  
\_\_\_\_\_  
Date:



**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

File Reference Number:	(For official use only)
NEAS Reference Number:	
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1996 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

*Shangoni Development within Kruger National Park*

Specialist:  
Contact Person:  
Postal address:  
Postal code:  
Telephone:

<i>JCP van Wyk</i>		
<i>JCP van Wyk</i>		
<i>P.O. Box 25655</i>		<i>Monument Park</i>
<i>0105</i>	Cell:	<i>082 410 3871</i>
	Fax:	
<i>kp@myk@dsamab.co.za</i>		
<i>SACNASP (Pr. S.2 Nat. registration # 400062/01)</i>		

E-mail:  
Professional affiliation(s) (if any)

Project Consultant:  
Contact person:  
Postal address:  
  
Postal code  
  
Telephone  
E-mail

<i>Envirolution Consulting</i>		
<i>Thabang Setale</i>		
<i>P.O. Box 1898, Sunninghill</i>		
<i>2157</i>		
<i>0861 44 44 99</i>		
<i>thabang@envirolution.co.za</i>		

I, JCP van Wyk, declare that –

General declaration:

I act as the independent specialist in this application;  
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;  
I declare that there are no circumstances that may compromise my objectivity in performing such work;  
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;  
I will comply with the Act, Regulations and all other applicable legislation;  
I have no, and will not engage in, conflicting interests in the undertaking of the activity;  
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;  
all the particulars furnished by me in this form are true and correct; and  
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Name of company (if applicable):


Date: 01/02/2016

I, Andrew Edward McKeechrie, declare that – General

declaration:

I act as the independent specialist in this application;  
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;  
I declare that there are no circumstances that may compromise my objectivity in performing such work;  
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;  
I will comply with the Act, Regulations and all other applicable legislation;  
I have no, and will not engage in, conflicting interests in the undertaking of the activity;  
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;  
all the particulars furnished by me in this form are true and correct; and  
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

  
\_\_\_\_\_  
Signature of the specialist:

  
\_\_\_\_\_  
Name of company (if applicable):

2016-07-29  
\_\_\_\_\_  
Date:



**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

File Reference Number:  
NEAS Reference Number:  
Date Received:


Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

Shangoni Development, Kruger National Park

Specialist:  
Contact Person:  
Postal address:  
Postal code:  
Telephone:  
  
E-mail:  
Professional affiliation(s) (if any)

Andrew McKochnie		
P.O. Box 12445, Hatfield		
0028	Cell:	0727777572
0124203232	Fax:	
amckochnie@gmail.com		
SACNASP (400205/05)		

Project Consultant:  
Contact person:  
Postal address:  
  
Postal code:  
  
Telephone:  
E-mail:

Envirolution Consulting		
Thabang Sekela		
PO BOX 1898, Sunninghill		
2157		
0861 444499		
thabang@envirolution.co.za		

I, Andrew Edward McKeechie, declare that – General

declaration:

I act as the independent specialist in this application;  
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;  
I declare that there are no circumstances that may compromise my objectivity in performing such work;  
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;  
I will comply with the Act, Regulations and all other applicable legislation;  
I have no, and will not engage in, conflicting interests in the undertaking of the activity;  
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;  
all the particulars furnished by me in this form are true and correct; and  
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:



Name of company (if applicable):

2016-07-29

Date:

Curriculum Vitae and abbreviated Company Profile



Drafted by  
Antoinette Eysell  
Pr Sci Nat (400029/11) Ecological Science  
Dimela Eco Consulting  
Tel. 083 6426 295  
E-mail: [Antoinette@dimela-eco.co.za](mailto:Antoinette@dimela-eco.co.za) or  
[DimelaEcoConsulting@gmail.com](mailto:DimelaEcoConsulting@gmail.com)  
389 Rossouw Street  
Die Wilgers  
Pretoria

Curriculum Vitae and abbreviated Company Profile



Drafted by  
Antoinette Eyssell  
Pr Sci Nat (400029/111) Ecological Science  
Dimela Eco Consulting  
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[DimelaEcoConsulting@gmail.com](mailto:DimelaEcoConsulting@gmail.com)  
389 Rossouw Street  
Die Wilgers  
Pretoria

Curriculum Vitae: Antoinette Eyssel

**1. EMPLOYMENT RECORD**

I am currently self-employed and am the sole proprietor of Dimela Eco Consulting. I have been working in the field of environmental impact assessment since 2007 (7 years) (Table 1).

Table 1: Employment record: Environmental Assessments

Time frame	Title	Company
Nov 2011 - current	Sole proprietor, vegetation specialist	Dimela Eco Consulting
Sep 2007 – Nov 2011	Terrestrial Ecologist, specialising in vegetation	Strategic Environmental Focus (SEF)

Prior to working in the environmental impact assessment field, my main work experience was gained at the Pretoria National Botanical Gardens where I have developed much of my knowledge on indigenous plants.

Table 2: Employment record: Other

Time frame	Title	Company
Aug 2003 – Sep 2007	Snr Environmental Education Officer	Environmental Education Centre, Pretoria National Botanical Garden, South African National Biodiversity Institute (SANBI)
Jun – Jul 2003	Horticultural Trainer	17 Staff Training Centre, Johannesburg
May 1997 – Mar 2002	Horticulturist	Pretoria National Botanical Garden (then NBI, now SANBI)

**2. QUALIFICATIONS**

- M.Sc Environmental Science, University of Pretoria (2010)  
Dissertation: *Land cover change and its effect on future land uses*
- B. Sc (Hons) Horticulture, University of Pretoria (1999-2005)  
Dissertation: *Horticultural uses of the indigenous *Barleria* species*
- B. Sc (Agriculture) Horticulture, University of Pretoria (1993-1996)

*Proof of MSc – Appendix A*

**3. PROFESSIONAL MEMBERSHIP: SACNASP**

Registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professionals (SACNASP)

SACNASP Reg no 46003913

*Proof of certificate – Appendix B*



Curriculum Vitae

Antoinette Eyssell

4. SPECIALIST WORK EXPERIENCE

Dimela Eco Consulting is an independent consultancy which offers a range of services pertaining to the integration of vegetation, vegetation ecology, protected plants and other ecological concerns into the development and land use process. In support of sustainable development, green infrastructure and socially responsible progress, Dimela Eco Consulting provides clients with quality, unbiased and reliable reports to help minimise the impact on the receiving natural environment and to inform effective decision making by providing the following services:

- Vegetation assessments;
- Vegetation overviews or scans;
- Strategic ecological assessments, including wetland input;
- Wetland assessments in conjunction with Limesella Consulting;
- Mitigation measures to reduce impacts on the natural environment;
- Ecological management and biodiversity action plans (including alien vegetation management);
- Specialist input: ecological conditional requirements for Green Star rating;
- Ground-truthing of vegetation related data; and
- Review of ecological reports.

In addition, Antoinette Eyssell has 4 years' experience in Environmental Education and Greening Projects at the South African National Biodiversity Institute (SANBI) (2009-2007). In this time, she mentored four students over two year period as part of an internship programme.

She currently writes the ecology feature for the bimonthly Supemova Kids Magazine and welcome opportunities to stay involved in environmental education and related community programmes.

Since January 2012, Antoinette assists with the administration, project management, report review and vegetation assessments for Limesella Consulting. Limesella Consulting is an independent consultant that specialises in wetland assessments, but also include a wide range expertise such as fauna, flora and aquatic assessments.

The table below list some of Dimela's projects, since 2012.

PROJECT NAME	INDUSTRY / CLIENT	DATE	ADDITIONAL INFORMATION
Vegetation Assessment for Solar Panels	Schmidtsdrift, Northern Cape	January 2012	Delineation of vegetation communities, determine vegetation sensitivities and survey for plants of conservation concern. Report on potential impacts and mitigation measures to limit impacts.
Protected tree identification	Kranspoort road upgrade	March 2012	Identify and record localities, species and numbers of protected trees along an area earmarked for road upgrade.
Ground-truth final ESKOM	Dhuva-Minerva route	March-April 2012	Walk proposed route alignment and identify sensitive vegetation issues and pylon positions that might



PROJECT NAME	INDUSTRY / CLIENT	DATE	ADDITIONAL INFORMATION
route alignment	deviation		need to be moved.
Vegetation base line study and input into Biodiversity Action Plan	Kumba Iron Ore (Anglo)	April-May 2012	Undertake a gap analysis and review of existing information and update by assessing the vegetation during the summer months and suggesting monitoring plots, information to be collected and areas where sensitive vegetation should be avoided and managed.
Vegetation assessment	Rietfontein Open Cast	April 2012	Delineation of vegetation communities, determine vegetation sensitivities and survey for plants of conservation concern. Report on potential impacts and mitigation measures to limit impacts.
Vegetation assessment	Esikom: Perseus to Gamma	October 2012	Survey the proposed route options and compare the floral assemblages that are expected to occur within the area to the actual vegetation found to be present along the route options. Map the localities of plants of conservation concern that was identified during the field survey or suitable habitat where these plants could potentially occur. Assess impacts and determine route alignment that is likely to have the least impact on sensitive vegetation
Vegetation assessment and EMP input	Vierfontein Colliery	January 2013	Assess the current impacts of the open cast mine on the vegetation and provide input into the EMP to conserve and limit impact on conservation worthy vegetation that persist on the site
Diepsloot Eskom line and substation, Johannesburg (Gauteng)	Enviolution	March 2013	Survey the preferred and alternative route alignments and compare the floral assemblages that are expected to occur within the area to the actual vegetation found to be present along the routes. Map the vegetation / habitat types according to structurally distinct vegetation units as well as transformed areas, as well as the localities of threatened plant species. Recommend mitigation measures to aid the conservation of vegetation during construction and operation and indicate the route that will have the least impact on the vegetation.
Komati Power Station – Coal stockyard Vegetation	ESKOM	May 2013	• Assess the potential plant species and vegetation communities that could be impacted by the proposed increase in capacity of the coal stockyard; and



Curriculum Vitae Antoinette Eyssell

PROJECT NAME	INDUSTRY / CLIENT	DATE	ADDITIONAL INFORMATION
Opinion			<ul style="list-style-type: none"> <li>Recommend mitigation measures to avoid or limit the potential negative impacts that the proposed activity could have on the surrounding vegetation.</li> </ul>
Droogfontein - open cast mine Vegetation assessment	CEMS	October 2013	<ul style="list-style-type: none"> <li>Assess the vegetation on land proposed for an open cast mine and indicate sensitive vegetation groupings and plants of conservation concern.</li> </ul>
Tshepong Mine, assessment and Biodiversity Action Plan (BAP)	Harmony	November 2013 – Feb 2014	<ul style="list-style-type: none"> <li>Undertake baseline assessments for fauna, flora and wetlands;</li> <li>Compile a Biodiversity Action Plan (BAP) based on the baseline assessments</li> <li>Compile an alien invasive plant management plan for the site</li> </ul>
Masa Ngwedi 750kV and 400kV lines (Limpopo and North West Provinces) Section D & E Vegetation input for EMP	Mandara Consulting	November 2013	<p>Walk downs with specific reference to plants of conservation concern that could occur along the proposed powerline route. A report detailing the pylons in proximity to intact and likely sensitive vegetation as well as measures to aid conservation / rehabilitation of this vegetation along the powerline routes as input into the EMP; and localities of plants of conservation concern will be mapped and used to apply for permits for the removal/destruction/pruning of these species where they might be impacted on by the powerline.</p>
Marakele Bush Camp	NuLeaf	December 2013	<ul style="list-style-type: none"> <li>Site visit and meeting with the park manager with regards to the area proposed for the development</li> <li>An opinion with regards to the suitability and ecological sensitivity of the proposed area as well as the likelihood for protected plant species occurring within the development footprint.</li> </ul>
Meteor substation, as well as the 88kV line between the Pulsar, Meteor and Sorland substations, Sebokeng area,	Nsovo Environmental Consulting	February 2014	<ul style="list-style-type: none"> <li>Survey the preferred and alternative route alignments and substation locality;</li> <li>Compare the floral assemblages that are expected to occur within the area to the actual vegetation found to be present along the routes;</li> <li>Map the vegetation / habitat types according to structurally distinct vegetation units as well as transformed areas;</li> <li>Map the localities of plants of conservation concern</li> </ul>



Curriculum Vitae

Anriette Eysel

PROJECT NAME	INDUSTRY / CLIENT	DATE	ADDITIONAL INFORMATION
Gauteng			<p>that was identified during the field survey or suitable habitat where these plants could potentially occur;</p> <ul style="list-style-type: none"> <li>Assess the possible impacts that the proposed powerline an substation could have on the vegetation;</li> <li>Recommend mitigation measures to aid the conservation of vegetation during construction and operation; and</li> <li>Indicate the route that will have the least impact on the vegetation</li> </ul>
Temporary Asphalt sites	Environamic	March 2014	<ul style="list-style-type: none"> <li>Reference to the state of the vegetation e.g. was the vegetation in a primary, secondary or degraded state;</li> <li>An indication of whether the vegetation is of conservation value;</li> <li>Confirm the presence or absence of plants of conservation concern (threatened and protected plant species) on the site;</li> <li>Map any potential sensitivities that may occur on the site; and</li> <li>Assess the possible impacts that the proposed development could have on the vegetation or proximate ecological features.</li> </ul>
Blesbokaagte & Leeupoort Township development	Shangoni	April 2014	<ul style="list-style-type: none"> <li>Undertake a field survey and assessment of the biophysical environment and current status of natural features on the proposed site and compare the findings to the expected natural state as listed in the national vegetation map;</li> <li>Field survey with specific reference to plants of conservation concern ("red data" and provincially protected species) that could occur within the study site or immediate surroundings;</li> <li>Sensitivity mapping, including possible or confirmed localities of plants of conservation concern; and</li> <li>Report on the potential impacts that the proposed township could have on vegetation and recommend mitigation measures to limit or negate the potential negative impacts where possible.</li> </ul>



Curriculum Vitae: Antoinette Eysseil

APPENDIX A: MSc

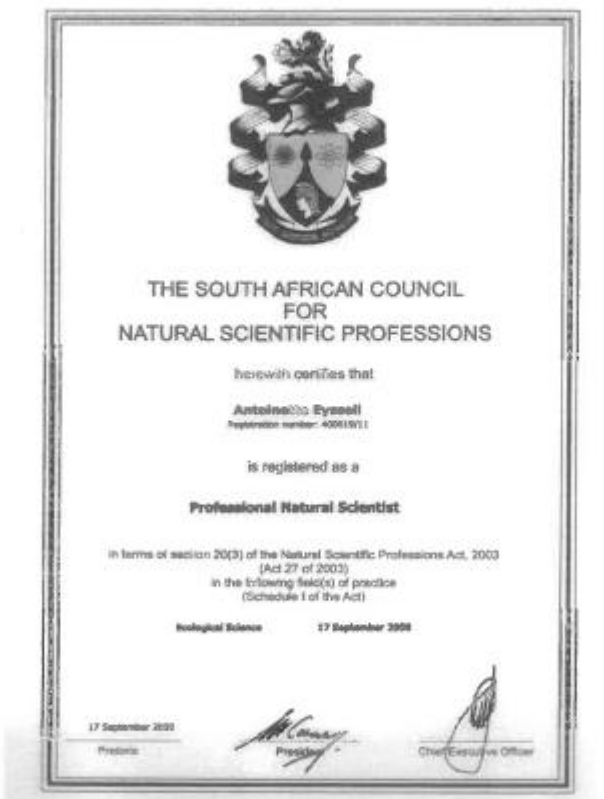
03/7800



The diploma is a formal document from the University of Pretoria. It features the university's crest at the top center. To the left of the crest is a small rectangular stamp with illegible text. To the right is another stamp that reads 'UNIVERSITY OF PRETORIA' and '2010-11-01'. The main text of the diploma is centered and reads: 'University of Pretoria', 'The Council and Senate hereby declare that at a congregation of the University the degree', 'Magister Scientiae with specialisation in Environmental Education', 'with all the associated rights and privileges was conferred on', 'ANTOINETTE EYSSELL', 'in terms of the Higher Education Act, 1997 and the Statute of the University'. Below this, there are two columns of text. The left column says 'On behalf of the Council and Senate' followed by a signature and the title 'Vice-Chancellor and Principal'. The right column says 'On behalf of the Faculty of Natural and Agricultural Sciences' followed by a signature and the title 'Dean'. At the bottom right, there is another signature and the title 'Registrar'. A large, dark, circular seal is located at the bottom left of the diploma. The date '2010-08-02' is printed at the bottom right.

Curriculum Vitae: Antoinette Eysseil

APPENDIX B: SACNASP



**Appendix B: Abbreviated Curriculum Vitae of participating specialists**

**Name:** ANTONETTE BOOTSMA nee van Wyk  
**ID Number:** 7804250013068  
**Name of Firm:** Limosella Consulting  
**Position:** Director - Principal Specialist  
**SACNASP Status:** Professional Natural Scientist # 420222-09 Botany and Ecology

**EDUCATIONAL QUALIFICATIONS**

- B. Sc (Botany & Zoology), University of South Africa (1997 - 2001)
- B. Sc (Hons) Botany, University of Pretoria (2003-2005). Project Title: A phytosociological Assessment of the Wetland Parts of Lake Chrissie
- Short course in wetland delineation, legislation and rehabilitation, University of Pretoria (2007)
- Short course in wetland soils, Terrasol Science (2009)
- MSc Ecology, University of South Africa (2010 - ongoing). Project Title: Natural mechanisms of erosion prevention and stabilization in a Marakele peatland; implications for conservation management

**PUBLICATIONS**

- P.L. Grundling, A Lindstrom, M.L. Pretorius, A. Bootsma, N. Job, L. Delport, S. Elshehawi, A.P. Groenjans, A. Grundling, S. Mitchell. 2015. Investigation of Peatland Characteristics and Processes as well as Understanding of their Contribution to the South African Wetland Ecological Infrastructure Water Research Commission KSA 2: K5/2346
- A.P. Groenjans, A.J.M. Jansen, A. Snijderwind, P.C. de Hullu, H. Jacobsen, A. Bootsma and P.L. Grundling. (In Press). In search of spring mines in Namibia: the Waterberg area revisited
- Haagner, A.S.H., van Wyk, A.A. & Wassenaar, T.D. 2006. The biodiversity of herpetofauna of the Richards Bay Minerals leases. CERU Technical Report 32. University of Pretoria.
- van Wyk, A.A., Wassenaar, T.D. 2006. The biodiversity of epiphytic plants of the Richards Bay Minerals leases. CERU Technical Report 33. University of Pretoria.
- Wassenaar, T.D., van Wyk, A.A., Haagner, A.S.H. & van Aarde, R.J.H. 2006. Report on an Ecological Baseline Survey of Zulu South Lease for Richards Bay Minerals. CERU Technical Report 29. University of Pretoria

**KEY EXPERIENCE**



The following projects provide an example of the application of wetland ecology on strategic as well as fine scale as well as its implementation into policies and guidelines. (This is not a complete list of projects completed, rather an extract to illustrate diversity):

- Wetland specialist input into the Open Space Management Framework for Linbro Park and Greater Bassonia, City of Johannesburg, 2015
- More than 250 fine scale wetland and ecological assessments in Gauteng, Mpumalanga, KwaZulu Natal, Limpopo and the Western Cape, 2007, ongoing.
- Scoping level assessment to inform a proposed railway line between Swaziland and Richards Bay, April 2013.
- Environmental Control Officer. Management of onsite audit of compliance during the construction of a pedestrian bridge in Zola Park, Soweto, Phase 1 Phase 2 and Phase 3. Commenced in 2010 -2014.
- Fine scale wetland delineation and functional assessments in Lesotho and Kenya, 2008 and 2009.
- Analysis of wetland/riparian conditions potentially affected by 14 powerline rebuilds in Midrand, Gauteng, as well submission of a General Rehabilitation and Monitoring Plan, May 2013.
- Wetland specialist input into the Environmental Management Plan for the upgrade of the Figrove Substation, Western Cape, April 2013
- An audit of the wetlands in the City of Johannesburg. Specialist studies as well as project management and integration of independent datasets into a final report. Commenced in August 2007
- Input into the wetland component of the Green Star SA rating system. April 2008;
- A strategic assessment of wetlands in Gauteng to inform the GOACE Regional Environmental Management Framework. June 2008.
- As assessment of wetlands in southern Mozambique. This involved a detailed analysis of the vegetation composition and sensitivity associated with wetlands and swamp forest in order to inform the development layout of a proposed resort. May 2008.
- An assessment of three wetlands in the Highlands of Lesotho. This involved a detailed assessment of the value of the study sites in terms of functionality and rehabilitation opportunities. Integration of the specialist reports socio economic, aquatic, terrestrial and wetland ecology studies into a final synthesis. May 2007.
- Ecological studies on a strategic scale to inform an Environmental Management Framework for the Emakazeni Municipality and an Integrated Environmental Management Program for the Emalahleni Municipality. May and June 2007

Name: RUDI BEZUIDENHOUDT  
 ID Number: 880831 5038 081  
 Name of Firm: Limosella Consulting  
 Position: Wetland Specialist  
 63

SACNASP Status: Certified Natural Scientist SACNASP Reg. No. 500024/13

**EDUCATIONAL QUALIFICATIONS**

- BSc Hons (Environmental Science), University of South Africa (ongoing)
- B. Sc (Botany & Zoology), University of South Africa (2008 - 2012)
- Short course in Wetland Rehabilitation Principles, University of the Free State (2012)
- Short course in Tools for Wetland Assessment, Rhodes University (2011)
- Short course in Understanding Environmental Impact Assessment, WESSA (2011)
- Short course in SASS 5, Groundtruth (2012)
- Wetland Seminar, ARC-ISCW & IMCG (2011)
- Introduction to Wetlands Seminar, Gauteng Wetland Forum (2010)
- Biomimicry and Constructed Wetlands Workshop, Golder Associates & Water Research Commission (2011)

**KEY EXPERIENCE**

- ▶ Assistant Wetland Specialist  
This entails all aspects of scientific investigation associated with a consultancy that focuses on wetland specialist investigations. This includes the following:
  - Approximately 70 specialist investigations into wetland and riparian conditions on strategic, as well as fine scale levels in Gauteng, Limpopo, North-West Province, Mpumalanga, KwaZulu Natal, Western Cape, Eastern Cape & Northern Cape
  - Ensuring the scientific integrity of wetland reports including peer review and publications.
- ▶ Assistant – Wetland and Rehabilitation  
This entailed the management of wetland vegetation and rehabilitation related projects in terms of developing proposals, project management, technical investigation and quality control through the following:
- ▶ Wetland Ecology  
Experience in the delineation and functional assessment of wetlands and riparian areas in order to advise proposed development layouts, project management, report writing and quality control.
- ▶ Environmental Controlling Officer:  
Routine inspection of construction sites to ensure compliance with the City's environmental ordinances, the Environmental Management Program and other laws and by-laws associated with development at or near wetland or riparian areas.



- Soweto Zola Park 2011-2014

**MEMBERSHIPS IN SOCIETIES**

- Botanical Society of South African
- SAWS (South African Wetland Society) Founding member
- SACNASP (Certified Natural Scientist)

**EMPLOYMENT EXPERIENCE**

**Wetland Specialist – Umosele Consulting (September 2010 - Ongoing)**

**Technical Assistant – Afrigis (2008 – 2010)**



**ABRIDGED CURRICULUM VITAE: GEORGE JOHANNES BREDEKAMP****Born:** 10 February 1946 in Johannesburg, South Africa.**Citizenship:** South African**Marital status:** Married, 1 son, 2 daughters**Present work address**

Department of Botany, University of Pretoria, Pretoria, 0002, South Africa

Tel:(27)(12)420-3121 Fax: (27)(12)362 5009

E-Mail: gbredek@postino.up.ac.za

or

EcoAgent CC

PO Box 25533, Monument Park, 0105, South Africa

Tel and Fax: (27)(12) 346 3180

Cell 082 5767046

E-Mail: george@ecoagent.co.za

**Qualifications:**

1963 Matriculation Certificate, Kemptonpark High School

1967 B.Sc. University of Pretoria, Botany and Zoology as majors,

1968 B.Sc. Hons. (cum laude) University of Pretoria, Botany.

1969 T.H.E.D. (cum laude) Pretoria Teachers Training College.

1975 M.Sc. University of Pretoria, Plant Ecology .

1982 D.Sc. (Ph.D.) University of Pretoria, Plant Ecology.

**Theses:** (M.Sc. and D.Sc.) on plant community ecology and wildlife management in nature reserves in South African grassland and savanna.**Professional titles:**

- MSAIE South African Institute of Ecologists and Environmental Scientists
  - 1989-1990 Council member
- MGSSA Grassland Society of Southern Africa
  - 1995 Elected as Sub-editor for the Journal
  - 1995-1999 Serve on the Editorial Board of the Journal
  - 1990 Organising Committee: International Conference: Meeting Rangeland challenges in Southern Africa
  - 1993 Elected as professional member
- PrSciNat. South African Council for Natural Scientific Professions Registration Number 400066/83
  - 1993-1997 **Chairman** of the Professional Advisory Committee: Botanical Sciences
  - 1993-1997: **Council Member**
  - 1992-1994: **Publicity Committee**
  - 1994-1997: **Professional Registration Committee**

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**Professional career:**

- Teacher in Biology 1970-1973 in Transvaal Schools
- Lecturer and senior lecturer in Botany 1974-1983 at University of the North
- Associate professor in Plant Ecology 1984-1988 at Potchefstroom University for CHE
- Professor in Plant Ecology 1988-2008 at University of Pretoria.
- 2009 – current Professor Extra-ordinary in the Dept of Plant Science, University of Pretoria
- Founder and owner of the Professional Ecological Consultancy firms Ecotrust Environmental Services CC and Eco-Agent CC, 1988-present.

**Academic career:**

## • Students:

- Completed post graduate students: M.Sc. 53; Ph.D. 14.
- Presently enrolled post-graduate students: M.Sc. 4; Ph.D. 2.

## • Author of:

- 175 scientific papers in refereed journals
- >150 papers at national and international congresses
- >250 scientific (unpublished) reports on environment and natural resources
- 17 popular scientific papers.
- 39 contributions in books

## • Editorial Committee of

- South African Journal of Botany,
- Journal Grassland Society of Southern Africa,
- Bulletin of the South African Institute of Ecologists.
- Journal of Applied Vegetation Science, (Sweden)
- Phytocoenologia (Germany)

- FRD evaluation category: C2 (=leader in South Africa in the field of Vegetation Science/Plant Ecology)

**Membership:**

- International Association of Vegetation Science.
- British Ecological Society
- International Society for Ecology (Intecol)
- Association for the Taxonomic study of the Flora of Tropical Africa (AETFAT).
- South African Association of Botanists (SAAB)
  - 1988-1993 Elected to the Council of SAAB.
  - 1989-1990 Elected as **Chairman** of the Northern Transvaal Branch
  - 1990 Elected to the Executive Council as **Vice-President**
  - 1990- Sub-editor Editorial Board of the Journal
  - 1991-1992 Elected as **President** (2-year period)
  - 1993 **Vice-President** and Outgoing President
- Wildlife Management Society of Southern Africa
- Suid-Afrikaanse Akademie vir Wetenskap en Kuns

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- (=South African Academy for Science and Art).
- Wildlife Society of Southern Africa
    - 1975 - 1988: Member
    - 1975 - 1983: Committee member, Pietersburg Centre
    - 1981 - 1982: **Chairman**, Pietersburg Centre
  - Dendrological Society of Southern Africa
    - 1984 - present: Member
    - 1984 - 1988: Committee member, Western Transvaal Branch
    - 1986 - 1988: **Chairman**, Western Transvaal Branch
    - 1987 - 1989: Member, Central Committee (National level)
    - 1990 - 2000: Examination Committee
  - Succulent Society of South Africa
    - 1987 - 2000
  - Botanical Society of South Africa
    - 2000 - present: Member
    - 2001 - 2008: Chairman, Pretoria Branch
    - 2002 - 2006: Chairman, Northern Region Conservation Committee
    - 2002 - 2007: Member of Council
- Special committees:**
- Member of 10 special committees re ecology, botany, rangeland science in South Africa.
  - Member of the International Code for Syntaxonomical Nomenclature 1983-present.
- Merit awards and research grants:**
- 1968 Post graduate merit bursary, CSIR, Pretoria.
- 1977-1979 Research Grant, Committee re Research Development, Dept. of Co-operation and Development, Pretoria.
- 1984-1989 Research Grant, Foundation for Research Development, CSIR, Pretoria.
- 1986-1987 Research Grant, Dept. of Agriculture and Water Supply, Potchefstroom.
- 1990-1997 Research Grant, Dept. of Environmental Affairs & Tourism, Pretoria.
- 1991-present Research Grant, National Research Foundation, Pretoria.
- 1991-1993 Research Grant, Water Research Commission.
- 1999-2003 Research Grant, Water Research Commission.
- 2006 South African Association of Botanists Silver Medal for outstanding contributions to South African Botany
- Abroad:**
- 1986 Travel Grant, Potchefstroom University for Christian Higher Education, Potchefstroom  
Visits to Israel, Italy, Germany, United Kingdom, Portugal.
- 1987 Travel Grant, Potchefstroom University for Christian Higher Education, Potchefstroom.  
Visits to Germany, Switzerland, Austria, The Netherlands, United Kingdom.
- 1990 Travel Grant, FRD.  
Visit to Japan, Taiwan, Hong-Kong.
- 1991 Travel Grant, FRD.  
Visits to Italy, Germany, Switzerland, Austria, France, The Netherlands, United Kingdom.

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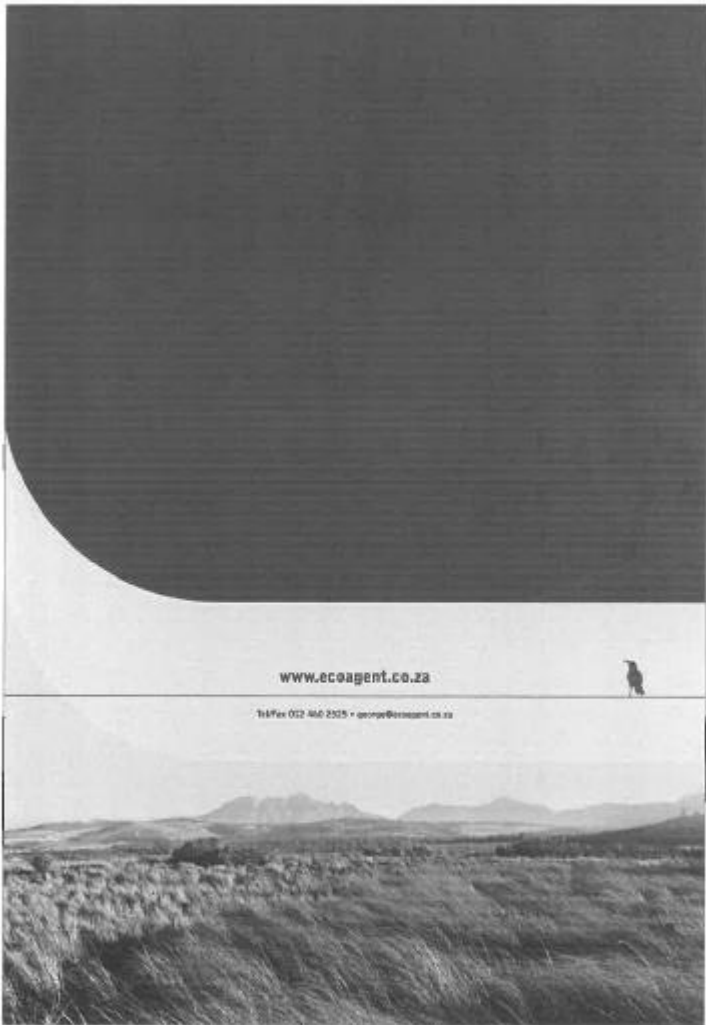
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- 1993 Travel Grant, University of Pretoria.  
Visits to the USA, Costa Rica, Czech Republic, Austria.
- 1994 Travel Grant FRD.  
Visits to Switzerland, The Netherlands, Germany, Czech Republic.
- 1995 Travel Grant FRD, University of Pretoria  
Visits to the USA.
- 1996 Travel Grant, University of Pretoria  
Visit to the UK.
- 1997 Travel Grant University of Pretoria, Visit Czech Republic, Bulgaria
- 1998 Travel Grant, University of Pretoria, Visit Czech Republic, Italy, Sweden
- 1999 Travel Grant, University of Pretoria, Visit Hungary, Spain, USA
- 2000 Travel Grant, University of Pretoria, Visit Poland, Italy, Greece.
- 2001 Travel Grant, NRF, Visit Brazil
- 2006 German Grant Invited lecture in Rinteln, Germany

**Consultant**

Founder and owner of Ecotrust Environmental Services CC and Eco-Agent CC  
Since 1968 >250 reports as consultant on environmental matters, including:

- Game Farm and Nature Reserve planning,
- Environmental Impact Assessments,
- Environmental Management Programme Reports,
- Vegetation Surveys,
- Wildlife Management,
- Veld Condition and Grazing Capacity Assessments,
- Red data analysis (plants and animals).



## ABRIDGED CURRICULUM VITAE

## ANDREW E. MCKECHNIE

Professor  
Department of Zoology and Entomology  
University of Pretoria

Email: aemckechnie@zoology.up.ac.za  
Tel: +27-(0)12-423232  
Cell: +27-(0)72-7777572

## ACADEMIC QUALIFICATIONS

Ph.D. (Zoology), University of Natal, April 2002  
M.Sc. *cum laude* (Zoology), University of Natal, April 1999  
B.Sc. (Honours) *cum laude* (Zoology), University of Natal, April 1997  
B.Sc. (Majors: Zoology and Botany), University of Natal, April 1996

## PROFESSIONAL QUALIFICATIONS

Professional Natural Scientist (*Pr. Sci. Nat.*; Registration number: 400265/05), South African Council for Natural Scientific Professions

## TECHNICAL REPORTS [31 in total, only 10 most recent shown]

McKechnie, A.E. 2013. Specialist avifaunal assessment: proposed Frankfort Power Station. Prepared for Rural Maintenance.

McKechnie, A.E. 2013. Specialist avifaunal assessment: proposed MOGS oil storage facility, Saldanha Bay. Prepared for Enviro-Insight.

McKechnie, A.E. 2012. Specialist winter avifaunal assessment: proposed Prieska Photovoltaic Plant. Prepared for Enviro-Insight.

McKechnie, A.E., Verburg, L., Chimimba, C.T., Orban, B. and Niemand, L.J. 2011. Initial environmental assessment report: proposed Chisanga Falls Hydroelectric Generation Facility. Prepared for Rural Maintenance.

McKechnie, A.E., Verburg, L., Chimimba, C.T., Orban, B. and Niemand, L.J. 2011. Initial environmental assessment report: proposed expansion to the Kapsobekers Coal Mine, northern Malawi. Prepared for Rural Maintenance.

McKechnie, A.E., Verburg, L., Chimimba, C.T., Orban, B. and Niemand, L.J. 2010. Malawi Mine Grids Ecological Assessment Report. Prepared for Rural Maintenance and Millennium Challenge Corporation.

McKechnie, A.E. 2010. Specialist survey report: assessment of impacts on birds, with particular reference to threatened and near threatened species: proposed subdivision of portion 39, Olyvenvlei 327 JG, Gauteng. Prepared for Prism EMS.

McKechnie, A.E. 2009. Specialist survey report: assessment of impacts on birds, with particular reference African Grass-owl, White-bellied Korhaan, African Finchbill and Half-collared Kingfisher: proposed residential development on portion 63, Rietvlei 180 JG, Roodpoort, Gauteng. Prepared for Prism EMS.

McKechnie, A.E. 2009. Specialist survey report: Assessment of impacts on birds: proposed wind farm development on Bargeskop 107 and Elandpoort 99 HS, Mpumalanga. Prepared for K2M Environmental.

Schulzfeld, U., Alexander, G.J., McKechnie, A.E., et al. 2009. Monitoring recommendations for fawns: AngloGold Ashanti Fossil Reef and West Wits. Prepared for AngloGold.

## PEER-REVIEWED SCIENTIFIC PUBLICATIONS [71 in total, only three most recent shown]

Pletten, D.W., Synes, C.T., Woodburn, S.W., McKechnie, A.E. and Jansen, R. (in press)  
Diet and prey selectivity of the specialist myrmecophage, Temminck's ground pangolin (*Smutsia temminckii*). *Journal of Zoology*

Smit, B. and McKechnie, A.E. 2015. Water and energy fluxes during summer in an arid-zone passerine bird. *Ibis* 157(4): 774-785.  
 Whitfield, M.C., Smit, B., McKechnie, A.E. and Wolf, B.O. 2015. Avian thermoregulation in the heat: scaling of heat tolerance and evaporative cooling capacity in three southern African arid-zone passerines. *Journal of Experimental Biology* 218: 1705-1714.

#### ARTICLES IN SEMI-POPULAR MAGAZINES [73 in total, only three most recent shown]

McKechnie, A.E. 2016. Mercury rising - South Africa's national parks are getting warmer. *African in press*.  
 McKechnie, A.E. 2016. Enormous, enigmatic, extinct - the elephant birds of Madagascar. *African Birdlife* in press.  
 Noakes, M.J. and McKechnie, A.E. 2015. Hot or not? Physiological variation in white-breasted sparrowweavers. *African Birdlife* September/October 2015: 12-13.

#### CONFERENCE PRESENTATIONS [110 in total, only plenary lectures shown]

McKechnie, A.E., Smit, B., Hockey, P.A.R. and Wolf, B.O. Taking the heat: climate change and desert. *At Frontiers in South African Ornithology*, 15-16 March 2012, Port Elizabeth, South Africa.  
 McKechnie, A.E., Smit, B., Cory Trossant, D., Boyle, J.G. and Wolf, B.O. Hot birds and bats: approaches to predicting climate change impacts in small endotherms. *At: In: ZSSA and PARSA Conference*, 10-13 July 2011, Stellenbosch, South Africa.

#### SCIENTIFIC AWARDS AND RECOGNITION [only last five years shown]

2013	Finalist: 2012/2013 NSTF/BHP Billiton Awards
2013	Exceptional Academic Achiever, University of Pretoria
2011	Founding Member, South Africa Young Academy of Science
2008-2012	Exceptional Young Researcher Award, University of Pretoria

#### STUDENT SUPERVISION

Current supervision: 4 PhD, 1 BSc(Hons); Current co-supervision: 3 PhD  
 Past supervision: 1 PhD, 10 MSc, 9 BSc (Hons); Past co-supervision: 1 PhD, 2 MSc, 3 BSc (Hons)

#### EDITORSHIP

Associate Editor: *Climate Change Responses*  
 Associate Editor: *Emu - Austral Ornithology*  
 Editorial Board: *Journal of Comparative Physiology B*

#### INVITED SEMINARS AND LECTURES [23 in total, only 3 most recent shown]

Mirral Department for Desert Ecology, Ben-Gurion University of the Negev, Israel, August 2015.  
 School of Biological Sciences, University of Queensland, July 2015  
 Hawkesbury Institute for the Environment, University of Western Sydney, July 2015.

#### OTHER CONTRIBUTIONS

Scientific Advisor, *African Birdlife* magazine  
 Expert reviewer - South African National Standard SANS 10386 Annex C  
 Member, Research Ethics and Scientific Committee, National Zoological Gardens  
 Member, Steering Committee, Endangered Wildlife Trust Threatened Grassland Species Program  
 Council Member, Zoological Society of Southern Africa [2009-2013]

**SOCIETY MEMBERSHIP**

American Ornithologists' Union  
Australia and New Zealand Society for Comparative Physiology and Biochemistry  
Cooper Ornithological Society  
International Ornithologists' Union  
Society for Integrative and Comparative Biology  
Zoological Society of Southern Africa

**ABRIDGED CURRIVULUM VITAE VAN WYK:****JACOBUS CASPARUS PETRUS (JACO)****Identity number** 680804 5041 08 4**Gender** Male**Date of birth** 4 August 1968**Nationality** South African**Home languages** Afrikaans, fluent in English**Postal address** P.O. Box 25085, Monument Park, Pretoria, 0105.**Tel no** +27 12 347 8502, Cell +27 82 410 8871**E-mail** jcpvanwyk@absamail.co.za**Present position** Co-Department Head, Environmental Education & Life Sciences, Hoërskool Waterkloof**Consultant** Specialist Environmental Assessments, EIAs, writing, photo-recording**Qualifications** B.Sc. (U.F.S.) B.Sc. (Hon.) (U.F.S.), H.E.D (U.F.S.), M.Sc. (U.F.S.)**Honours** Foundation of Research Development bursary holder**Professional Natural Scientist (Zoology)** – S.A Council for Natural Scientific Professions,

Registration # 400062/09

**Notable Research Contribution** In-depth field study of the giant bullfrog**Formal Courses Attended** Outcomes Based Education, University of the South Africa (2002)

Introductory Evolution, University of the Witwatersrand (2008)

OBE, GET &amp; FET training, 2002-2008, Education Department

**Employment history****2000 – Present** Co-Department Head for Environmental Education & Life Sciences, Hoërskool Waterkloof, Pretoria.**1995 - 1999** Teaching Biology (Grades 8 – 12) and Physics / Chemistry (Grades 8 – 9) at the Wilgenrivier High School, Free State. Duties included teaching, mid-level management and administration.**July 1994 – Dec 1994** Teaching Botany practical tutorials to 1<sup>st</sup> year students at the Botany & Zoology Department of the Qwa-Qwa campus of the University of Free State, plant collecting, amphibian research**1993 - 1994** Mammal Research Institute (University of Pretoria) research associate on the Prince Edward Islands: topics field biology and population dynamics of invasive alien rodents, three indigenous seals, invertebrate assemblages, censusing king penguin chicks and lesser sheathbills, and marine pollution**1991 - 1993** Laboratory demonstrator for Zoological and Entomological practical tutorials, and caring for live research material, University of the Free State**1986 - 1990** Wildlife management and eco-guiding, Mt. Everest Game Farm, Harrismith**Professional Achievement** **Research:** Author and co-author of 52 scientific publications in peer-reviewed and popular subject journals, and >60 contractual EIA research reports. Extensive field work and laboratory experience in Africa**Public Recognition:** Public speaking inter alia radio talks, TV appearances**Hobbies:** Popular writing, travel, marathon running, climbing (viz Kilimanjaro), photography, biological observations, public speaking.

Curriculum Vitae

BIOGRAPHIC DETAILS

**First Name:** Michelle Leigh  
**Last Name:** Thompson  
**Gender:** Female  
**Date of Birth:** 19 May 1989  
**ID Number:** 8905190183089  
**Marital Status:** Single  
**Contact Address:** 191 Murray Street, Brooklyn, Pretoria 0181  
**Cellphone and e-mail:** (+27)71 869 9042 mtompson@zoology.up.ac.za  
**Languages:** English, Afrikaans  
**Drivers Licence:** South African Code B, light motor vehicle licence

TERTIARY EDUCATION

2014 - Current **PhD (Zoology)**, Department of Zoology and Entomology, University of Pretoria, South Africa. Title: Climate change and arid-zone birds: validation of a behavioural index for assessing species' relative vulnerabilities to rising temperatures. Advisors: Prof Andrew McKechnie, Dr Susan Cunningham.

2012 **MSc (Zoology), cum laude**, Department of Zoology and Entomology, University of Pretoria, South Africa. Title: Influence of solar radiation on heat production capacity and daily heterothermy in energy constrained Eastern rock elephant shrews (*Elephantulus myurus*). Advisors: Prof Andrew McKechnie, Dr Nomakwezi Mzilikazi.

2011 **BSc Honours (Zoology)**, Department of Zoology and Entomology, University of Pretoria, South Africa. Title: Relative learning capabilities of benthic sharks. Advisors: Prof Marthen Bester, Ryan Johnson, Adam Johnstone.

2010 **BBe (Zoology)**, Department of Zoology and Entomology, University of Pretoria, South Africa.

TEACHING EXPERIENCE

2012 – Current **Teaching assistant**, Department of Zoology and Entomology, University of Pretoria, South Africa.  
 Courses: Evolutionary Physiology, Ecophysiology, Physiology

2012 – Current **Mentorship Program**, Department of Zoology and Entomology, University of Pretoria, South Africa. Mentoring one final-year undergraduate student per year, teaching lab procedures and maintenance as well as animal maintenance.

2012 – 2014 **Private Tutor**, Highschool level (Grade 10 – 12) Biology, Physical Science.

AWARDS & SCIENTIFIC/SCHOLARLY RECOGNITION

2014 – 2016 DST-NRF Centre of Excellence Bursary (R120 000 p.a.)  
 2014 Received MSc cum laude  
 2012 – 2014 NRF MSc Free-standing Bursary (R40 000 p.a.)  
 2010 Subject Merit Bursary

**SOCIETIES**

2016 Student representative for Department of Zoology and Entomology for the Post-graduate Association for the Natural and Agricultural Sciences (PSANA)

2016 Association of Field Ornithologists

2011, 2015 Golden Key International Honour Society

2011 Zoological Society of South Africa

**PEER-REVIEWED SCIENTIFIC PUBLICATIONS**

Thompson ML, Mzilikazi N, Bennett N, McKechnie AE. 2015. Solar radiation during rewarming from torpor in elephant shrews: supplementation or substitution of endogenous heat production? *PLoS one* 10, p. e0120442 <http://dx.doi.org/10.1371/journal.pone.0120442>

**CONFERENCES**

Thompson ML, Cunningham SJ, McKechnie AE. It's cool to be dominant: Social status and thermoregulation in birds. *Learn about Birds*. 10-11 March 2016. Kruger National Park, South Africa.

Thompson ML, Mzilikazi N, Bennett N, McKechnie AE. The Effects of solar radiation on heterothermy and metabolic thermogenesis capacity in the eastern rock elephant shrew, *Elephantulus myurus*. *Zoological Society of South Africa*. 15-17 July 2016. Grahamstown, South Africa.

Thompson ML, Mzilikazi N, Bennett N, McKechnie AE. The Effects of solar radiation on heterothermy and metabolic thermogenesis capacity in the eastern rock elephant shrew, *Elephantulus myurus*. *Physiology and Pharmacology of Temperature Regulation*. 7-12 September 2014. Kruger National Park, South Africa

**OTHER CONTRIBUTIONS**

Reviewer for *African Zoology*

- Taylor, P.J. 1998. The Smaller Mammals of KwaZulu-Natal. University of Natal Press: Pietermaritzburg.
- Taylor, P.J. 2000. Bats of Southern Africa. University of Natal Press: Pietermaritzburg.
- Thidley, J.-M. 1999. Responses of an avian community to rain forest degradation. *Biodiversity and Conservation* 8:513-534.
- Van Niekerk, J. 2015. Environmental Guidelines and Laws for Beef Cattle Feedlots in South Africa. (With a quick guide to common transgressions and relevant legislation in Appendix A). South African Feedlot Association (SAFA).
- Van Schalkwyk, M. 2007. National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004); Publication of Lists of Critically Endangered, Endangered, Vulnerable and Protected Species.
- Van Wyk, J.C.P., Kok, D.J. & Du Preez, L.H. 1992. Growth and behaviour of tadpoles and juveniles of the African Bullfrog, *Pyxicephalus adspersus* Tschudi 1838. *J. Herp. Assoc. Afr.* 40:56.
- Weiermans, J., and R. J. van Aarde. 2003. Roads as ecological edges for rehabilitating coastal dune assemblages in northern KwaZulu-Natal, South Africa. *Restoration Ecology* 11:43-49.

## 12. CURRICULUM VITAE

### RÉSUMÉ

IGNATIUS LOURENS RAUTENBACH Ph.D., Prof. Nat. Sci.  
Independent Environmental Consultant – MAMMALOGY.

Identity Number 421201 5012 00 5  
Gender Male  
Date of Birth 1 December 1942; born Germiston, RSA  
Nationality South African  
Home Languages Bilingual (English & Afrikaans)  
Postal Address 45 Heigaard Street, Klerk Park, Pretoria, RSA 0186.  
Tel no +27 12 3334112, Cell +27 082 3351288.  
E-mail naasrauten@rmweb.co.za  
Former Position Director: Planning, Northern Flagship Institute  
Present Position Consultant – Specialist, Environmental Impact Assessments (Applied research);  
Photographing microstock for four agencies  
Qualifications B.Sc. (UP) 1968; T.H.E.D (Pta TTC) 1967, M.Sc. (UP) 1971, Ph.D. (Un. Natal) 1971

### Professional Honours

1. Professional Natural Scientist (Zoology) – S.A Council for Natural Scientific Professions, Registration # 400300/05
2. Fellow of the Photographic Society of South Africa
3. Master photographer at club level
4. Honorary life member of the S.A. Wildlife Management Association.

**Notable Research Contribution** In-depth survey of the Mammals of the Transvaal. 1962. 211pp. Ecoplan Monograph 1.

**Notable Literary Contribution** Rautenbach, Naas & Annalene Rautenbach. 2008. *Photography for Focused Beginners*. 302pp with 250 images. Green Door Studio, Pretoria.

**Formal Courses Attended** Computer Literacy, Project Management, Contract Design, Senior Management

Basic Assessment of Vertebrates and Habitats of Shangani April 2016 Page 70

**Employment history**

**May 2001 - Present** Self-employed, collaborator with Eco-Agent CC Ecological Consultants as well as Galago Environmental [environmental impact assessments], technical writing, and photography

**April 1999 - August 2001** Director: Planning, Northern Flagship Institution

**Jan 1991 - April 1999** Executive Director, Transvaal Museum

**July 1967 - Dec 1990** Curator (in charge) of the Division of Mammalogy, Transvaal Museum. Promoted to Principal Scientist rank as of June 1985

**March - June 1967** Research student at the Mammal Research Institute of the Zoology Department, University of Pretoria

**July 1966, Nov 1966 - Febr 1967** Member of the Smithsonian Institution's field teams collectively partaking in the 'African Mammal Project'

**1966 -** Part-time research assistant to Prof. J. Meester, University of Pretoria

**1962 - 1965** Temporary assistant during University holidays in the Nematology laboratories, Agricultural Technical Services

**1991 - 2002** Founder member and non-executive director of the Board of Trustees of

**1993 - 2001** Founder member and Trustee of the privatised Museums Pension Fund

**1997 - 2001** Non-executive director of the Tswaing Section 21 Company

**Professional Achievements**

**Managed** a research institute of 125 members of staff. Solicited numerous grants totalling ≥ R1 000 000. Initiated and overseen building programmes of R30 million at the Transvaal Museum. Conceptualised and managed 12 display programmes.

**Research:** Author and co-author of 85 scientific publications re mammalogy in peer reviewed subject journals, 18 popular articles, 10 books, and >400 contractual EIA research reports. Extensive field work and laboratory experience in Africa, Europe, USA, Alaska, Brazil and Mexico. B -rated by FRD as scientist of international status 1983 - 1995.

**Students:** Additional to museum manager duties, co-supervised 5 B.Sc. (Hons.), 2 M.Sc. and 2 Ph.D. students.

**Public Recognition:**

Public speaking *inter alia* Enrichment Lecturer on board the 6\* SS *Silver Wind*, radio talks, TV appearances.

**Hobbies**

Technical writing, photography, field logistics, biological observations, wood working, cooking, designs.

**Personal Evaluation**

I am goal-orientated, expecting fellow workers and associates to share this trait. I am an extrovert, sensitive to amicable interpersonal relations. I have a wide interest span ranging from zoological consulting, photography, cooking, sport, news, gardening and out of necessity, DIY. To compensate for my less than perfect memory, I lead a structured and organised life to deal with the detail of a variety of interests. Often to the chagrin to people close to me, I have an inclination to "Think Out of the Box".

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**CURRICULUM VITAE**

**Name:** **maer Johan van den Berg**  
**Qualification:** Qualified Landscape Architect  
**Date of Birth:** 17 September 1960  
**ID No:** 800917 5002 061  
**Nationality:** South African  
**Marital Status:** Married  
**Languages:** Afrikaans (mother tongue), English

**CONTACT DETAILS**

**PO Box:** 14856  
**Zuurfontein**  
**1912**  
**South Africa**

**Tel nr:** +2778 169 1456  
**E-mail:** i-scapes@vodanet.co.za

**EDUCATIONAL QUALIFICATIONS**

- M.(Prof) (Landscape Architecture), University of Pretoria, Pretoria (2004)
- B.Sc Hons (Landscape Architecture), University of Pretoria, Pretoria (2003)
- B.Sc. (Landscape Architecture), University of Pretoria, Pretoria (2002)

**PREVIOUS EMPLOYMENT EXPERIENCE**

- Employed by i-Dot Design Studio CC from 2010 providing Landscape and Architectural services;
- Self Employed from January 2007 – March 2010;
- Employed as a Qualified Landscape Architect at Strategic Environmental Focus (Pty) Ltd (Feb 2005 – Dec 2006). Specialist responsibilities entailed:
  - Visual Impact Assessment
  - Landscape Design
  - Landscape Rehabilitation & Environmental Planning
  - Invasive Vegetation Eradication Programming;
- Research assistant on the subject of human's visual perception with regards to mine Tailings Disposal Facilities – University of Pretoria (2004).

**KEY COMPETENCIES**

- Visual Impact Assessment (VIA)
- Rehabilitation planning for disturbed surfaces
- Environmental Planning
- Landscape Design
- Computer Aided Design (CAD)
- VIA related GIS data interpretation
- Graphic Design

**SPECIALIST WORKING EXPERIENCE****VISUAL IMPACT ASSESSMENT (2012-2015)**

- Eskom Holdings Ltd, Visual Impact Assessment report for the Platjies Substation and rebuild of a power line in Roodepoort, Gauteng. – Envirovolution Consulting (2015);
- Eskom Holdings Ltd, Visual Impact Assessment report for the Kgebelatsane – Wegglass Substations and associated loop-in and loop-out power lines in the Winterfeld area, City of Tswane. – Envirovolution Consulting (2015);
- Malelane Safari Resort Investments (Pty) Ltd, Re-assessment of the Visual Impact Assessment for the proposed Malelane Safari Lodge in the Kruger National Park, Mpumalanga. – NuLeaf Planning and Environmental (Pty) Ltd (2015);
- Eskom Holdings Ltd, Visual Impact Assessment report for the Rhombus – Lethabong Substation and 88kV line, Rustenburg Municipality, NorthWest Province. – Envirovolution Consulting (2014);
- City of Cape Town, Visual Impact Assessment report for the Closure of the Waterloof Landfill Site in Somerset West, Western Cape Province. – Mott MacDonald PDNA (2014);
- Eskom Holdings Ltd, Visual Impact Assessment report for the proposed Dipompong, Tswaing Substations and 132kV distribution line, Northern Tswane, Gauteng. – Envirovolution Consulting (2014);
- Thaba Ya Bolewena Eco-Tourism, Visual Impact Assessment report for the proposed Stone River's Arch Mixed-Use Development in the southern part of the City of Johannesburg – Gauteng Province. – GladAfrica Environmental Management (Pty) (2013);
- Eskom Holdings Ltd, Visual Impact Assessment report for the proposed Diepsloot East 132kV servitude and Bluehills Substation, City of Johannesburg Municipality, Gauteng. – Envirovolution Consulting (2013);
- Shell South Africa Marketing (Pty) Ltd, Visual Impact Assessment report for the proposed Ngezebe Shell Service Station, Ga Masha Village, Limpopo. – Environmental Resources Management (2012);
- Cradle of Malelane (Pty) Ltd, Visual Impact Assessment report for the proposed Malelane Safari Resort in the Kruger National Park (2012);
- Eskom Holdings Ltd, Visual Impact Assessment report for the proposed proposed establishment of the Anderson 400kV Substation, Broederstroom, North West Province. – Nermal Consulting CC (2012);
- Eskom Holdings Ltd, Visual Impact Assessment report for the proposed establishment of the Ntshona Substation and 132kV power line, West Rand District Municipality, Gauteng. – Envirovolution Consulting (2012);
- Eskom Holdings Ltd, Visual Impact Assessment report for the proposed Dordkruis – Aberdeen 400kV Servitude, Beaufort West, Western Cape Province. – Envirovolution Consulting (2012);

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CURRICULUM VITAE - MJ VAN DEN BERG (2015)

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- ABC Solar (Pty) Ltd, Visual Impact Assessment report for the proposed 75MWp photovoltaic power plant and ancillary infrastructure on a portion of the remaining extent of erf 1, Prieska, Northern Cape. Lead consultant – Kalk-hart Survey Solutions and Products (2012);
- Eskom Holdings Ltd, Visual Impact Assessment report for the proposed Kookfontein – Jaguar 88kV distribution line from Mreyetse to Oranjeboom, Gauteng. Lead consultant – Lead consultant Envirovolution Consulting (2012);
- Eskom Holdings Ltd, Visual Impact Assessment report for the realignment of approximately 20 km of the proposed Marathon 600kV transmission line between Witvliet and Nelspruit, Mpumalanga. Lead consultant – BKS Pty (Ltd) (2012);

**LANDSCAPE REHABILITATION****Mine Closure Cost Quantification:**

- Platinum Australia – Kalplate, for the quantification of closure costs as part of a Bankable Feasibility Study based on the Department of Minerals and Energy closure quantum determination best practice guidelines and in association with Arbol Consulting. Located near Stella, North West Province (2006);
- Xtrata Alloys – Thomcliffe and Helena Chrome mines, for the quantification of closure costs of both active mines based on the Department of Minerals and Energy closure quantum determination best practice guidelines and in association with Arbol Consulting. Located between Roosensik and Steelpoort, Limpopo Province (2007);

**Alien Vegetation Management Program:**

- Vini's International Trading (Pty) Ltd, for the proposed establishment of the township Paulshof ext. 78, on holding 6 Airdin Agricultural Holdings (A.H.), Sunninghill, Johannesburg (2006);
- Zuaro Investments, For the establishment of the township Barbeque Downs ext. 29 Bothasfontein 436-JR, Midrand (2008);

**Resource Management and Planning:**

- Department of Water Affairs and Forestry (DWAF), Inyaka Dam Resource Management Plan, Bushbuck Ridge, Mpumalanga (2006):
  - Source baseline data and information;
  - Compile sections of the Encumbrance Report;
  - Attend Technical Task Team meetings; and
  - Compile sections of the Draft Resource Management Plan;

**Environmental Management Planning:**

- City of uMhlabuthuze, Relocation of Biodiversity Assets and Rehabilitation, KwaZulu Natal, Richards Bay, (2006):
  - Compile section of the Environmental Management Plan (EMP);
  - Compile Tender Specifications;

**Landscape Rehabilitation:**

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- Ceramic Industries Ltd, Re-vegetation and implementation of a 1 ha disturbed area at the Pegasus Export Facility, Vereeniging, Gauteng (2008);
- Ceramic Industries Ltd, Landscape rehabilitation (design and supervision) of the existing Steelpark clay quarry, Vereeniging, Gauteng (2005-2006);

**Landscape Rehabilitation:**

- Highveld Crushers, Landscape rehabilitation program for the proposed expansion of the stone aggregate quarry, Standerton, Mpumalanga (2005);

**LANDSCAPE DESIGN****Landscape Site Development Plan:**

- Gateway Capital Limited, Landscape Site Development Plan and Installation Management of Brisant Head Office Complex – 366 Rubenstein Road Moreletta Park (2009);
- Gateway Capital Limited, Landscape Site Development Plan and Installation Management of office complex – 324 Rubenstein Road Moreletta Park (2009);
- Gateway Capital Limited, Landscape Site Development Plan for Delta Park Office Complex – 366 Rubenstein Road Moreletta Park (2009);
- Emerald Auto, Landscape Site Development Plan for the upgrade of Emerald Auto Cnr of HF Verwoerd Street and Swammer Street, Gezina (2008).

**Landscape Master Plan Development:**

- Helgard Muller, Landscape Master Plan Development, Sketch plan development and implementation management for Wonderfontein 350 security complex, Sasolburg, Free State (2013-2015);
- Ceramic Industries Ltd, Landscape design and implementation for Pegasus Canteen and Laboratory, Vereeniging, Gauteng (2010);
- The Church of Jesus Christ of Latter-Day Saints, Landscape Design and project management of new church facility in C. R. Swart Drive, Randpark Ridge (2010-2011);
- Ceramic Industries Ltd, Landscape design and implementation for Ceramic Exports, Vereeniging, Gauteng (2008);
- Burris Smit Developers, Cashan X7 Residential Development on the Remainder of Portion 43 of the farm Waterval 306JQ in Rustenburg, North West Province (2006);

**Landscape Development Guidelines:**

- Mr. Howard Walker, The Proposed Establishment of a Resort on Portion 36 of the farm Lunsklip 105JT (2006);

**PUBLICATIONS**

- Van Deventer, H and Van den Berg, M. 2006. Using GIS visibility analysis in visual impact assessments. Position IT July/Aug 2006 pp. 33-35.
- Sustainable Tailings Impoundment Landform Design: Rational Decision Making for the Sustainable Configuration of Tailings Impoundments (Paper and presentation at Chamber of Mines Conference, 2006)

CURRICULUM VITAE - MJ VAN DEN BERG (2015)

**CURRICULUM VITAE**  
**Johan Abraham van Schaikwyk**

**PERSONAL PARTICULARS**

Date of birth: 14 April 1952  
Identity number: 520414 5099 08 4  
Marital status: Married; one daughter  
Nationality: South African

**CURRENT POSITION**

Head of Research: National Cultural History Museum.

**CURRENT ADDRESS**

Work:  
P O Box 28088, Sunnyside, 0132  
Tel: (012) 324 6082; Fax: (012) 328 5173; E-mail: jshaikw@nfi.org.za

Home:  
62 Coetzer Ave, Monument Park, Pretoria, 0181  
Tel: (012) 347 7270

**ACADEMIC QUALIFICATIONS**

BA - 1976  
BA (Hons.) Archaeology - 1978 - (with distinction)  
Post Graduate Diploma in Museum Science - 1979  
BA (Hons.) Anthropology - 1981 - (with distinction)  
MA. Anthropology - 1985  
D. Lit et Phil (Anthropology) - 1996

**NON ACADEMIC QUALIFICATIONS**

Genec Management Course - 1986  
Genec Management Course - Advance Course - 1987  
12th HSRC-School in Research Methodology - July 1990  
Dept. of Education and Training Management Course - June 1992  
Social Assessment Professional Development Course - 1994  
Integrated Environmental Management Course, UCT - 1994

**EMPLOYMENT RECORD**

1978 - present: National Cultural History Museum, Pretoria  
1976 - 1977: Archaeology Department, University of Pretoria

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**PROFESSIONAL EXPERIENCE**

1992 - present: Chief researcher: Head of Department of Research. Manage an average of seven researchers in this department and supervise them in their various research projects. Also do various projects relating to Anthropology and Archaeology in Limpopo Province, Mpumalanga, North West Province and Gauteng. Am also in charge of the Museum's section for Heritage Impact Assessment projects. Have done work in this regard in Limpopo Province, Gauteng, Mpumalanga, North West Province, Botswana, Lesotho and Swaziland. Curated various exhibitions at different museums.

1978 - 1991: Curator of the Anthropological Department of the Museum. Carried out extensive fieldwork in both anthropology and archaeology and HIA projects all over Mpumalanga, Limpopo Province and Gauteng. Curated various exhibitions at different museums.

1976 - 1977: Assistant researcher responsible for excavations at various sites in Limpopo Province and Mpumalanga.

**PROFESSIONAL MEMBERSHIP**

Member, Association for Anthropologists in Southern Africa  
 Member, South African Association of Archaeologists  
 Member, Southern African Museums Association  
 Member, International Association for Impact Assessment, South African Chapter  
 Member, African Studies Association, Smithsonian Institute, Washington  
 Member, African Studies Association of Australasia and the Pacific, Perth

**ADVISORY POSITIONS**

1. Honorary curator, National Monuments Council: 1984-1989.
2. Member of the "Steering committee for the promotion of the arts in the Greater Pretoria": 1992-1994.
3. Member, Board of Directors of the Bakgatla ba Kgafela Heritage Centre: 1997-2000.
4. Member, CRM section of the South African Association of Archaeologists: 1997-1998.
5. Member of the Archaeological Standards Generating Body: 2002-

**COMMUNITY DEVELOPMENT**

1. Assisting the Bakgatla-ba-Kgafela people, located at Saultpoort, North West Province, to establish a Community Heritage Centre.
2. Informal training of students from formerly disadvantaged communities in aspects of heritage management, museology, etc. The main thrust of this action is to give them some vocational training to prepare them for future job opportunities.
3. Assisting the Hemaowa and Bakoni baka Matlala Tribal Authorities with conservation of sites of cultural significance through programmes of sustainable tourism development.
4. Assisting the Mlambo Tribal Authority with development of programme for cultural tourism.
5. Assisting the Ndebele of Marsala with documentation and development of sites of cultural significance for tourism.

**LECTURING**

Present on regular basis lectures at professional associations - a complete list can be supplied on request.

Act as guest lecture for

\* museology at the University of Pretoria;

#### PUBLICATIONS

Published more than fifty papers on topics relating to anthropology, archaeology, history and impact assessment in various scientific journals - a complete list can be supplied on request.

#### TEMPORARY EXHIBITS

Curated a total of 14 temporary exhibits on diverse topics. A complete list can be supplied on request.

#### AWARDS AND GRANTS

1. Hamisch Book Prize for the best final year Archaeology student, University of Pretoria - 1976.
2. Special merit award, National Cultural History Museum - 1986.
3. Special merit award, National Cultural History Museum - 1991.
4. Grant by the Department of Arts, Culture, Science and Technology, to visit the various African countries to study museums, sites and cultural programmes - 1993.
5. Grant by the National Parks Service, USA, to visit the United States of America to study museums, sites, cultural programmes and impact assessment programmes - 1998.
6. Research grant by the Department of Arts, Culture, Science and Technology - 1999.
7. Grant by the Cultural Affairs office of the United States Embassy to attend a conference in Charleston, West Virginia - 2000.
8. Grant by the National Research Foundation to develop guidelines for community based tourism projects - 2001.

#### CONTRACT WORK

1. Did research (anthropological, archaeological and historical) and collecting of museum material for various museums and institutions, including:  
Cultural History Museum, Cape Town; Anthropology Museum, Hamburg (Germany); Royal Academy of Art, London; Johannesburg Art Gallery.
2. Did more than 180 impact assessments (archaeological, anthropological and social) for various departments and companies. Projects include roads, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments. Clients include the following:  
Pretoria City Council; AMCOAL; Anglo-Alpha; Africon; CSIR; Conradie, Müller & Associates, Architects; Dept. of Environmental Affairs & Tourism; Akasia City Council; Walmsley Environmental Consultants; HSRC; Rustenburg Platinum Mines; Digby Wells & Associates; Senesque, Maughan-Brown, SWK; Consultants; Bruinette, Kruger & Stoffberg, Consulting Engineers; Dannie Joubert & Associates; Corporate Image; Western Platinum; Environmental Impact Management Services (EIMS); Strategic Environmental Focus; Oxy Environmental; Lenton, Venn & Associates; Ekokernul Inc.; Afrosouth Index; Gorus Uys & White; Bosa-Allen & Hamilton (SA) Ltd; Midrand Metropolitan Council; GLMC, Naledi Development.
3. Am also involved with the development of sites of cultural significance as tourist attractions. These include sites around Pretoria, in North West Province, Limpopo Province and Lesotho.

#### NON-PROFESSIONAL EXPERIENCE

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*Curriculum Vitae*  
Hein du Toit

**Personal Details**

**Surname** : Du Toit  
**Names** : Hein  
**Date of Birth** : 12 February 1972  
**Nationality** : RSA  
**Profession** : Development Economist & Real Estate Analyst

**Key Qualifications**



**Hein du Toit.** Hein du Toit is the Managing Director and founding member of DEMACON Market Studies. Hein is a specialist development economist and expert real estate analyst. He obtained a degree in Town and Regional Planning (*Cum Laude*) at the University of Pretoria in 1994 and a Masters Degree (MSc) in real estate market studies in 2002 (*Cum Laude*). He has also completed

specialist courses in, *inter alia*, Cluster Development for Cluster Practitioners (1999) and Shopping Centre Management – the Certificate in Shopping Centre Management (CSCM) in 2005 (*Cum Laude*). Hein is in process of reading his PhD in real estate market studies and impact modelling techniques. His research has been published in, *inter alia*, the *South African Journal of Economic and Management Sciences*. Hein was also invited to read a paper on his research at the International Real Estate Conference in Brisbane in January 2003. He has also been invited as presenter to the South African Council of Shopping Centres' Research Conference. He has successfully completed a number of certificate courses. Hein has 21 years field related experience. He is a member of the SA Property Owners Association, SA Council of Shopping Centres and SA Planning Institution and South African Research and Innovation Management Association. He has been extensively involved in real estate and economic market studies both locally and beyond SA borders, including Swaziland, Lesotho, Angola, Botswana, Burundi, Central African Republic, Mozambique, Namibia, People's Republic of China, Kenya, Tanzania, Uganda and Zambia. His fields of expertise include, *inter alia*, real estate market studies, urban and rural economics, as well as economic and fiscal impact assessments. His client base includes, *inter alia*, SA's leading commercial banks, listed funds, private funds, investors and developers, advocates' chambers, attorneys, economic development agencies, all tiers of government (national, provincial, metropolitan/local) as well as parastatals, etc. Hein is part-time lecturer and is periodically invited to serve as external examiner.

Hein prides himself in providing sound, objective, expert advice and in developing, maintaining and growing professional client relations. As such, he is an asset to any client, whether in an individual capacity or as part of a multidisciplinary project team.



*Curriculum Vitae*  
Hein du Toit

**Expertise**

- ✓ Real estate mixed use market studies (human settlements, office sector, logistics, industrial, warehousing & distribution, tourism, healthcare, educational, etc.)
- ✓ Retail studies
- ✓ Specialist Economic Assessments & Strategies
- ✓ Economic and Fiscal Impact Assessments
- ✓ Socio-economic studies and surveys
- ✓ Economic sector studies
- ✓ Cluster Analyses
- ✓ Demand & supply modelling
- ✓ Urban renewal programmes
- ✓ Investment strategies
- ✓ Business planning and consulting

**Academic Qualifications**

Institution (Date from – Date to)	Degree(s) or Diploma(s) or Certificate(s) obtained:
University of Pretoria (Cum Laude), 1991 – 1994	BTRP
University of Pretoria (Cum Laude), 1998 – 2002	MSc (Real Estate)
University of Pretoria in association with SAPOA, 2005 (Cum Laude)	Certificate in Shopping Centre Management (CSCM)
University of Pretoria (2005, in process – with interruptions)	PhD (Real Estate)

**MSC Dissertation:** *Appraisal of the Fischer-DiPasquale-Wheaton (FDW) Real Estate Model and Development of an Integrated Property and Asset Market Model (IPAMM).* Hein was invited to read a paper on his dissertation at the **International Real Estate Conference in Brisbane** in January 2003. This paper was published in the **South African Journal of Economic and Management Sciences**.

**PhD Thesis:** *Advanced Real Estate Market Potential & Impact Modelling Techniques (in process)*

In addition to the above, Hein completed an **Industrial Cluster Practitioners Course** in 1999. In subsequent years, he was primarily responsible for industrial and related real estate research at a firm of macro economists, where he was a partner – before starting up **DEMACON**.

Hein is a member of the **South African Property Owners' Association (SAPOA)**, the **South African Council of Shopping Centres (SACSC)**, **South African Planning Institution (SAPI)** and the **South African Research and Innovation Management Association (SARIMA)**.



Curriculum Vitae  
Hein du Toit

Condensed list of Project Experience

**SPECIALIST ECONOMIC STUDIES / STRATEGIES / PLANS**

- ✓ JPC Land Strategy Market Analysis
- ✓ Ekurhuleni Capital Investment Framework (CIF) & modelling
- ✓ Mpumalanga Spatial Development Framework Economic and Market Study
- ✓ North West Spatial Development Framework Economic and Market Study
- ✓ Ndwedwe Regional Framework Market Study
- ✓ R21 / Albertina Sisulu Corridor LSDF Economic and Market Study
- ✓ University of Pretoria Spatial Development Framework Economic and Market Study
- ✓ Westgate Station Spatial Development Framework Economic and Market Study
- ✓ Urban Development Zone (UDZ) Tax Incentive Scheme appraisal
- ✓ Timball Floriculture and Nutraceutical Technology Incubator Business Plan & Market Analysis (European Union Funds)
- ✓ Commercial Helicopter Manufacturing Market Analysis and Business Plan
- ✓ City of Johannesburg Sustainable Human Settlements and Urbanisation Plan
- ✓ City of Johannesburg Corridor Plans
- ✓ City of Johannesburg Sector Cluster Analyses
- ✓ Mbombela Investment Strategy, including Cluster Analyses & Strategies
- ✓ Economic respective assessments for 13 Neighbourhood Development Partnership Grant Programmes (NDPG), National Treasury including City of Tshwane, Polokwane, Mookopane, Mthuzi, Bushbuckridge, Zeerust (Ikageng), Matosana, Nsikasi, Galeshewe, Tzaneen.
- ✓ Pickitup Site Relocation Study
- ✓ Sol Plaatje LED Review
- ✓ Zeerust Socio-Economic Sector Analysis and Development Plan – Neighbourhood Development Programme
- ✓ Nalspruit CBD Renewal Plan (2000 & 2005)
- ✓ George CBD Renewal Plan
- ✓ Mbombela Economic Development Agency Establishment Business Plan
- ✓ Braamfontein Economic Redevelopment Plan
- ✓ Bekkersdal Urban Renewal Programme
- ✓ Winterveld Urban Renewal Programme
- ✓ Evaton Urban Renewal Programme
- ✓ Mofhenwell Urban Renewal Programme

**RESIDENTIAL & HOUSING PROJECTS**

- ✓ Ellaton Social Housing Market Study (SHRA)
- ✓ Flamwood Social Housing Market Study
- ✓ Sunnyside Social Housing Market Study
- ✓ Chantelle Social Housing Market Study
- ✓ Devland Social Housing Market Study
- ✓ Turfontein Social Housing Market Study (JOSHCO)
- ✓ Lombardy East Social Housing Market Study (JOSHCO)
- ✓ Arcadia Timberlands Social Housing Market Study
- ✓ Tshwane CBD Rental Housing Market Study



Curriculum Vitae  
Hein du Toit

- ✓ Eye of Africa Golf Estate
- ✓ Serengeti Golf Estate
- ✓ Shyamoya Coastal & Forest Estate
- ✓ Chief Albert Luthuli Integrated Human Settlement Market Study
- ✓ Cosmo City Integrated Human Settlement Market Study
- ✓ Luthfereng Integrated Human Settlement Market Study
- ✓ Woodmead (KZN) Mixed Typology Housing Project
- ✓ Hyde Park Market Study
- ✓ Rocky Park Mixed Typology Housing Development

**INDUSTRIAL AND IDZ/SEZ STUDIES**

- ✓ JIA (now ORTIA) Industrial Development Zone Study and Industrial Cluster Analysis (H. du Toit)
- ✓ R21 / Albertina Sisulu Development Industrial Corridor Economic Development Plan & Impact Assessment
- ✓ Mafikeng Freight Transport Strategy, Passenger Rail & Rail Freight Plan & Feasibility Study for the Development of a Freight Hub at Mafikeng Airport
- ✓ Dube TradePort Economic & Market Study
- ✓ SIP2 Strategic Corridor Plan Economic & Market Study
- ✓ Richards' Bay IDZ Study – land demand and Sectoral forecasts
- ✓ Richards' Bay IDZ/SEZ Marketing Strategy
- ✓ Limpopo Eco-Industrial Analysis and Gas Exploration Cluster Analyses
- ✓ Iscor Flat Steel Products Industrial Market Analysis
- ✓ Saldanha IDZ Market Study – Cluster Analysis & Investment Strategy
- ✓ East London IDZ Business Plans – various
- ✓ National Manganese Metals Industrial Market Study and Strategy
- ✓ Kings Estate Industrial Market Analysis
- ✓ Mbombela Economic Development Strategy and Industrial Cluster Analyses
- ✓ Limpopo (Northern Province) Industrial Strategy
- ✓ Eastern Gauteng Regional Economic and Industrial Development Strategy
- ✓ JIA (now ORTIA) IDZ Industrial Study and Strategy
- ✓ Ekurhuleni Aerropolis Market Study and Strategy – incl. Rhodesfield Aero City Economic Assessment & Plan

**TRANSPORT, INFRASTRUCTURE AND RELATED PROJECTS**

- ✓ Moloto Rail Demand Study and Economic Impact Assessment
- ✓ N3 De Beers Pass By-Pass Economic Impact Assessment
- ✓ Ermelo Ring Road Economic Impact Assessment
- ✓ Johannesburg BRT Economic Assessment & Plan (JDA)
- ✓ Westgate Station Economic Assessment & Plan (JDA)
- ✓ Masa-Selemo Power Project Economic Impact Assessment (Eskom)
- ✓ Epsilon Power Station Economic Impact Assessment (Eskom)
- ✓ Nkomati Power Lines Economic Impact Assessment (Eskom)
- ✓ Gautrain – various Station alignment and realignment economic & real estate impact assessments (Bombela / Iliso Consulting)



- ✓ Rainbow Junction Market Study & Economic & Fiscal Impact Assessments – input to bulk infrastructure contribution apportionments (RJ Development Company / City of Tshwane)
- ✓ Rhodesfield Station Precinct Plan – input to the Aerropolis Concept (Ekurhuleni Metro)

**NEIGHBOURHOOD DEVELOPMENT PARTNERSHIP GRANT – ECONOMIC ASSESSMENTS**

- ✓ Tsosoloso Tsosoloso NDPG Economic Assessment & Plan
- ✓ Be-Phealaborwa Township Renewal Strategy Economic Assessment
- ✓ Polokwane NDPG Economic Assessment & Plan
- ✓ Mookopane / Mahwelereng NDPG Economic Assessment & Plan
- ✓ Matlosana NDPG Economic Assessment & Plan
- ✓ Bushbuckridge NDPG Economic Assessment & Plan
- ✓ Ntshali NDPG Economic Assessment & Plan
- ✓ Ikagateng NDPG Economic Assessment & Plan
- ✓ Kanyamazane NDPG Economic Assessment & Plan
- ✓ Swaiela NDPG Economic Assessment & Plan
- ✓ eMhuzi NDPG Economic Assessment & Plan
- ✓ Sol Plaatje – selected economic surveys and inputs
- ✓ Tzaneen NDPG Economic Assessment & Plan
- ✓ Tlokwe NDPG Economic Assessment & Plan

**ECONOMIC IMPACT ASSESSMENTS**

- ✓ Epsilon Substation Economic Impact Assessment (ESKOM / PBA International)
- ✓ Nkomati Power Lines Impact Assessment
- ✓ Gautrain Economic Impact Assessment (6 separate, consecutive investigations)
- ✓ Zonki/Zizwe Mixed Use Precinct Economic Impact Assessment (Old Mutual)
- ✓ Mbombela (Nelspruit) Stadium Economic Impact Assessment
- ✓ GOPE Diamond Mine Socio-Economic Impact Assessment (Botswana)
- ✓ Innovation Hub Phase 2 Economic Impact Assessment
- ✓ Iscor Fiat Steel Economic Impact Assessment
- ✓ Msobo Coel Mine Economic Impact Assessment
- ✓ Alexander Mine Economic Impact Assessment
- ✓ Wallmannsthal Mine Economic Impact Assessment

**MIXED USE PRECINCTS**

- ✓ Ningbo Super Regional Mall Market Study (People's Republic of China)
- ✓ Newtown Mixed Use Market Study
- ✓ Menlyn Maine Mixed Use Precinct Market Analysis
- ✓ Lynnwood Bridge Mixed Use Precinct Market Analysis
- ✓ Riverside Mixed Use Precinct Market Analysis
- ✓ Riverfields Mixed Use Precinct Market Analysis
- ✓ Blue Mountain Mixed Use Market Analysis
- ✓ Zonki/Zizwe Mixed Use Precinct Impact Assessment
- ✓ Rainbow Junction Mixed Use Precinct



*Curriculum Vitae*  
Hein du Toit

- ✓ The Villa Mixed Use Precinct
- ✓ Zwartkoppies Mixed Use Precinct
- ✓ Zambezi Mixed Use Precinct
- ✓ Heritage Hill Mixed Use Market Study
- ✓ Sandown Extension 49 Mixed Use Precinct (Sandton Gautrain Station)

**NEW / PROPOSED SHOPPING CENTRES**

- ✓ Mall of the North Mixed Use Market Study
- ✓ Kolonnade Retail Park Market Study (Phase 1)
- ✓ Bay West Mall
- ✓ Forest Hill Mall
- ✓ The Grove Mall
- ✓ Ateridgeville Mall
- ✓ Kyalami Village Mall
- ✓ Taakane Mall
- ✓ Klerksdorp Village Mall
- ✓ Ilanga Mall
- ✓ Middelburg Mall
- ✓ Secunda Mall
- ✓ Burgersfort Mall
- ✓ Bridge City
- ✓ Tzaneen Mall
- ✓ Market studies for all new outlets, including the likes of Makro/Massmart, Shoprite/Checkers, Pick 'n Pay franchise stores, Fresh Stop, Alert Steel outlets Phonak, Netcare, etc.

**CENTRE REFURBISHMENTS / EXPANSIONS / REPOSITIONING**

- ✓ Menlyn Park Market Study
- ✓ Brooklyn Mall
- ✓ Southgate Mall
- ✓ Cresta Mall
- ✓ Eastgate Mall
- ✓ The Grove – Phase 2 expansion
- ✓ Ilanga Mall – Phase 2 expansion
- ✓ Tzaneen Mall – Phase 2 expansion
- ✓ Woodlands Mall Market Study
- ✓ Irene Mall Market Study
- ✓ Highveld Mall Market Study
- ✓ Kolonnade Retail Park Market Study (Phase 2)
- ✓ Kolonnade Expansion Market Study
- ✓ Mall @ Reds
- ✓ Jabulani Mall Market Study
- ✓ Limpopo Provincial Retail Market Analysis (2004 & 2008)
- ✓ Swaziland Retail Market Analysis
- ✓ Riverside Mall
- ✓ Nelson Mandela Square
- ✓ Kriel Mega Mall



*Curriculum Vitae*  
Hein du Toit

**BUSINESS PLANS:**

- ✓ King's Estate Industrial Park Market Analysis & Business Plan
- ✓ Sebokeng Mixed Use Development Market Study & Business Plan
- ✓ Musina Manufacturing Business Plan (Veneta Mine)
- ✓ Timbali Floriculture and Nutraceutical Technology Incubator Business Plan & Market Analysis (H. du Toit & James Vos)
- ✓ Commercial Helicopter Manufacturing Market Analysis & Business Plan
- ✓ Brick Yard Business Plan and Feasibility Study
- ✓ Bekkersdal Business Plan & Urban Renewal Market Study
- ✓ Miscellaneous business plans for Neighbourhood Development Partnership Grant (NDPG) projects for National Treasury

**SELECTED CLIENTS**

- ✓ SHRA
- ✓ JOSHICO
- ✓ Ekurhuleni Metro
- ✓ National Treasury
- ✓ SARS
- ✓ Public Works
- ✓ National Department of Human Settlements
- ✓ The Presidency
- ✓ Gauteng Department of Human Settlements
- ✓ Tshwane Metro
- ✓ City of Johannesburg
- ✓ Johannesburg Development Agency
- ✓ Old Mutual
- ✓ Atterbury
- ✓ Anglo American
- ✓ Resilient
- ✓ Liberty
- ✓ Growth Point
- ✓ HIProp
- ✓ Massmart & Makro Group
- ✓ Shoprite/Checkers
- ✓ ABSA DevCo
- ✓ Investec
- ✓ Nedbank
- ✓ Moolman Group
- ✓ Trade & Investment Limpopo (TIL)
- ✓ LimDev
- ✓ National Housing Finance Corporation (NHFC)
- ✓ International Housing Solutions (IHS)
- ✓ Sasol Pension Fund
- ✓ Standard Bank
- ✓ SANRAL
- ✓ PRASA
- ✓ Caltex, etc.