

Draft Basic Assessment Report

# Proposed Extensions at Ngwenya Lodge near Kruger National Park, Mpumalanga Province



November 2021

Prepared by:



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## Foreword

This report constitutes the **Draft Basic Assessment Report**, and has been circulated digitally for Stakeholder Comment on 3 November 2021.

NuLeaf Planning and Environmental would like to thank all Stakeholders for their participation and input into this process to date, and hereby invite Stakeholders to review this draft report and to provide feedback, input, concerns and comments.

All written comments received, including NuLeaf's response to each, will be captured in a Comments and Responses Register, which will be made available to all I&AP's and included in the Final Basic Assessment Report for submission to the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs.

All comments on the Draft BAR must be **in writing** and must reach NuLeaf by no later than close of business on 3 December 2021.

Please mark all comments for the attention of:

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## Acronyms and abbreviations

BA:	Basic Assessment
BAR:	Basic Assessment Report
CBA:	Critical Biodiversity Area
CMP:	Construction Management Plan
DARDLEA:	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs
DWS:	South African National Department of Water and Sanitation
EA:	Environmental Authorisation
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment
EMPr:	Environmental Management Programme
EMS:	Environmental Management System
EO:	Environmental Officer
I&AP:	Interested and Affected Party
IDP:	Integrated Development Plan
IEM:	Integrated Environmental Management
KNP	Kruger National Park
LED:	Local Economic Development
MTPA:	Mpumalanga Tourism and Parks Agency
NEMA:	National Environmental Management Act, Act No. 107 of 1998
NEMPAA:	National Environmental Management: Protected Areas Act, Act No. 57 of 2003
NPAES:	National Protected Area Expansion strategy
OMP:	Operational Management Plan
SAHRA:	South African Heritage Resources Agency

## GLOSSARY OF TERMS

Alien Vegetation:	Alien vegetation defined as undesirable plant growth which shall include, but not be limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA) regulations.
Alien Species:	A plant or animal species introduced from elsewhere: neither endemic nor indigenous.
Alternatives:	In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to: (a) The property on which or location where it is proposed to undertake the activity; (b) The type of activity to be undertaken; (c) The design or layout of activity; (d) The technology to be used in the activity; and (e) The operational aspects of the activity.
Applicant:	Any person who applies for an authorization to undertake an activity or to cause such activity to be undertaken as contemplated in the National Environmental Management Act (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010.

Buffer zone:	Is a collar of land that filters out inappropriate influences from surrounding activities, also known as edge effects, including the effects of invasive plant and animal species, physical damage and soil compaction caused by trampling and harvesting, abiotic habitat alterations and pollution. Buffer zones can also provide more landscape needed for ecological processes, such as fire.
Construction Activity:	Any action taken by the Contractor, his subcontractors, suppliers or personnel during the construction process.
Ecology:	The study of the inter relationships between organisms and their environments.
Environment:	All physical, chemical and biological factors and conditions that influence an object and/or organism.
Environmental Impact:	An Impact or Environmental Impact is the degree of change to the environment, whether desirable or undesirable, that will result from the effect of a defined activity. An Impact may be the direct or indirect consequence of the activity and may be simple or cumulative in nature.
Environmental Impact Assessment:	Assessment of the effects of a development on the environment.
Environmental Management Programme:	A legally binding working document, which stipulates environmental and socio-economic mitigation measures that, must be implemented by several responsible parties throughout the duration of the proposed project.
Indigenous:	Means a species that occurs, or has historically occurred, naturally in a free state within the borders of South Africa. Species that have been introduced to South Africa as a result of human activity are excluded (South Africa (Republic) National Environmental Management: Biodiversity Act, 2004: Chapter 1).
Interested and Affected Party:	Any person, group of persons or organization interested in or affected by an activity contemplated in an application, or any organ of state that may have jurisdiction over any aspect of the activity.
Invasive vegetation:	Plant species that show the potential to occupy in unnatural numbers, any disturbed area, including pioneer species.
Mitigate:	The implementation of practical measures to reduce adverse impacts
Public Participation:	Public Participation Process: is a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters. The legislated process contemplated in terms GN R543, in which all potential interested and affected parties are informed of the proposed project and afforded the opportunity to input, comment and object. Specific requirements are listed in terms of advertising and making draft reports available for comment.
Road Reserve:	The road reserve is a corridor of land, defined by co-ordinates and proclamation, within which the road, including access intersections or

	interchanges, is situated. A road reserve may, or may not, be bounded by a fence.
Road Width:	The area within the Road Reserve including all areas beyond the Road Reserve that are affected by the continuous presence of the road i.e. the verge.
Red data plant species:	Are fauna and flora species that require environmental protection based on the World Conservation Union (IUCN) categories and criteria.
RoD:	Record of Decision pertaining to the Application for Environmental Authorisation issued by the Competent Authority. The RoD is legally binding on the Applicant and may contain a positive or negative decision on the Application as well as conditions and provisions for each.
Soil Compaction:	Mechanically increasing the density of the soil, vehicle passage or any other type of loading. Wet soils compact easier than moist or dry soils.
Species:	Means a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind. The term "species" include any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population (South Africa [Republic] National Environmental Management: Biodiversity Act, 2004: Chapter 1).
The Contractor:	The contractor, as the developers agent on site, is bound by the ROD and EMP conditions through his/her contract with the developer, and is responsible for ensuring that conditions of the EMP and ROD are strictly adhered to at all times. The contractor must comply with all orders (whether verbal or written) given by the ECO, project manager or site agent in terms of the EMPr.
The Developer:	Remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMP and the conditions of the Environmental Decision throughout all phases of the project.
The Environmental Control Officer (ECO):	The ECO is appointed by the developer as an independent monitor of the implementation of the EMP i.e. independent of the developer and contractor.
The Environmental Officer (EO):	The Contractor shall submit to the Site Agent a nominated representative of the Contractor as an EO to assist with day to day monitoring of the construction activities for the contract.
Vegetation:	Is a collective word for plants occurring in an area.
Vulnerable:	A taxon is 'Vulnerable' when it is not 'Critically Endangered' or 'Endangered' but is facing a high risk of extinction in the wild in the medium term future.
Watercourse:	A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may by notice in the Government Gazette, declare to be a watercourse, and a reference to a

watercourse includes, where relevant, its bed and banks" (South Africa [Republic] National Water Act, 1998).



## Executive Summary

The proposed development entails the expansion of the existing Ngwenya Lodge located on the remaining portion of 68 and Portions 78, 79, 80 and 82 of Farm Tenbosch 162 JU adjacent to the Kruger National Park. The expansion will entail the addition of a maximum of 2182 beds which will include a 100 bed safari lodge/timeshare unit. All associated civil infrastructure (water, electricity, waste treatment) will be included, as well as, internal access roads.

The study area is situated in Delagoa Lowveld within the Lowveld Bioregion in the Savanna Biome which is considered well protected and has a conservation status of Least Concern. It is not listed as a Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9 December 2011) nor is the study area situated in an floristic centre of endemism. The entire study area is situated within the Ecological Support Areas (ESA): Protected Area Buffers unit.

Most of the terrestrial ecosystems within the study area are classified as Heavily Modified or Moderately Modified Areas by the Mpumalanga Biodiversity Sector Plan (MBSP). The scattered untransformed sections are classified as Other Natural Areas. Two untransformed vegetation communities were identified within the study area, namely Disturbed Riparian Forest/Thicket and Degraded Woodland/Thicket which has a sensitivity rating of high and moderate respectively. The transformed areas are assessed as having a low sensitivity rating. One Nationally protected plant species was confirmed to occur, namely *Philenoptera violacea*. Two Near Threatened plants were confirmed to occur, namely *Elaeodendron transvaalense* and *Dalbergia melanoxylon*. Seven plant species that are protected under either the National Forests Act (No. 30 of 1998) or the Mpumalanga Nature Conservation Act (No.10 of 1998), namely *Aloe chabaudii* var. *chabaudii*, *A. parvibracteata* and *A. marlothii* subsp. *marlothii*, *Combretum imberbe*, *Elaeodendron transvaalense* and *Sclerocarya birrea* subsp. *caffra*, were confirmed to occur.

Two conservation- important mammals are listed as Vulnerable and were confirmed during fieldwork, namely Hippopotamus (*Hippopotamus amphibius*) and African Elephant. The White-backed Vulture assessed as Critically Endangered was confirmed flying over the Ngwenya Lodge site.

No Stone Age, Iron Age or historical settlements, structures, features, assemblages or artefacts were recorded during the survey. Also, no graveyards or individual graves were recorded.

The construction and operation of the proposed Ngwenya expansion will have a visual impact on the scenic resources of the study area especially on the KNP and the existing Ngwenya Timeshare owners/guests. Owing to the fact that Ngwenya Lodge has been in operation for many years, the visual impact is already in place, thereby reducing the overall impact substantially.

The construction impacts of the Preferred Alternative, if effectively and sufficiently managed will mostly be of **low** significance, post mitigation. It should be noted that a **moderate** post mitigation significance rating is anticipated in terms of disturbance and loss of ecological and hydrological function and destruction of the riparian areas. This is mainly due to the placement of 3 sewage pump stations, 3 bird hides, 13 chalet units and a portion of the restaurant within the 32 m buffer of the drainage lines and the riparian habitat, areas deemed to have a high sensitivity. It should be noted that the 3 bird hides will use a tread lightly approach, will be on elevated platforms to limit the amount of vegetation to be cleared. No post mitigation impacts of high significance are expected.

Assuming that the recommendations are implemented and adhered to, there is no reason why the proposed expansion of Ngwenya Lodge should not take place. There are no fatal flaws to this project, and all potentially negative impacts may be mitigated through careful management during all phases of the project lifecycle. The Environmental Assessment Practitioner therefore recommends that the development be supported.

## SECTION A: ACTIVITY INFORMATION

### 1. PROJECT DESCRIPTION

#### 1.1. Development Components

The proposed development entails the expansion of the existing Ngwenya Lodge located on the remaining portion of 68 and Portions 78, 79, 80 and 82 of Farm Tenbosch 162 JU adjacent to the Kruger National Park. The expansion will entail the addition of a maximum of 2182 beds which will include a 100 bed safari lodge/timeshare unit. All associated civil infrastructure (water, electricity, waste treatment) will be included, as well as, internal access roads. Refer to Appendix A.

The total footprint of the proposed expansion will not exceed 20 hectares.

The proposed expansion will consist 5 Development Zones, where Development Zones 1, 2 and 4 will consist of the construction of chalets, Development Zone 5 will comprise of the safari lodge and Development Zone 3 will be either a restaurant (as per Alternative 1: Preferred Alternative) or additional chalets (as per Alternative 2: Layout Alternative).

#### Alternative 1: Preferred Alternative

Development Zones 1, 2, 4 (timeshare chalets) and Development Zone 3 (restaurant) will be comprised of the following:

- 80 2/3 bedroom units
- A restaurant with covered parking bays
- Retail and information centre
- Recreational areas inclusive of
  - Putt-putt course
  - Boma
- 5 x Viewpoints/ bird hides
- Parking areas
- Access control point

Development Zone 5 (lodge) will be comprised of the following:

- 51 hotel units/rooms totalling 100 beds
- A central complex
- Restaurant
- 1 x Viewpoints/ bird hide

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

- 3x sewage pump stations
- A portion of the restaurant and associated covered parking
- 3x viewpoints/ bird hides

The minimum allowable distance from the ephemeral systems are 17 m and from the Crocodile River is 42m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 2 sewage pump stations, a portion of the new main sewage pump station, a portion of the restaurant and associated covered parking and 4 bird hides.

#### Alternative 2: Layout Alternative

Development Zones 1-4 (timeshare chalets) will be comprised of the following:

- 87 2/3 bedroom units
- Retail and information centre
- Recreational areas inclusive of
  - Putt-putt course
  - Boma
- 5 x Viewpoints/ bird hides
- Parking areas
- Access control point

Development Zone 5 (lodge) will be comprised of the following:

- 51 hotel units/rooms totalling 100 beds
- A central complex
- Restaurant
- 1 x Viewpoints/ bird hide

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

- 3x sewage pump stations
- 5x chalet units
- 3x viewpoints/ bird hides

The minimum allowable distance from the ephemeral systems are 17 m and from the Crocodile River is 42m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 2 sewage pump stations, a portion of the new main sewage pump station, 5 chalets and 4 bird hides.

## 1.2. Detailed description of the listed activities associated with the project as applied for

Government Notice R327 Activity No.	Describe the relevant Basic Assessment Activity in writing as per Listing Notice 1 (GN No. R327)	Describe the portion of the development as per the project description that relates to the applicable listed activity
12 (ii) (c)	The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more where such development occurs within 32 meters of a watercourse.	<p>The proposed development entails the construction of chalets and a 100 bed safari lodge. The chalets will be between approximately 70-200 square meters in size.</p> <p><u>Alternative 1: Preferred Alternative</u> The following infrastructure will be located within 32 m of a watercourse: 3x sewage pump stations, A portion of the restaurant and associated covered parking, 3x viewpoints/ bird hides.</p> <p>The minimum allowable distance from the ephemeral systems are 17 m and from the Crocodile River is 42m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 2 sewage pump stations, a portion of the new main sewage pump station, a portion of the restaurant and associated covered parking and 4 bird hides.</p>

		<p><u>Alternative 2: Layout Alternative</u> the following infrastructure will be located within 32 m of a watercourse: 3x sewage pump stations, 5x chalet units, 3x viewpoints/ bird hides.</p> <p>The minimum allowable distance from the ephemeral systems are 17 m and from the Crocodile River is 42m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 2 sewage pump stations, a portion of the new main sewage pump station, 5 chalets and 4 bird hides.</p>
27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.	The total cleared footprint of indigenous vegetation will be approximately 45 000 m <sup>2</sup> (4.5 Ha)
48 (i) (c)	The expansion of (i) infrastructure or structures where the physical footprint is expanded by 100 square meters or more (c) within 32 meters of a watercourse.	<p>The proposed development entails the expansion of the existing Ngwenya Lodge with the addition of a maximum of 2182 beds which will include a 100 bed safari lodge/timeshare unit.</p> <p><u>Alternative 1: Preferred Alternative</u> The following infrastructure will be located within 32 m of a watercourse: 3x sewage pump stations, A portion of the restaurant and associated covered parking, 3x viewpoints/ bird hides.</p> <p>The minimum allowable distance from the ephemeral systems are 17 m and from the Crocodile River is 42m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 2 sewage pump stations, a portion of the new main sewage pump station, a portion of the restaurant and associated covered parking and 4 bird hides.</p> <p><u>Alternative 2: Layout Alternative</u> the following infrastructure will be located within 32 m of a watercourse: 3x sewage pump stations, 5x chalet units, 3x viewpoints/ bird hides. The minimum allowable distance from the ephemeral systems are 17 m and from the Crocodile River is 42m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 2 sewage pump stations, a portion of the new main sewage pump station, 5 chalets and 4 bird hides.</p>
<b>Government Notice R324 Activity No:</b>	<b>Describe the relevant Scoping and EIA Activity in writing as per Listing Notice 2 (GN No. R324)</b>	<b>Describe the portion of the development as per the project description that relates to the applicable listed activity</b>
4 (f) (i) (gg)	The development of a road wider than 4 meters	The internal access tracks will be approximately 5

	with a reserve less than 13,5 m in (f) Mpumalanga (i) outside urban areas within (gg) areas 10 Km from national parks identified in terms of NEMPAA.	m in width.  The Kruger National Park is located less than 1 Km from the proposed site.
12 (f) (iii)	The clearance of an area of 300 square meters or more of indigenous vegetation in (f) Mpumalanga (iii) on land zoned open space or had an equivalent zoning.	A total of approximately 45 000 square meters of indigenous vegetation will be cleared for the proposed expansion.  The portions are all zoned as agriculture.
14 (ii) (c) (f) (i) (hh)	The development of (ii) infrastructure or structures with a physical footprint of 10 square meters or more, where such development occurs within (c) 32 meters or a watercourse; in (f) Mpumalanga (i) outside urban areas in (hh) areas within 10 Km of a national park as identified in terms of NEMPAA.	The proposed development entails the construction of chalets and a 100 bed safari lodge. The chalets will be between approximately 70-200 square meters in size.  <u>Alternative 1: Preferred Alternative</u> The following infrastructure will be located within 32 m of a watercourse: 3x sewage pump stations, A portion of the restaurant and associated covered parking, 3x viewpoints/ bird hides.  The minimum allowable distance from the ephemeral systems are 17 m and from the Crocodile River is 42m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 2 sewage pump stations, a portion of the new main sewage pump station, a portion of the restaurant and associated covered parking and 4 bird hides.  <u>Alternative 2: Layout Alternative</u> the following infrastructure will be located within 32 m of a watercourse: 3x sewage pump stations, 5x chalet units, 3x viewpoints/ bird hides. The minimum allowable distance from the ephemeral systems are 17 m and from the Crocodile River is 42m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 2 sewage pump stations, a portion of the new main sewage pump station, 5 chalets and 4 bird hides.  The Kruger National Park is located less than 1 Km from the proposed site.
17 (f) (i) (gg)	The expansion of a resort, lodge, hotel and tourism or hospitality facilities where the development footprint will be expanded and the expanded facility can accommodate an additional 15 people or more in (f) Mpumalanga (i) outside urban areas in (gg) ) areas within 10 Km of a national park as identified in terms of NEMPAA.	The proposed development entails the expansion of the existing Ngwenya Lodge. The expansion will consist of an additional 2182 beds inclusive of a 100 bed safari lodge.  The Kruger National Park is located less than 1 Km from the proposed site.
18 (f) (i) (gg)	The widening of a road by more than 4 meters, or	Access roads may be lengthened by approximately 1.3 Km

	the lengthening of a road by more than 1 Km in (f) Mpumalanga (i) outside urban areas in (gg) areas within 10 Km of a national park identified in terms of NEMPAA and (ii) within 100 meters of a watercourse.	. The Kruger National Park is located less than 1 Km from the proposed site.
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## 2. FEASIBLE AND REASONABLE ALTERNATIVES

### 2.1. Site Alternatives

Only one site alternative is under consideration for the proposed expansion which will take place on the remaining portion of 68 and Portions 78, 79, 80 and 82 of Farm Tenbosch 162 JU.

The preferred site and the associated 5 Development Zones located therein are all 'brownfields'/disturbed sites. Development Zones 1, 2, 3 and 5 are located in open areas between existing timeshare units. Development Zone 4 used to function as an old buffalo camp.

The site is situated adjacent to the Kruger National Park boundary on the southern bank of the Crocodile River. Agricultural, commercial and residential developments lie to the west, south and east of the site.

Services (water, electricity and sewage) will be obtained by extending and upgrading the existing infrastructure at the existing Ngwenya Lodge located on site.

**Advantages** of this site for the proposed development include the following:

- The site is a 'brownfields'/disturbed site
- The site has a high aesthetic value owing to the presence of the Crocodile River and KNP beyond
- Existing large trees will help to conceal the visual impact of the additional chalets and safari lodge
- Portions of the site are classified as Heavily or Moderately Modified Areas by the Mpumalanga Biodiversity Sector Plan (MBSP)

**Disadvantages** of this site for the proposed activity include the following:

- Site could potentially have a visual impact on the adjacent KNP
- Site is situated within the Ecological Support Area: Protected Area Buffer
- Portions of the site are classified as Other Natural Areas by the Mpumalanga Biodiversity Sector Plan (MBSP)

### 2.2. Lay-out Alternatives

Two layout alternatives are being considered for the proposed expansion.

#### Alternative 1: Preferred Alternative

Refer to Appendix A.2.1 for the preferred layout of the proposed expansion.

The proposed expansion will consist 5 Development Zones, where Development Zones 1, 2 and 4 will consist of the construction of chalets, Development Zone 5 will comprise of the safari lodge and Development Zone 3 will be a restaurant.

**Development Zone 5** entails the construction of a safari lodge consisting of 50 units/ rooms sleeping 100 guests. Majority of the units will overlook the Crocodile River and KNP beyond, while the remainder will be located more to the centre of the development zone. There will also be a central hotel complex/ reception building and covered parking bays.

**Development Zone 4** will consist of 32 3 bedroom chalet units whereby the layout of the chalets is designed to capitalize on the views provided by the Crocodile River and KNP to the north, as well as the drainage lines to the east and west. The chalets will be grouped in pairs and constructed out of brick and mortar. Covered parking bays will also be provided. The chalets will be in a similar style to the existing chalets at Ngwenya Lodge. A recreational and information centre will be located near the centre of the site which will include amenities such as a putt-putt course, a swimming pool and a boma area.

**Development Zone 3** will entail the construction of a new restaurant which the inclusion of covered parking bays.

**Development zone 2** will consist of 29 chalet units which will be positioned around two existing dams. The chalets will be stand alone, 1 storey in height and constructed out of brick and mortar.

**Development Zone 1** will consist of 19 2 bedroom chalet units. These units will be 'bush' view units positioned behind existing chalets and adjacent to the existing roads at Ngwenya Lodge.

Six (6) bird hides/ viewpoints will be located throughout the proposed development site- two in the far west near the northern boundary by Development Zone 4, one directly north of Development Zone 3, two near the centre of the Development Zone 2- one overlooking the Crocodile River and the other overlooking a dam near, and lastly one in the far east overlooking the Crocodile River in front of Development Zone 5. These hides will be based on bird hides that are found within the existing Ngwenya Lodge already and will be approximately 4x3 meters, be on elevated decks, lower than the tree line, made from natural materials and earth tones used so that the hides blend into the natural environment. Additionally, no spot lights will be used.

An additional access control point will be constructed west of the existing point of access along the District Road 1870 to provide access to Development Zone 4 and to alleviate traffic congestion in peak seasons.

Ngwenya Lodge currently abstracts raw water from the Crocodile River from two existing abstraction points. The raw water is then treated and distributed to the units via a water distribution network.

A waste water treatment facility (WWTF) has been constructed on an adjacent property to service the existing Ngwenya Lodge and the proposed expansions. A collector sewer line conveys the sewage to the WWTF via the sewage pump station which is located within the development footprint of the existing Ngwenya Lodge sewage system site. The Ngwenya Waste Water Treatment Facility (WWTF) is able to treat 400 m<sup>3</sup>/day of domestic sewage. Nine (9) additional sewage pump stations will be constructed; 2 within Development Zone 4, 1 within Development Zone 3, 2 within Development Zone 2, 2 within Development Zone 1 and 1 in Development Zone 5. Additionally, a larger sewage pump station will be located south of Development Zone 3, which will then pump the sewage to the WWTF.

Electricity supply will be via the existing Eskom lines on site.

The preferred layout respects the 1:100 flood line along the Crocodile River. The minimum allowable distance from the ephemeral systems are 17 m and from the Crocodile River is 42m. All of the above mentioned infrastructure is located outside of the stipulated buffer zones with the exception of the 2 sewage pump stations, a portion of the new main sewage pump station, a portion of the restaurant and associated covered parking and 4 bird hides. The following infrastructure will be located within 32 m of a watercourse: 3x sewage pump stations, a portion of the restaurant and associated covered parking, 3x viewpoints/ bird hides.

**Advantages** of this layout for the proposed development include the following:

- Majority of the development is located in areas of moderate sensitivity to low/transformed
- The 1:100 year flood line is respected
- Protected trees and plant species will be avoided
- Existing service infrastructure is already in place



- Added amenity of the restaurant to service both the existing Ngwenya Lodge and the expansion

**Disadvantages** of this layout for the proposed development include the following:

- 3 sewage pump stations, 3 bird hides/view points, 13 chalet units and a portion of the restaurant/parking are located within the riparian vegetation which has a high sensitivity rating.
- 2 sewage pump stations, a portion of the new main sewage pump station, a portion of the restaurant and associated covered parking and 4 bird hides are located in front of the setback lines determined for the Crocodile River and drainage lines
- 3x sewage pump stations, a portion of the restaurant and associated covered parking, 3x viewpoints/ bird hides are located within the 32 m buffer of the watercourses
- Existing energy supply, which will be extended, is not renewable and sustainable green technology
- The long term cost of energy from Eskom is set to increase significantly in the future, meaning a long term escalation in operational energy costs

**Coordinates of infrastructure:**

**Development Zone 1: Corner coordinates**

<b>Latitude (S):</b>			<b>Longitude (E):</b>		
25 °	22'	47.99"	31 °	51'	15.88"
25 °	22'	49.66"	31 °	51'	18.55"
25 °	22'	48.52"	31 °	51'	21.15"
25 °	22'	46.23"	31 °	51'	20.87"

- Sewage pump station 7

<b>Latitude (S):</b>			<b>Longitude (E):</b>		
25 °	22'	47.88"	31 °	51'	17.60"

- Sewage pump station 8

<b>Latitude (S):</b>			<b>Longitude (E):</b>		
25 °	22'	48.02"	31 °	51'	19.51"

**Development Zone 2: Corner coordinates**

<b>Latitude (S):</b>			<b>Longitude (E):</b>		
25 °	22'	49.11"	31 °	51'	10.95"
25 °	22'	53.44"	31 °	51'	10.73"
25 °	22'	54.50"	31 °	51'	16.20"
25 °	22'	49.68"	31 °	51'	17.39"

- Sewage pump station 5

<b>Latitude (S):</b>			<b>Longitude (E):</b>		
25 °	22'	48.91"	31 °	51'	11.52"

- Sewage pump station 6

<b>Latitude (S):</b>			<b>Longitude (E):</b>		
25 °	22'	51.43"	31 °	51'	14.19"



Development Zone 3: Corner coordinates

Latitude (S):			Longitude (E):		
25 °	22'	49.54"	31 °	51'	7.00"
25 °	22'	52.57"	31 °	51'	7.52"
25 °	22'	52.32"	31 °	51'	8.50"
25 °	22'	49.28"	31 °	51'	8.35"

- Restaurant

Latitude (S):			Longitude (E):		
25 °	22'	49.63"	31 °	51'	7.65"

- Sewage pump station 4

Latitude (S):			Longitude (E):		
25 °	22'	51.62"	31 °	51'	7.30"

Development Zone 4: Corner coordinates

Latitude (S):			Longitude (E):		
25 °	22'	48.47"	31 °	50'	56.82"
25 °	22'	51.33"	31 °	50'	56.49"
25 °	22'	52.72"	31 °	51'	5.39"
25 °	22'	49.45"	31 °	51'	5.67"

- Putt-putt course

Latitude (S):			Longitude (E):		
25 °	22'	50.85"	31 °	51'	1.19"

- Boma

Latitude (S):			Longitude (E):		
25 °	22'	50.44"	31 °	51'	59.42"

- Swimming pool

Latitude (S):			Longitude (E):		
25 °	22'	50.14"	31 °	51'	0.62"

- Retail and information Centre

Latitude (S):			Longitude (E):		
25 °	22'	51.19"	31 °	51'	2.73"

- Sewage pump station 1

Latitude (S):			Longitude (E):		
25 °	22'	48.50"	31 °	50'	56.91"

- Sewage pump station 2

Latitude (S):			Longitude (E):		
25 °	22'	49.25"	31 °	51'	2.83"

- Sewage pump station 3

Latitude (S):			Longitude (E):		
25 °	22'	50.95"	31 °	51'	5.68"

Development Zone 5: Corner coordinates

Latitude (S):			Longitude (E):		
25 °	22'	41.98"	31 °	51'	23.09"
25 °	22'	46.48"	31 °	51'	24.95"
25 °	22'	43.39"	31 °	51'	30.03"
25 °	22'	40.15"	31 °	51'	26.65"

- Main hotel building/reception

Latitude (S):			Longitude (E):		
25 °	22'	42.45"	31 °	51'	25.71"

- Sewage pump station 9

Latitude (S):			Longitude (E):		
25 °	22'	41.36"	31 °	51'	24.62"

New access point/gate

Latitude (S):			Longitude (E):		
25 °	22'	52.91"	31 °	50'	59.92"

Larger new sewage pump station

Latitude (S):			Longitude (E):		
25 °	22'	53.31"	31 °	51'	8.01"

Bird hides/Viewpoints:

	Latitude (S):			Longitude (E):		
Bird hide 1	25 °	22'	47.87"	31 °	50'	57.47"
Bird hide 2	25 °	22'	48.69"	31 °	51'	2.11"
Bird hide 3	25 °	22'	48.95"	31 °	51'	7.44"
Bird hide 4	25 °	22'	48.13"	31 °	51'	12.15"
Bird hide 5	25 °	22'	50.58"	31 °	51'	15.21"
Bird hide 6	25 °	22'	41.34"	31 °	51'	24.65"

Infrastructure within 32 m of a watercourse:

Latitude (S):	Longitude (E):

Bird hide 1	25 °	22'	47.87"	31 °	50'	57.47"
Bird hide 2	25 °	22'	48.69"	31 °	51'	2.11"
Bird hide 3	25 °	22'	48.95"	31 °	51'	7.44"
Restaurant	25 °	22'	49.63"	31 °	51'	7.65"
Sewage pump station 1	25 °	22'	48.50"	31 °	50'	56.91"
Sewage pump station 3	25 °	22'	50.95"	31 °	51'	5.68"
Sewage pump station 4	25 °	22'	51.62"	31 °	51'	7.30"

Alternative 2: Layout Alternative

Refer to Appendix A.2.2 for the layout alternative of the proposed expansion.

The layout for Alternative 2: Layout Alternative is the same as for Alternative 1: Preferred Alternative, with the exception of Development Zone 3.

In Alternative 2: Layout Alternative, Development Zone 3 consists of the construction of 7 3 bedroom chalet units inclusive of covered parking bays.

**Advantages** of this alternative layout for the proposed development include the following:

- Majority of the development is located in areas of moderate sensitivity to low/transformed
- The 1:100 year flood line is respected
- Protected trees and plant species will be avoided
- Existing service infrastructure is already in place

**Disadvantages** of this alternative layout for the proposed development include the following:

- 3 sewage pump stations, 3 bird hides/view points, 18 chalet units are located within the riparian vegetation which has a high sensitivity rating.
- 2 sewage pump stations, a portion of the new main sewage pump station, 5 chalets and 4 bird hides are located in front of the setback lines determined for the Crocodile River and drainage lines
- 3x sewage pump stations, 5x chalet units, 3x viewpoints/ bird hides are located within the 32 m buffer of the watercourses
- No added amenity of the restaurant, thereby placing pressure on the existing restaurant on site
- Existing energy supply, which will be extended, is not renewable and sustainable green technology
- The long term cost of energy from Eskom is set to increase significantly in the future, meaning a long term escalation in operational energy costs

Infrastructure within 32 m of a watercourse:

	Latitude (S):			Longitude (E):		
Bird hide 1	25 °	22'	47.87"	31 °	50'	57.47"
Bird hide 2	25 °	22'	48.69"	31 °	51'	2.11"
Bird hide 3	25 °	22'	48.95"	31 °	51'	7.44"
Sewage pump station 1	25 °	22'	48.50"	31 °	50'	56.91"
Sewage pump station 3	25 °	22'	50.95"	31 °	51'	5.68"

Sewage pump station 4	25 °	22'	51.62"	31 °	51'	7.30"
Chalet unit 34	25 °	22'	51.78"	31 °	51'	7.79"
Chalet unit 35	25 °	22'	51.15"	31 °	51'	7.60"
Chalet unit 36	25 °	22'	50.95"	31 °	51'	7.82"
Chalet unit 37	25 °	22'	50.44"	31 °	51'	7.62"
Chalet unit 38	25 °	22'	49.69"	31 °	51'	7.25"

### 2.3. No- project Alternative

The No-Project Alternative implies that the proposed extensions at Ngwenya Lodge will not take place. In this scenario no negative environmental impacts relating to ground/surface water and biodiversity will be incurred.

The No Project Alternative also implies that no positive impacts or benefits will be experienced such as the generation of employment opportunities, job creation and diversification of tourism offerings in the region.

## 3. SITE ACCESS

Ready access is available to the proposed development site via the District Road 1870 that runs parallel to the property. Existing internal paved roads are also located throughout the property. New internal roads have been proposed to provide access to Development Zones 2, 3 and 4.

Additionally, a new access point is proposed west of the existing access point, located outside of Portion 82 (development zone 4).

## 4. LOCALITY MAP

Please refer to Appendix A1 for the locality map.

## 5. LAYOUT/ ROUTE PLAN

Please refer to Appendix A2.1 for the Preferred Alternative layout map.

## 6. SENSITIVITY MAP

Please refer to Appendix A3.1 for the Preferred Alternative sensitivity map.

## 7. SITE PHOTOGRAPHS

Please refer to Appendix B for photographs taken at the 8 compass points.

## 8. ACTIVITY MOTIVATION

a) IDP, SDF other guidelines

Areas of pristine natural environment in the northern part of Nkomazi include the Kaalrug Mountain range to the west, the Lebombo Mountain range to the east and the whole length of the Crocodile River. These areas have excellent potential for eco-tourism uses.

The existing conservation developments of Marloth Park, Lionspruit Game Reserve, Ligwalagwala Conservancy, Dumaneni Reserve, Mahushe-Shonge Nature Reserve, Mawewe Cattle/Game Project as well as the proposed Vlakbult, Ntunda, Madadeni-Sikwahlane and Masibekela-Mananga Cattle Game projects create the opportunity for an uninterrupted conservation zone in the centre of Nkomazi. This forms one large ecological unit that stretches from Kruger National Park in the north to Lubombo Conservancy in the south-east. Associated land uses may include nature conservation, cattle ranching, game breeding, tourist facilities and hunting.

Kruger National Park – the Kruger National Park dictates the type of land uses to be found adjacent to its border, including agriculture, tourism related developments i.e. eco areas, conservancies and uses focusing on nature conservation.

Additionally, the Nkomazi IDP recognized the importance of tourism as it provides a significant contribution to the provincial GDP. The Tourism Sector is one of the most thriving sectors of the Local economy. Nkomazi municipality continues to attract the large number of tourists to the tranquil and scenic beauty of our landscapes, the warm cultural and historical heritage of our people like Samora Machel Monument and our wild life in both the Kruger National Park as well as our very own Marloth Park. The hospitality industry in Nkomazi continues year on year to improve its product offering and have turned Nkomazi to a much-loved tourist hot spot in the province.

The Nkomazi Spatial Development Framework guidelines states that tourism product development should be focused towards the area around the border of the Kruger National Park.

The proposed site falls within the buffer zone of the Kruger National Park where by acceptable/ permissible activities include overnight facilities and leisure and recreation.

In this regard, the proposed expansion of Ngwenya Lodge falls within both the Nkomazi IDP and SDF, as well as the Kruger National Park Management Plan.

b) Need and Desirability

The existing Ngwenya Lodge is located on the banks of the Crocodile River, adjacent to the Kruger National Park. The motivation and reasoning behind the proposed expansion of Ngwenya Lodge is to further develop the growing tourism industry and possible tourism linkages within the area. Ngwenya Lodge is situated in a prime position where the Kruger National Park forms the northern boundary of the proposed site. Other game reserves located nearby are the Mjejane Private Game Reserve and Lionspruit Game Reserve. These Game Reserves are within easy driving distance from Gauteng and are also popular Big 5 game viewing destinations. It is, therefore, important that the natural recreational potential of this region be explored. In order to do this, accommodation facilities need be developed in the greater region that will help to unlock the natural potential of the region.

The benefits of the proposed expansion are positive as it will contribute to economic growth of the region. Additionally, jobs will be created during the construction phase and operational phase, which is ideal in the Nkomazi Local municipality where the unemployment rate is high.

## **APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES**

The following legislation may also be applicable:

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY	DATE
<b>LEGAL FRAMEWORK</b>			
Constitution of Republic of South Africa (Act No.108 of 1996):	This is the fundamental law of South Africa, setting out the Bill of Rights as well as the relationship of various government structures to each other.	National Government	1996
Conservation of Agricultural Resources Act (Act No. 43 of 1983):	Provides for control over the utilization of the natural agricultural resources of the Republic. The proposed project will be required in terms of this legislation to ensure that: <ul style="list-style-type: none"> <li>▫ The soil mantle is protected and conserved,</li> <li>▫ The natural water sources are protected,</li> <li>▫ Vegetative cover is conserved and weeds and invader plants are removed from the site.</li> </ul>	Department of Agriculture	1983
National Environmental Management Act (Act No. 107 of 1998)	To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith.	Department of Environmental Affairs	1998
National Environmental Management: Protected Areas Act (Act No. 57 of 2003):	The Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas, and for matters in connection therewith. The proposed development is within 1 Km of the Kruger National Park, a Protected Area in terms of this Act.	Department of Environmental Affairs	2003
National Environmental Management: Biodiversity Act (Act No. 10 of 2004):	The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework set out by NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed (see below). Rare or protected species may be affected during construction. The Act lists species that are threatened or require protection to ensure their survival in the wild, while regulating the activities, which may involve such listed threatened or protected species and activities which may have a potential impact on their long-term survival. The Act has listed flora and fauna species.	Department of Environmental Affairs	2004
National Spatial	The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection	Department of	2011

Biodiversity Assessment, 2011:	based on its biophysical characteristics, which are ranked according to priority levels.	Environmental Affairs	
National Forests Act (Act No. 84 of 1998):	This Act provides for the management, utilisation and protection of forests through the enforcement of permitting requirements associated with the removal of protected tree species, as indicated in a list of protected trees (first promulgated in 1976 and updated since). Although not anticipated, should any protected tree species require removal or relocation within the project area, a permit will be required.	Department of Agriculture, Forestry and Fisheries	1998
National Veld and Forest Fire Act (Act No. 101 of 1998)	The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic. The Act provides for a variety of institutions, methods and practices for achieving this purpose.	Department of Water Affairs	1998
National Heritage Resources Act (Act No. 25 of 1999)	The National Heritage Resources Act legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 hectares (ha) and where linear developments exceed 300 metres in length. In this regard, the proposed development site will be subject to engagement with the South African Heritage Resources Agency (SAHRA). Potential impact on cultural heritage, paleontological or archaeological resources through excavation activities or disturbance will need to be monitored. Permits may be required per the National Heritage Resources Act (Act No. 25 of 1999).	South African Heritage Resources Agency (SAHRA)	1999
The National Water Act (Act No. 36 of 1998)	This Act aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. The proposed development will have to ensure that local water resources are protected, used, developed, conserved, managed and controlled in a responsible way.	Department of Water Affairs	1998
The National Water Services Act (Act No. 108 of 1997)	The Act legislates the necessity to provide for the rights of access to basic water supply and basic sanitation; to provide for the setting of national standards and of norms and standards for tariffs; to provide for water services development plans; to provide a regulatory framework for water services institutions and water services intermediaries; to provide for the establishment and disestablishment of water boards and water services committees and their powers and duties; to provide for the monitoring of water services and intervention by the Minister or by the relevant Province; to provide for financial assistance to water services institutions; to provide for certain general powers of the Minister; to provide for the gathering of information in a national information system and the distribution of that information; to repeal certain laws; and to provide for matters connected therewith.	Department of Water Affairs	1997
National Environmental Management Waste Act (Act No. 59 of 2008)	The Waste Act reforms the law regulating waste management in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation. The proposed development will be subject to this Act in terms of the disposal of waste.	Department of Environmental Affairs	2008

Hazardous Substances Act (Act No. 15 of 1973)	To provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control of certain electronic products; to provide for the division of such substances or products into groups in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products; and to provide for matters connected therewith.	Department of Health	1973
National Environmental management Air Quality Act (Act No. 39 of 2004)	To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.	Department of Environmental Affairs	2004
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993):	The purpose of this Act is to provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with, the activities of persons at work. The proposed development will therefore be subject to this Act during the construction and operational Application for Environmental Authorisation.	Department of Labour	1993
Integrated Environmental Management Information Series	IEM is a key instrument of NEMA and provides the overarching framework for the integration of environmental assessment and management principles into environmental decision-making. The aim of the information series is to provide general information on techniques, tools and processes for environmental assessment and Management. These various documents have been referred to for information on the most suitable approach to the environmental assessment process for the proposed development.	Department of Environmental Affairs	1992
Local Government: Municipal Structures Act, No. 117 of 1998	To provide for the establishment of municipalities in accordance with the requirements relating to categories and types of municipality; to establish criteria for determining the category of municipality to be established in an area; to define the types of municipality that may be established within each category; to provide for an appropriate division of functions and powers between categories of municipality; to regulate the internal systems, structures and office-bearers of municipalities; to provide for appropriate electoral systems; and to provide for matters in connection therewith	National Government	1998
Local Government: Municipal Systems Act, No. 32 of 2000	To provide for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of local communities, and ensure universal access to essential services that are affordable to all; to define the legal nature of a municipality as including the local community within the municipal area, working in partnership with the municipality's political and administrative structures; to provide for	National Government	2000



	the manner in which municipal powers and functions are exercised and performed; to provide for community participation; to establish a simple and enabling framework for the core processes of planning, performance management, resource mobilisation and organisational change which underpin the notion of developmental local government.		
<b>REGIONAL PLANNING POLICIES</b>			
Nkomazi Local Municipality IDP	The Kruger National Park has influenced the spatial form of the local municipality and dictates the type of land uses to be found adjacent to its border, including agriculture and tourism related developments. Tourism has been identified as one of the five key pillars for economic development within the municipality.	Nkomazi Local Municipality	2020/2021

## 9. WASTE AND EFFLUENT

### 9.1. Solid Waste Management

Solid waste is currently collected daily from the accommodation units and other facilities whereby it is then taken to several central collection points at the lodge. Nkomazi Local Municipality collects the solid waste weekly from these collection points where it is disposed of at the Steenbok landfill site.

### 9.2. Liquid effluent

A waste water treatment facility (WWTF) has been constructed on an adjacent property to service the existing Ngwenya Lodge and the proposed expansions. A collector sewer line conveys the sewage to the WWTF via the sewage pump station which is located within the development footprint of the existing Ngwenya Lodge sewage system site. The Ngwenya Waste Water Treatment Facility (WWTF) is able to treat 400 m<sup>3</sup>/day of domestic sewage.

The WWTF is a Veolia Water Technologies (Veolia) WWTF and includes all unit processes and treatment components required to accomplish screening, primary treatment, and nitrification, solids removal (secondary settling) and disinfection (chlorination) tanks.

The WWTF has been designed to produce final effluent (treated water quality) to comply with the RSA General Standard for Discharge as published in Table 3.2 of Gazette No. 20526 of 8 October 1999. This treated water quality is in line with common practice in the region. Treated effluent of this quality can be reused for gardening and growing of selected agricultural crops (non-root vegetables). Since the final water is rich in nitrates, it is well suited for plant growth and will not have adverse effects on the flora. However, some microbial growth may still be present in the water, so locations frequented by people should not be considered for this purpose.

Water Treatment / disinfection is carried out via a hypochlorite dosing system.

This treated effluent is discharged into an irrigation dam on Portion 109.

The current sewage flow is based on 90% of the water demand is 202 m<sup>3</sup> per day. The proposed expansion will increase the number of beds and therefore the future sewage flow of the Ngwenya Lodge will be:

Description	Number	Rate (litre/unit)	Daily sewage outflow (kilolitre)
Beds	3406	140	476.84
Annual average daily sewage flow			476.84
Allowance for extraneous flow		15%	71.53
Total annual average daily sewage flow			548.37
Total annual average wet weather sewage flow			200155

The existing wastewater treatment facility capacity will need to be upgraded from 400 m<sup>3</sup> per day to at least 600 m<sup>3</sup> per day for the proposed expansion. Due to the nature of the system, this upgrade can be done via equipment changes rather than changes to the structure and layout.

The required upgrade and improvements capacity to the sewage of the proposed expansion will entail 2000 m of 100 mm diameter underground piping, 20 new manholes and 9 additional sewer pump stations.

Refer to Appendix I for the full services report.

## 10. WATER USE

The following water uses have been validated and verified at Ngwenya as existing lawful use:

Type of water use	Extent and lawfulness of water use		
	Volume (m <sup>3</sup> /annum)	Source	Farm Portion
Storing of water	5 508	N/A	Portion 72 of Tenbosch 162
Taking of water for non-irrigation purposes	10 500	Crocodile River	Portion 68 of Tenbosch 162
Taking of water for non-irrigation purposes	25 000	Borehole	Portion 68 of Tenbosch 162

A WULA is being undertaken and the following has been applied for:

Water use (in terms of Section 21 of the NWA)	Volume (m <sup>3</sup> / annum)	Source	Farm portion
S21 (a) taking of water (additional abstraction)	244 000	Crocodile River	Portion 72, 79 of Tenbosch 162
S21 (b)- storing of water (earthen ponds)	7 398	N/A	Portion 72, 73, 68, 79, 80 of Tenbosch 162

Therefore the total rights if approved will be to abstract 254 500 m<sup>3</sup> per annum from the Crocodile River.

Water is currently abstracted from the Crocodile River via two (2) abstraction points. One is located at the units known as Hippo Bend and the other at Unit 310. From the abstraction at Hippo Bend, water is pumped to Anton's dam which is used as a settling pond for the water. The average monthly abstraction from this point is 5920m<sup>3</sup>. This is metered.

At the Unit 310 abstraction, water is pumped to the large pond located near the existing restaurant. Again, this pond is used as settlement pond for the abstracted water. The average monthly abstraction from this point is 5896m<sup>3</sup>. This too is metered.

From the settling ponds the water is pumped to two water treatment plants and reservoirs. The Hippo Bend water treatment plant is located along the access road while the water from the reception pond is pumped to a water treatment plant next to reception. The treatment method utilized is filtration by a media filter and active carbon and then sterilization by Ultraviolet Light. The filtered water is pumped to two reservoirs each with a capacity of approximately 300m<sup>3</sup>.

The current water demand for the existing 194 units is 224 m<sup>3</sup> per day.

The water demand for both the existing units and the proposed expansion will be 851.4 m<sup>3</sup>.

The average occupation of the lodge is expected to be at 80%, therefore the average annual water demand is projected to be the following:

Design demand (Kl/day)	Design demand at 80% occupancy (Kl/day)	Average annual demand (Kl/day)
851.4	681.12	248 600

No additional water storage capacity will be required, however an additional water treatment plant will be needed. Water reticulation systems will need to be upgraded/ improved with 1000 m large diameter underground piping (50 to 160 mm diameter) and 2000 m small diameter underground piping.

Refer to Appendix I for the full services report.

## SECTION B: SITE/AREA/PROPERTY DESCRIPTION

### 11. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

A large proportion of Nkomazi is underlain with quartz monzonite (30.7%) to the south and central region. Basalt is the second most dominant (16.5%) geology type, located to the east. The north-western part is predominantly underlain with arenite and lava. The least occurring geology types are ultramafic rocks, granophyre, gabbro and dolomite.

### 12. GROUNDCOVER

According to Mucina & Rutherford (2006), the study area is situated in Delagoa Lowveld within the Lowveld Bioregion in the Savanna Biome. This vegetation type occurs in a narrow strip on Karoo Supergroup shale and sandstones from the Satara area in the KNP down to the Strydom Block area, and then through Swaziland and marginally into KwaZulu-Natal in the south. In Mpumalanga, Delagoa Lowveld originally covered 69 854 ha, of which 15 % has been transformed, mostly through sugarcane and settlements. This vegetation type is considered well protected and has a conservation status of **Least Concern** (Lötter et al., 2014). This is largely due to much of this community occurring within the KNP. It is not listed as a Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9 December 2011).

Most of the terrestrial ecosystems within the study area are classified as **Heavily Modified or Moderately Modified Areas** by the Mpumalanga Biodiversity Sector Plan (MBSP). The scattered untransformed sections are classified as **Other Natural Areas**. Other Natural Areas refer to areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character, while performing a range of biodiversity and ecological functions. Other Natural Areas offer much more flexibility in terms of permissible land uses, but the desired management objective should be to minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning.

The entire study area is also situated within the **Ecological Support Areas (ESA): Protected Area Buffers** unit. ESA's are "areas that are not essential for meeting (conservation) targets, but play an important role in supporting the functioning of CBA's and that deliver important ecosystem services" (Lötter et al., 2014). Protected Area Buffers are areas that surround proclaimed protected areas that moderate the negative impacts of land-uses that may affect the ecological functioning of those protected areas.

The study area is not situated in any of southern Africa's floristic centres of endemism, which are areas that have an unusually high number of plants unique to that area (Van Wyk & Smith, 2001).

Refer to Appendix C.1 for the full Ecology Report

### 13. SURFACE WATER

The study area falls within quaternary catchment X24H, which forms part of the Crocodile Sub-water Management Area, Inkomati Water Management Area.

The study area is associated with one perennial river (Crocodile) and several non-perennial rivers, including the Kumoyana River. The extent to which a river has been modified by human activity is referred to as the river condition (Nel et al., 2011). According to NFEPA, the Crocodile River has a condition of 'D', which means that it is largely modified such that a large loss of natural habitat, biota and basic ecosystem functions has occurred (Nel et al., 2011).

According to the MBSP freshwater assessment, the Crocodile River is an **ESA wetland area**. It is classified by NFEPA as channelled valley-bottom wetlands whereby the Crocodile River has a condition of DEF (i.e. 'heavily modified' – riverine wetland associated with a D, E, F or Z ecological category river).

The sub-catchment within which the study area falls has been classified by the MBSP as an '**ESA Important Sub-catchment**', but does include large sections of 'Heavily Modified' areas as well as four dams. The sub-catchment is important as it is a **Fish Support Area (FSA)**, as per NFEPA. FSAs are fish sanctuaries that are in a lower than A or B ecological condition. Fish sanctuaries, which include both river FEPAs and FSAs, are rivers and their associated sub-quaternary catchments that are essential for protecting threatened and near threatened fish; consequently, there should be no further deterioration in the condition of the associated rivers (Nel et al., 2011). This particular FSA supports the Tiger Fish (*Hydrocynus vittatus*), a fish species of **conservation concern**.

Refer to Appendix C.4 for the full Wetland Report.

## 14. LAND USE CHARACTER OF SURROUNDING AREA

The proposed development is situated on Portions 68, 78, 79, 80 and 82 of Farm Tenbosch 162 approximately 17 km west of the town of Komatipoort, Ehlanzeni District, Mpumalanga. The study area lies just south of the Kruger National Park boundary between the town of Marloth Park to the west and the Crocodile Bridge Gate to the east. Majority of the study area is developed and includes the tourist resort of Ngwenya Lodge, as well as, old agricultural lands.

## 15. CULTURAL/HISTORICAL FEATURES

Francois P. Coetzee, an independent Cultural Heritage Consultant, was commissioned by NuLeaf Planning and Environmental to undertake a Heritage Impact Assessment on Portions 68, 78, 79, 80 and 82 of the Farm Tenbosch 162 JU situated adjacent to the Kruger National Park in order to determine the heritage potential and the impact on possible heritage resources.

No Stone Age, Iron Age or historical settlements, structures, features, assemblages or artefacts were recorded during the survey. Also, no graveyards or individual graves were recorded.

Refer to Appendix C.2 for the full Heritage Impact Report.

## 16. SOCIO-ECONOMIC CHARACTER

Agriculture and tourism have been identified as one of the building blocks for economic development within the municipality and has been experiencing growth thereof.

Due to the fact that Nkomazi municipality is mostly a rural municipality, the municipality suffers from a high rate of unemployment as it is struggling to attract investments. Other factors contributing to the high employment rate is

the shortage of skills and illiteracy rates. As it is generally applicable throughout the country, unemployment is at the heart of poverty within the municipality.

The latest official statistical information suggests that unemployment rate has been on a downward trend. In 2007 the total unemployment rate of Nkomazi was approximately 34.2% which can be attributed to the 26% and 43% of males and females respectively. According to the 2011 STATS SA Census the total unemployment rate in the municipality is 34% with 26.8% being males and 42.5 % being females.

There were major improvements in educational attainment within the municipality between 2001 and 2011. In 1996 47% had had no schooling and this decreased to 26% in 2011 which indicates favourable improvements in educational attainment over a period of 15 years.

## 17. BIODIVERSITY

### 17.1. Terrestrial Ecology

A specialist terrestrial ecology assessment was undertaken by ECOREX Consulting Ecologists CC in November 2017.

#### 17.1.1. Flora

One hundred and forty-five (145) plant species were recorded within the study area during fieldwork. Two of these are classified as **Near Threatened**, namely the trees *Elaeodendron transvaalense* (rare) and *Dalbergia melanoxylon* (rare). Four plants are **protected** under the National Forests Act (No. 30 of 1998), namely the trees *Philenoptera violacea* (rare), *Combretum imberbe* (rare), *Sclerocarya birrea subsp. caffra* (uncommon) and *Elaeodendron transvaalense* (rare). Three plant species recorded are **protected** under the Mpumalanga Nature Conservation Act (No.10 of 1998), namely the succulents *Aloe marlothii subsp. marlothii* (uncommon), *A. parvibracteata* (rare) and *A. chabaudii var. chabaudii* (rare). The two Near Threatened species are discussed below:

- ***Elaeodendron transvaalense*** (Burt Davy) R.H.Archer Bushveld Saffron: This is a small to medium-sized evergreen tree occurring in northern and eastern South Africa, and further afield through Namibia, Botswana, Zimbabwe, Mozambique and Zambia. The species is heavily harvested in South Africa for traditional medicine and some sub-populations have declined as a result; as such it has been assessed as **Near Threatened** (Williams et al., 2008a). A few scattered individuals were located within the Ngwenya Lodge grounds.
- ***Dalbergia melanoxylon* Guill. & Perr.** Zebra Wood: This species usually grows as a small to medium-sized tree and is found throughout the Lowveld and as far north and west as Senegal. Although not locally listed, it is assessed by the IUCN as **Near Threatened** due to over-collection for the wood carving industry and in the manufacturing of musical instruments. A few small colonies were located within the Ngwenya Lodge grounds.

Two untransformed vegetation communities were identified within the study area on the basis of distinctive vegetation structure (grassland, woodland, thicket, etc.), floristic composition (dominant and diagnostic species) and position in the landscape (mid-slopes, terrace, crest, etc.). Transformed areas make up majority of the study area. The untransformed vegetation communities are described in detail below:

- *Ficus sycomorus* – *Trichilia emetic* Disturbed Riparian Forest/Thicket

This vegetation community occurs in narrow, scattered portions within the study area along a few small tributaries of the Crocodile River. The largest tracts are located on Remainder of Portion 109 south of the D1870. Vegetation structure is mostly Low to Tall Forest but also Thicket in places (sensu Edwards, 1983) where strata are absent. Riparian Forest / Thicket covers a small portion of the study area. Evergreen trees and woody shrubs dominate this vegetation community, with the dominant canopy species being *Ficus sycomorus* and *Trichilia emetica*. Other common canopy species include *Diospyros mespilliformis*, *Schotia brachypetala*, *Bridelia micrantha*, *Rauvolfia caffra* and *Acacia robusta* subsp. *clavigera*. Dominant shrubs found include *Flueggea virosa* subsp. *virosa*, *Phyllanthus reticulatus*, *Gymnosporia senegalensis*, *Lantana camara* and *Gymnanthemum coloratum*. The climbers *Acacia schweinfurthii* var. *schweinfurthii*, *Combretum microphyllum*, *C. mossambicense* and *Capparis tomentosa* are frequently observed. Herbs and dwarf shrubs located include *Barleria elegans*, *Pluchea dioscoridis*, *Hypoestes forskoolii*, *Euphorbia cyathophora* and *Ageratum conyzoides*. Grasses are generally sparse except at forest edge and include *Setaria megaphylla* and *Panicum maximum*.

A total of 59 species was recorded from Riparian Forest / Thicket, the second highest of all the vegetation communities. Species fidelity, which is closely linked to community uniqueness, is very high, with majority of the community list occurring nowhere else in the study area.

Only one **conservation-important** plant species was recorded during fieldwork, namely *Philenoptera violacea*, which is protected under the National Forests Act (No. 30 of 1998).

#### - *Acacia nigrescens* – *Dichrostachys cinerea* Degraded Woodland/Thicket

This vegetation community is restricted to the Ngwenya Lodge grounds in the northern part of the study area. Vegetation structure is mostly Low to Short Closed Woodland grading into Thicket in places (sensu Edwards, 1983). Degraded Woodland / Thicket covers just under 7 ha or almost 10 % of the entire study area.

This community has been degraded through a variety of anthropogenic factors including dumping of building rubble and garden refuse, lack of a burning policy leading to moribund vegetation and invasion by alien plants. The canopy is dominated by various tree species, including *Acacia nigrescens*, *A. tortilis* subsp. *heteracantha*, *A. xanthophloea*, *Ziziphus mucronata* subsp. *mucronata*, *Peltophorum africanum* and *Sclerocarya birrea* subsp. *caffra*. The most frequently recorded shrubs include *Dichrostachys cinerea* subsp. *africana*, *Lantana camara*, *Tecoma stans*, *Grewia bicolor* var. *bicolor*, *Maerua parvifolia* and *Schotia capitata*. Plants recorded in the herb layer include *Sansevieria hyacinthoides*, *Talinum cafferum*, *Stylochaeton natalensis* and *Ledebouria revoluta*. The succulents *Aloe parvibracteata*, *A. marlothii* subsp. *marlothii*, *A. chabaudii* var. *chabaudii* and *Opuntia stricta* occur in scattered colonies. Grasses are patchily distributed but when found are dominated by *Heteropogon contortus*.

A total of 77 species (53 % of the entire list) was recorded from the Degraded Woodland / Thicket community, the highest species richness of the untransformed vegetation communities in the study area. Species fidelity, which is closely linked to community uniqueness, is high, with 32 species (42 % of the community list) occurring nowhere else in the study area.

Eight **conservation-important species** were recorded within this vegetation community. *Elaeodendron transvaalense* and *Dalbergia melanoxylon* have been assessed as **Near Threatened**. The trees *Sclerocarya birrea* subsp. *caffra*, *Elaeodendron transvaalense*, *Combretum imberbe* and *Philenoptera violacea* are **protected** under the National Forests Act (No. 30 of 1998) and the succulents *Aloe chabaudii* var. *chabaudii*, *A. parvibracteata* and *A. marlothii* subsp. *marlothii* are **protected** under the Mpumalanga Nature Conservation Act (No.10 of 1998).

#### - Transformed/degraded

A large majority of the study area, is transformed through former agricultural activities. While most of these old lands were lying fallow during the survey, they were in the process of being planted to sugarcane. One



conservation-important plant species was recorded from Transformed areas namely *Sclerocarya birrea subsp. caffra* which is **protected** under the National Forests Act (No. 30 of 1998).

### 17.1.2. Fauna

#### - Mammals

The Komatipoort district, situated in the savanna biome immediately south of KNP, has very high mammal diversity, relatively low numbers of endemics and a moderate number of Red Data species. Most of the area around Tenbosch has been transformed for agriculture (mainly citrus, sugarcane and bananas) but also lodge developments, fruit packhouses and townships such as Marloth Park and Komatipoort itself. Large tracts of untransformed land are present to the north of the study area within the KNP but scattered small patches are present on Tenbosch and surrounding farms, including the municipal reserve Lionspruit situated c. 3.5 km to the west of the study area.

Most of the study area is transformed but much of the Remainder Portion 109 section contains natural woodland and currently supports a number of indigenous larger mammals bred for the game trade and hunting industries. In addition, the study area is located on the boundary fence of the KNP and animals such as African Elephant (*Loxodonta africana*) and Common Warthog (*Phacochoerus africanus*) are confirmed to enter in through the poorly maintained boundary fence to forage, presumably at night. Evidence of this was found in the extreme western portion of the study area, adjacent to the Crocodile River. According to the Animal Demography Unit's Virtual Museum, 150 mammal species have been recorded from the degree grid 2531. However, 65 mammal species are confirmed for 2531 BD, within which the study area is situated.

An estimated 24 **conservation-important** mammals potentially occur within the project area, although most of these are more likely in adjacent conservation land than in the project area itself. Several bat species are highly likely to occur overhead, such as Short-eared Trident Bat (*Cloeotis percivali*, **Endangered**), but these species are only likely to feed over the site because of the shortage of suitable roosting sites. Of the 24 potentially occurring species, 15 are considered to be of conservation concern with six considered **threatened**. Two of these are listed as **Vulnerable** and were confirmed during fieldwork, namely Hippopotamus (*Hippopotamus amphibius*) and African Elephant. These two are discussed below:

- Hippopotamus: This large artiodactyl is listed as **Vulnerable** due to habitat loss, range contraction, conflict with farmers and a decline in water quality. Evidence of this species was found in the grassy plain in the extreme west of the study area, adjacent to the Crocodile River. It is assumed that individuals enter this area through the poorly maintained fence at night to forage. It may also occur within the dams on Ngwenya Lodge. This species is resident in the adjacent Crocodile River (pers.obs.).
- African Elephant: Despite South Africa only having 4% of Africa's elephant population, they are the best protected and most intensely managed. Elephants, classified as **Vulnerable** in the latest Red Data assessment, are now mostly restricted to conservation areas in South Africa and the KNP area supports an estimated 13 750 animals. The world's largest land mammal is threatened due to poaching for ivory and meat, loss and fragmentation of habitat and conflict with humans in agricultural areas. Dung was located in the grassy plain in the extreme west of the study area, adjacent to the Crocodile River. It is assumed that individuals enter this area through the poorly maintained fence at night to forage but are only likely to do so irregularly.



The remaining four potentially occurring threatened species, namely African Wild Dog (*Lycaon pictus*), which is Endangered, and Lion (*Panthera leo*), Leopard (*Panthera pardus*) and Ground Pangolin (*Smutsia temminckii*), all of which are Vulnerable, have a low likelihood of occurrence due to human disturbance, lack of prey or general scarcity. Both Lion and African Wild Dog regularly escape from the KNP (pers. obs.) but tend to wander widely before being persecuted, captured or returning to the Park and tend not to remain in any one area for extended periods of time.

Eight potentially occurring species are classified as Near Threatened, which are species close to or likely to soon qualify for the status of Vulnerable. None were confirmed from within the study area during fieldwork but three of these have a moderate likelihood of occurring due to the presence of suitable habitat. These three are Honey Badger (*Mellivora capensis*), Side-striped Jackal (*Canis adustus*) and Natal Red Duiker (*Cephalophus natalensis*).

The rest of the potentially occurring Near Threatened species have a low likelihood of occurrence due to human disturbance, lack of prey or general scarcity.

Twenty potentially occurring species are protected under either the Mpumalanga Nature Conservation Act (No. 10 of 1998) or the National Environmental Management: Biodiversity Act Threatened or Protected Species (No. 10 of 2004). Four of these were confirmed during fieldwork: Hippopotamus, African Elephant, Nyala (*Tragelaphus angasi*) and Southern Savannah Buffalo. Nine mammal species were confirmed to occur during fieldwork, one of which was a new record for the QDS 2531 BD in the Virtual Museum Database, namely Single-striped Mouse (*Lemniscomys rosalia*).

#### - Birds

Ninety bird species were confirmed to occur in the study area during fieldwork. Thirty-two species were recorded from Riparian Forest, 34 from Woodland, 20 from Wetland and 15 from Transformed. Sufficient sampling was undertaken for assessing habitat suitability for potentially occurring threatened species, the primary objective of the ornithological component of this study, and to describe broad bird assemblages. Further fieldwork is likely to increase the species richness of each assemblage but is unlikely to identify additional assemblages. Four broad assemblages or species-habitat associations were identified, each of which is briefly described below:

- **Riparian Forest / Thicket Assemblage:** This assemblage occurs in the riparian forest / thicket patches, best represented in the south-western portion of the study area but also around the existing Ngwenya Lodge. Bird species present includes those species not commonly found in the adjacent K.N.P. due to habitat transformation by large herbivores. These include Red-backed Mannikin (*Lonchura nigriceps*), Purple-banded Sunbird (*Cinnyris bifasciatus*), Yellow-bellied Greenbul (*Chlorocichla flaviventris*), Tambourine Dove (*Turtur tympanistria*), Yellow-rumped Tinkerbird (*Pogoniulus bilineatus*) and African Goshawk (*Accipiter tachiro*). Thirty-two species were recorded from the Riparian Forest / Thicket assemblage, the second highest of the four assemblages.
- **Woodland Assemblage:** The drier woodlands across the study area provide refuge for a number of species that will utilise any type of wooded habitat. These include Blue Waxbill (*Uraeginthus angolensis*), Red-billed Firefinch (*Lagonosticta senegala*), White-bellied Sunbird (*Cinnyris talatala*), White-browed Scrub Robin (*Erythropygia leucophrys*) and Arrow-marked Babbler (*Turdoides jardineii*). Less common species recorded include Jacobin Cuckoo (*Clamator jacobinus*), Violet-backed Starling (*Cinnyricinclus leucogaster*), Red-headed Weaver (*Anaplectes rubriceps*) and Cut-throat Finch (*Amadina fasciata*). Thirty-four species were recorded from the Woodland assemblage, the highest of the four assemblages.
- **Wetland Assemblage:** The few scattered artificial dams and irrigation canals within the study area support an assemblage of birds that is restricted to wetland environments. Birds strongly associated with reeds and rushes found include Lesser Swamp Warbler (*Acrocephalus gracillirostris*), African Reed

Warbler (*Acrocephalus baeticatus*), Thick-billed Weaver (*Amblyospiza albifrons*) and Common Waxbill (*Estrilda astrild*). Birds recorded on open water include Egyptian Goose (*Alopochen aegyptiaca*), African Darter (*Anhinga rufa*), African Fish Eagle (*Haliaeetus vocifer*) and Reed Cormorant (*Microcarbo africanus*). An interesting record from this assemblage was that of a single Green Sandpiper (*Tringa ochropus*) which is a rare non-breeding Palearctic migrant to South Africa. Twenty species were recorded in this assemblage.

- **Degraded Grassland Assemblage:** This assemblage is restricted to transformed areas that are currently covered in pioneer plant species such as grasses and shrubs. It supports a low total of 19 species, most of which are well adapted to degraded environments. These include habitat generalists such as Helmeted Guineafowl (*Numida meleagris*), Pied Crow (*Corvus albus*), Southern Grey-headed Sparrow (*Passer diffuses*), Bronze Mannikin (*Lonchura cucullata*) and Pin-tailed Whydah (*Vidua macroura*).

The savanna biome supports the highest diversity of bird species within the Southern African sub-region and the KNP supports the largest bird list of all conservation areas in South Africa with an estimated 57 % of the birds found within the entire southern African sub-region recorded.

Twenty-nine of the bird species potentially occurring within the study area, either species that have been confirmed to occur in 2531 BD during SABAP2 or species that potentially occur due to presence of suitable habitat, have **Red Data** status. One of these was confirmed to occur during fieldwork:

- **White-backed Vulture (*Gyps africanus*):** Like all the other vulture species in South Africa, the White-backed Vulture's population has declined in the last few decades due to various factors including persecution for the medicinal trade, poisoning, power line electrocutions and collisions and drowning in concrete reservoirs. This has resulted in this species being assessed as **Critically Endangered** in the latest conservation assessment. Two birds were observed flying over the Ngwenya Lodge site but would potentially forage within the Remaining Portion 109 area to the south-west of the lodge, although only irregularly. This species is still fairly common within the adjacent KNP. Suitable nesting sites (tall trees such as *Diospyros mespiliformis* and *Acacia nigrescens*) are present in this area but no nests were located during fieldwork.

Nineteen additional species of conservation-concern have a low likelihood of occurring within the study area. This is primarily due to regional rarity, a lack of suitable prey items available, human disturbance from farming and recreational activities and insufficient habitat area available due to habitat transformation. Many of these species, though, will be visible from the study area in the adjacent KNP including vultures, eagles and storks. Some breeding habitat (tall trees) for larger birds is present in the Riparian Forest / Thicket vegetation community but the disturbance levels there are high due to agricultural activities and probably only suitable for species with high tolerance for humans such as the raptors Yellow-billed Kite (*Milvus aegyptius*) or Wahlberg's Eagle (*Hieraetus wahlbergi*), or Egyptian Goose (*Alopochen aegyptiaca*).

Six potentially occurring species have been assessed as **Threatened**. These three species are Bateleur (*Terathopius ecaudatus*), Tawny Eagle (*Aquila rapax*), Martial Eagle (*Polemaetus bellicosus*), Hooded Vulture (*Necrosyrtes monachus*) – **Critically Endangered**, Lappet-faced Vulture (*Torgos tracheliotos*) – **Endangered**, White-headed Vulture (*Trionoceph occipitalis*) – **Critically Endangered**, European Roller (*Coracias garrulous*) and Marabou Stork (*Leptoptilos crumeniferus*).

#### - Reptiles and Frogs

The Lowveld and foothills of far eastern Mpumalanga support a high diversity of reptile species. However, reptile endemism is very low, which is to be expected in an area that lies in close proximity to Mozambique and is

situated within the widespread savannah biome. One hundred and two species (142) have been recorded from the degree grid 2531 and, on a finer scale, 42 reptiles have been recorded from the QDS 2531 BD. Of the potentially occurring species, only two **conservation-important** reptiles potentially occur. One of these has been assessed as **Vulnerable**: Nile Crocodile (*Crocodylus niloticus*), which is also **protected** under NEMBA ToPS. This species was confirmed during fieldwork and is discussed below:

- **Nile Crocodile (*Crocodylus niloticus*):** Africa's largest reptile is listed as **Vulnerable** due to a number of factors including habitat transformation, water pollution, direct persecution from landowners and harvesting for the medicinal market. The Kruger National Park supports an estimated 3000 individuals which constitutes the largest population in South Africa. The adjacent Crocodile River supports a resident population of crocodiles (pers.obs.) and smaller individuals are able to enter the study area through the small drainage lines in the north-eastern portion. No breeding habitat (sandy river banks) is available around the dams though.

Southern African Python (*Python natalensis*) is **protected** under the National Environmental Management: Biodiversity Act (No.10 of 2004) and was confirmed to occur on Tenbosch by the same farm manager as mentioned above. This species was also confirmed from Tenbosch during a previous ECOREX ecological survey (McKenzie, 2016). Only three reptile species were recorded during fieldwork; however, a dedicated reptile survey, including pitfall traps, would add at least a few additional species, although it is unlikely to have changed the assessment of biodiversity value of habitats represented.

No frogs were recorded during the assessment although summer fieldwork with nocturnal surveys will result in a fair number of species.

Refer to Appendix C.1 for the full Ecology report.

## 17.2. Riparian Ecology

A specialist wetland/riparian survey was undertaken by Wet-Earth Eco-Specs to identify and delineate wetlands and riparian area, as well as, determine the present ecological state (PES) and the ecological importance and sensitivity (EIS).

Four (4) watercourses were identified in the study area and can be described as riverine areas. The delineated riparian areas are demarcated and indicated as N01, N02, N03 and N04 for ease of discussion.

### - N01

Water course N01 is a drainage line located in the west of the proposed site. The riparian zone extends upstream from the edge of the Crocodile River to the tar road between the R571 and the Tenbosch road. The Riparian Index of Habitat Integrity (RIHI) is a D/E (41.8%). The main impacts are the road crossing, historic cultivation and orchards in the catchment, exotic vegetation (*Tecoma stans* being the dominant species) and a housing development. The PES is D/E and the PES Ecostatus is D/E (largely modified/ seriously modified).

- **Marginal zone:** Trees are the dominant vegetation component with shrubs which occur in vast numbers. Due to the road crossing and lateral bank erosion, little cover occurs in places. The substrate consists mainly of high organic soil. The following woody species occur: *Phyllanthus reticulatus*, *Ficus sycomorus*, *Syzygium cordatum*, *Celtis africana*, *Ficus sycomorus*, *Syzygium cordatum*, etc. The cover and species composition appear to be good. Understorey plants such as *Hypoestes forskoolii*, *Syngonium podophyllum*, *Jasminum fluminense*, *Setaria megaphylla*, *Panicum coloratum* and *Panicum maximum* occur. Some exotic vegetation such as *Achyranthes aspera* var. *aspera*, *Solanum mauritianum*, *Lantana camara*, *Tecoma stans*, etc.

was also found. Exotic vegetation dominates the area just downstream of the road crossing and then occurs sporadically throughout the non-marginal zone.

- **Non-marginal zone:** Trees are the dominant vegetation component with shrubs which occur in vast numbers. Due to the road crossing and lateral bank erosion, little cover occurs in places. The substrate consists mainly of high organic soil with a heavy leaf layer. The following woody species occur: *Phyllanthus reticulatus*, *Ficus sycomorus*, *Syzygium cordatum*, *Celtis africana*, *Ficus sycomorus*, *Syzygium cordatum*, etc. The cover and species composition appear to be good. Understory plants such as *Hypoestes forskalii*, *Syngonium podophyllum*, *Jasminum fluminense*, *Setaria megaphylla*, *Panicum coloratum* and *Panicum maximum* occur. Some exotic vegetation such as *Achyranthes aspera* var. *aspera*, *Solanum mauritianum*, *Lantana camara*, *Tecoma stans*, etc. was also found. Exotic vegetation dominates the area just downstream of the road crossing and then occurs sporadically throughout the non-marginal zone.

#### - N02

Watercourse N02 is a drainage line located in the middle of the site. The riparian zone extends from the riparian edge of the Crocodile River upstream to the road between the R571 and the Tenbosch road. The RIHI is a D/E (37.6 %). The main impacts are the road crossing, historic cultivation and orchards in the catchment, exotic vegetation infestations (*Lantana camara* and *Tecoma stans* being the dominant species) and greywater being released into the system. Greywater can contain high levels of Chlorine, with additional pollutants in the form of sodium, phosphates, nitrates and other organic compounds. It is expected that this will have detrimental effects on the biota in this stream. Higher levels of flow occur which also contributes to an altered hydrology. PES is D/E while the PES Ecstatus is also a D/E (37.6%) (largely modified).

- **Marginal zone:** The dominant vegetation consists of forb species with scattered shrubs and trees. Some of the marginal zone areas are subject to mud deposits which smothers portions of this zone. The substrate consists mainly of soils, with rocky features in places. Dominant woody species include *Phyllanthus reticulatus*, *Ficus sycomorus* and *Trichilia emetica*. The following grass and sedge species occur: *Setaria megaphylla*, *Commelina diffusa* subsp. *scandens*, *Cyperus sexangularis*, etc. Exotic vegetation such as *Tecoma stans*, *Verbena bonariensis*, *Tagetes minuta*, *Ricinus communis*, *Lantana camara*, etc. occurs.
- **Non-marginal zone:** In this area trees are the dominant vegetation component with shrubs and forbs. Due to road crossings, a water treatment facility and eroded areas, sparse cover occurs in places. The substrate consists mainly of soils and rocky material. The following woody species occur: *Acacia xanthophloea*, *Phyllanthus reticulatus*, *Ficus sycomorus*, *Ziziphus mucronata*, *Syzygium cordatum*, *Grewia monticola*, *Pluchea dioscoridis*, etc. Understory plants such as *Setaria megaphylla*, *Panicum maximum*, *Hypoestes forskalii*, *Jasminum fluminense*, etc. occur. Exotic vegetation such as *Ricinus communis*, *Tecoma stans*, *Achyranthes aspera* var. *aspera*, *Solanum mauritianum*, *Lantana camara*, etc. was also found. *Lantana camara* is the most dominant of the exotic species

#### - N03

Watercourse N03 is an artificially created dam into which water is pumped from the Crocodile River. The dominant vegetation in this artificial environment is mostly exotic species, such as *Ipomoea purpurea*, *Lantana camara*, *Tecoma stans*, *Pennisetum clandestinum*, etc. Woody species present include: *Ficus sycomorus*, *Rauvolfia caffra*, *Syzygium cordatum*, *Celtis africana*, *Phyllanthus reticulatus*, *Acacia xanthophloea*, etc. *Ficus lutea*, a tree which is not indigenous in Mpumalanga, but has been cultivated widely also occurs in this artificial environment. The following grass and sedge species occur:

*Cyperus esculentus*, *Persicaria decipiens*, *Commelina diffusa* subsp. *scandens*, *Cyperus sexangularis*, etc.

- N04

Watercourse N04 is the Crocodile River which follows to the north of the site. The RIHI is a C (63.1%) The main impacts are grazing and trampling, flood events, exotic species, dumped building material, historic cultivation and possible water abstraction. PES is D and the PES Ecstatus is a D (56.8%).

- **Marginal zone:** The dominant vegetation consists of reeds and sedges, with grasses. Some riparian areas are subject to erosion due to game paths which has also contributed towards areas with sparse vegetation cover. The substrate consists mainly of sandy alluvial material. Dominant woody species are *Phyllanthus reticulatus* and *Pluchea dioscoridis*. The following grass and sedge species occur: *Phragmites australis*, *Persicaria decipiens*, *Commelina diffusa* subsp. *scandens*, *Cyperus sexangularis*, *Cyperus dives*, *Leersia hexandra*, etc. Exotic vegetation such as the macrophyte *Eichhornia crassipes*, *Verbena bonariensis*, *Centella asiatica*, *Ricinus communis*, *Lantana camara*, *Sesbania bispinosa*, etc. occurs.
- **Non-marginal zone:** In this area, tree and grasses are the dominant vegetation components with inhibited shrubs occurring sporadically in vast numbers. There are indicators that this zone is overgrazed and trampled. The substrate consists mainly of alluvial soils and some exposed rock dykes. The following woody species occur: *Acacia nigrescens*, *Acacia xanthophloea*, *Philenoptera violacea*, *Trichilia emetica*, *Diospyros mespiliformis*, *Phyllanthus reticulatus*, *Dichrostachys cinerea*, *Lippia javanica*, *Ficus sycomorus*, *Ziziphus mucronata*, *Syzygium cordatum*, *Sclerocarya birrea* subsp. *caffra*, *Grewia monticola*, *Grewia flavescens*, *Gomphocarpus fruticosus*, *Gymnosporia senegalensis*, *Pluchea dioscoridis*, *Asparagus cooperi*, *Vernonia colorata*, etc. The species composition appears to be good, however, the abundance and cover is lower than expected. Non-woody species such as *Cyperus sexangularis*, *Schoenoplectus brachyceras*, *Setaria sphacelata*, *Eragrostis rotifer*, *Melinis repens*, *Cynodon dactylon*, *Panicum coloratum* and *Panicum maximum* occur. Some exotic vegetation such as *Solanum mauritianum*, *Centella asiatica*, *Parthenium hysterophorus*, *Ricinus communis*, *Lantana camara*, etc. was also found. Exotic vegetation occurs sporadically throughout this non-marginal zone.

Refer to Appendix C.4 for the full Wetland Report.

## 18. VISUAL

A visual impact assessment was undertaken by NuLeaf Planning and Environmental in order to determine the possible visual impact of the proposed expansion of Ngwenya Lodge.

The study area lies adjacent to the Kruger National Park boundary on the southern bank of the Crocodile River between the town of Marloth Park to the west and the Crocodile Bridge Gate to the east. Land cover within the study area is characterised by a moderately developed shrub layer and a dense herbaceous layer. Land use is deemed predominately cultivation.

The visual quality of the broader study area is high, generally as a result of the lack of development and the large areas given over to conservation within the region. There is no evidence of widespread erosion or natural degradation, and development, where this occurs, is domestic in scale.

Viewer incidence is highest within the local built up areas. Second to these, are the roads surrounding the site. As such tourists using the roads and residents of the area are considered most sensitive to visual intrusion, as they will be exposed to visual intrusion during their rest and relaxation times.

Tourists within the neighbouring Kruger National Park, including visitors to the nearby lodges and tourists making use of internal game drive routes, represent additional visual receptors.

However, owing to the fact that Ngwenya Lodge has been in operation for many years, the visual impact is already in place, thereby reducing the overall impact substantially.

The overall visual absorption capacity (VAC) is low-medium.

Refer to Appendix C.3 for the full Visual Impact Assessment.

## SECTION C: PUBLIC PARTICIPATION

### 1. ADVERTISEMENT AND NOTICE

An advertisement was placed in the Lowvelder, a local publication, on 27 August 2020. Site notices were placed at the following locations in and around the proposed property on 26 August 2020:

Site Notice Position	Latitude	Longitude
Entrance gate to the proposed property	25°22'53.99"S	31°51'8.63"E
Entrance gate to the adjacent property	25; 22; 53.6068	31; 51; 2.1368
Reception at Ngwenya Lodge	25°22'41.32"S	31°51'29.36"E

### 2. DETERMINATION OF APPROPRIATE MEASURES

The following details the measures taken to include all potential I&APs as required by Regulation 41 and 42 of GN 326:

- A list of interested and affected parties (I&AP's), as well as, compliance authorities was compiled inclusive of Local and District Municipalities, local landowners and environmental organizations.
- Written notification of the proposed development, including a background information document, was sent to all identified I&AP's and Compliance Authorities on 26 August 2020.
- A printed advertisement was placed in the Lowvelder, a local publication, on the 27 August 2020.
- Site notices were placed at the entrance to the affected property and at the Reception at Ngwenya Lodge on 26 August 2020.

Proof of stakeholder engagement is included in Appendix D.2.

### 3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Interested and Affected Party	Issue
Denis Goffinet	1. Water availability and the effects and pressure on an already stressed Crocodile



	<p>River system</p> <ol style="list-style-type: none"> <li>2. Crocodile Bridge gate (KNP) is already under considerable pressure for day visitor entry with daily quotas filled regularly, especially during long weekends.</li> <li>3. The Southern Kruger area is already the busiest part of Kruger Park and adding on a further 2000 potential visitors will impact on the experience of tourists visiting southern Kruger.</li> </ol>
Greg Beyers	Our only concerns will be the availability of water and the treatment of waste water as downstream water users.
Peter Collier	For the record my biggest concern and unhappiness regarding the proposed expansion is the bottle neck that this expansion will create at KNP Crocodile Bridge gate access.
Simone Swiel	Concern about water usage from the Crocodile River and the associated pressure to the river.
Theo Schlooz	<ol style="list-style-type: none"> <li>1. How will the value of my property at Ngwenya Lodge</li> <li>2. An additional 2182 beds will put an additional strain on entering the already difficult to enter Crocodile Bridge gate of the Kruger National Park, where especially during peak periods only a limited number of guests are allowed to enter the Kruger National Park.</li> <li>3. I am also concerned about the noise effect on the current tranquil surroundings, as well as the increased security risk.</li> </ol>
Ute Latzke	<p>According to the AGM, there was no talk about 2000 beds which, I'm sure, is most owners greatest concern.</p> <p>The environmental impact on the area is one thing, but the burden on the Kruger quite another. I've been in the busy tourism industry my whole life, appreciate the 'quiet' that Ngwenya affords and worry about our 2 week investment.</p> <p>Have any arrangements been made with either Croc Bridge or Malelane to handle the extra traffic/permits?</p>

#### 4. COMMENTS AND RESPONSE REPORT

Please refer to Appendix D.3 for the comments and response report.

#### 5. AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders:

Authority/ Organ of State	Contact Person
DARDLEA	Robyn Luyt
Ehlanzeni District Municipality	Pretty Masego
Nkomazi Local Municipality	Shirely Shabungu
Nkomazi/Ehlanzeni Municipality- Environmental Management	Lebogang Mdluli
DWS	Dudu
MTPA	Frans Krige
DWS	Silo Kheva

Refer to Appendix D.4 for proof that the Authorities and Organs of State received written notification of the proposed activities.

## 6. CONSULTATION WITH OTHER STAKEHOLDERS

Refer to Appendix D.5 for a list of registered I&APs.

## SECTION D: IMPACT ASSESSMENT

### 1. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

#### 1.1. Potential impacts

All potential environmental impacts, both positive and negative, have been identified for the entire lifecycle of the project i.e. Planning / design, construction and operations. The decommissioning of the proposed development is not anticipated and has therefore not been assessed.

##### 1.1.1. Decommissioning Phase

The decommissioning of the facility is not anticipated at this stage and, therefore, no impacts are anticipated

#### 1.2. Impact assessment

Activity	Impact summary	Significance	Proposed mitigation
<b>PREFERRED ALTERNATIVE (ALTERNATIVE 1)</b>			
Planning and Design Phase	<b>Direct impacts:</b>		
	<b>Ground Water</b>		
	None.		
	<b>Hydrology (Surface Water)</b>		
	Risk to ecological function of the riparian habitat along the Crocodile River. <i>This pertains to the placement of 3 birdhides, the restaurant and 3 sewage pump stations.</i>	<b>33</b> <b>M</b>	<ul style="list-style-type: none"> <li>Planning and compliance, including ground water, surface water and storm water management as per the EMPr (section 7.1).</li> <li>Development footprint planning as per the EMPr (section 7.2).</li> </ul>
	Risk to hydrological function (quality and fluctuation properties)	<b>27</b> <b>L</b>	



Activity	Impact summary	Significance	Proposed mitigation
	along the Crocodile River and drainage lines.  <i>This pertains to the placement of 3 birdhides, the restaurant and 3 sewage pump stations.</i>		
<b>Soil</b>			
	Erosion risk to soils	27 L	<ul style="list-style-type: none"> <li>• Planning and compliance, including ground water, surface water, storm water management and waste management as per the EMPr (section 7.1).</li> <li>• Development footprint planning as per the EMPr (section 7.2).</li> </ul>
<b>Air</b>			
	None.		
<b>Biodiversity (Flora)</b>			
	Risk to ecological support areas: Protected Area Buffer	27 L	<ul style="list-style-type: none"> <li>• Planning and compliance, including protected species, storm water management and waste management as per the EMPr (section 7.1).</li> <li>• Development footprint planning as per the EMPr (section 7.2).</li> </ul>
	Risk to Delagoa Lowveld vegetation classified as Least Threatened	27 L	
	Risk to sensitive habitats, specifically the riparian habitat.  <i>This pertains to the placement of 3 sewage pump stations, 3 birdhides, 11 chalet units and a portion of the restaurant.</i>	36 M	
	Risk to Conservation Important Species and protected trees. i.e. <i>Elaeodendron transvaalense (NT), Dalbergia melanoxylon (NT), Sclerocarya birrea, Combretum imberbe, Philenoptera violacea and Elaeodendron transvaalense, Aloe chabaudii, A. marlothii, A. spicata, A. parvibracteata</i>	30 L	
<b>Biodiversity (Fauna)</b>			
	Risk of habitat fragmentation	27 L	<ul style="list-style-type: none"> <li>• Planning and compliance, including protected species, storm water management and waste management as per the EMPr (section 7.1).</li> <li>• Development footprint planning as per the EMPr (section 7.2).</li> </ul>
	Risk to the untransformed vegetation communities (Riparian forest, Closed Woodland and Degraded Woodland) which are key habitats and migration corridors for fauna.	30 L	
<b>Land use and Agricultural potential</b>			
	None		•
<b>Heritage</b>			
	None.		
<b>Visual</b>			
	Risk to visual quality of the surrounding area and sense of place	20 L	<ul style="list-style-type: none"> <li>• Development footprint planning as per the EMPr (section 7.2).</li> <li>• Visual environment planning as per the EMPr (section 7.3).</li> </ul>
<b>Socio-economic</b>			
	None.		

Activity	Impact summary	Significance	Proposed mitigation
	<b>Municipal services and Traffic</b>		
	None.		
	<b>Indirect impacts:</b>		
	None.		
	<b>Cumulative impacts:</b>		
	<b>Biodiversity (Flora)</b>		
	Cumulative loss of sensitive habitats, specifically riparian zones	26 L	<ul style="list-style-type: none"> <li>• Planning and compliance, including protected species, storm water management and waste management as per the EMPr (section 7.1).</li> <li>• Development footprint planning as per the EMPr (section 7.2).</li> </ul>
Cumulative reduction of plant species of conservation importance: protected trees <i>Elaeodendron transvaalense</i> (NT), <i>Dalbergia melanoxylon</i> (NT), <i>Sclerocarya birrea</i> , <i>Combretum imberbe</i> , <i>Philenoptera violacea</i> and <i>Elaeodendron transvaalense</i> , <i>Aloe chabaudii</i> , <i>A. marlothii</i> , <i>A. spicata</i> , <i>A. parvibracteata</i>	28 L		
<b>Biodiversity (Fauna)</b>			
Cumulative loss of faunal habitat.	20 L	<ul style="list-style-type: none"> <li>• Planning and compliance, including protected species, storm water management and waste management as per the EMPr (section 7.1).</li> <li>• Development footprint planning as per the EMPr (section 7.2).</li> </ul>	
Construction Phase	<b>Direct impacts:</b>		
	<b>Ground Water</b>		
	Depletion of ground water due to overuse and waste during construction activities	21 L	<ul style="list-style-type: none"> <li>• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>• Site establishment, including site demarcation, accommodation, pollution control and access roads as per the EMPr (section 8.2)</li> <li>• Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3).</li> <li>• Vehicles and equipment management as per the EMPr (section 8.7).</li> </ul>
	Pollution and contamination of ground water	18 L	
	<b>Hydrology (Surface Water)</b>		
	Disturbance and loss of ecological function of the habitat (physical structure) along the Crocodile River and drainage lines.  <i>This pertains to the placement of 3 birdhides, 11 chalet units, the restaurant and 3 sewage pump stations being placed within the 32 m buffer and the riparian vegetation.</i>	32 M	<ul style="list-style-type: none"> <li>• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>• Site establishment, including site demarcation, accommodation, pollution control, access roads and protection of the riparian system as per the EMPr (section 8.2)</li> <li>• Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3).</li> <li>• Stockpiles, storage and handling as per the EMPr (section 8.4).</li> <li>• Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5).</li> <li>• Alien plant control as per the EMPr (section 8.5).</li> </ul>
	Pollution and contamination of surface water of the Crocodile River and drainage lines	30 L	
Disturbance and loss of hydrological function (quality and fluctuation properties) of the	32 M		

Activity	Impact summary	Significance	Proposed mitigation
	Crocodile River and the drainage lines.  <i>This pertains to the placement of 3 birdhides, 11 chalet units, the restaurant and 3 sewage pump stations being placed within the 32 m buffer and the riparian vegetation.</i>		8.6). <ul style="list-style-type: none"> <li>• Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>• Socio-economic management, including staff, visual as per the EMPr (section 8.8).</li> <li>• Fire management as per the EMPr (section 8.9).</li> <li>• Rehabilitation as per the EMPr (section 8.10).</li> </ul>
<b>Soil</b>			
	Soil contamination and pollution	18 L	<ul style="list-style-type: none"> <li>• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>• Site establishment, including site demarcation, accommodation, pollution control and access roads as per the EMPr (section 8.2)</li> <li>• Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3).</li> <li>• Stockpiles, storage and handling as per the EMPr (section 8.4).</li> <li>• Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5).</li> <li>• Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>• Rehabilitation as per the EMPr (section 8.10).</li> </ul>
	Soil erosion by wind and rain	27 L	
	Soil compaction and increased risk of sediment transport and erosion.	18 L	
<b>Air</b>			
	Air pollution due emissions from construction vehicles and equipment.	24 L	<ul style="list-style-type: none"> <li>• Site establishment, including site demarcation, accommodation, pollution control and access roads as per the EMPr (section 8.2)</li> <li>• Stockpiles, storage and handling as per the EMPr (section 8.4).</li> <li>• Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5).</li> <li>• Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>• Socio-economic management, including visual as per the EMPr (section 8.8).</li> <li>• Fire management as per the EMPr (section 8.9).</li> <li>• Rehabilitation as per the EMPr (section 8.10).</li> </ul>
	Dust liberated by general construction activities and movement of construction vehicles.	21 L	
	Smoke from open fires used by site staff for heating and cooking as well as from uncontrolled fires	21 L	
<b>Biodiversity (Flora)</b>			
	<i>Removal of invader alien species found on site (positive impact).</i>	50 M	<ul style="list-style-type: none"> <li>• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>• Site establishment, including site demarcation, accommodation, pollution control, access roads, protection of flora, and protection of the riparian system as per the EMPr (section 8.2)</li> <li>• Materials management, including solid, liquid</li> </ul>
	Loss of ecological support areas: protected area buffer and areas classified as Heavily modified/ other natural areas	28 L	
	Loss of Delagoa Lowveld vegetation classified as Least Threatened	28 L	

Activity	Impact summary	Significance	Proposed mitigation
	Destruction of riparian areas due to placement of infrastructure within this habitat.  <i>This pertains to the placement of 3 sewage pump stations, 3 birdhides, 11 chalet units and a portion of the restaurant.</i>	48 M	and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3). <ul style="list-style-type: none"> <li>• Stockpiles, storage and handling as per the EMPr (section 8.4).</li> <li>• Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5).</li> </ul>
	Disturbance of sensitive habitats, specifically riparian zones.  <i>This pertains to the placement of 3 sewage pump stations, 3 birdhides, 11 chalet units and a portion of the restaurant.</i>	27 L	<ul style="list-style-type: none"> <li>• Alien plant control as per the EMPr (section 8.6).</li> <li>• Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>• Fire management as per the EMPr (section 8.9).</li> <li>• Rehabilitation as per the EMPr (section 8.10).</li> </ul>
	Destruction and damage to plant species of conservation importance: protected trees <i>Elaeodendron transvaalense</i> (NT), <i>Dalbergia melanoxylon</i> (NT), <i>Sclerocarya birrea</i> , <i>Combretum imberbe</i> , <i>Philenoptera violacea</i> and <i>Elaeodendron transvaalense</i> , <i>Aloe chabaudii</i> , <i>A. marlothii</i> , <i>A. spicata</i> , <i>A. parvibracteata</i>	24 L	
	Increase in exotic vegetation/alien species and bush encroachment into disturbed soils and areas	26 L	
<b>Biodiversity (Fauna)</b>			
	Loss of faunal habitat	27 L	<ul style="list-style-type: none"> <li>• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> </ul>
	Disturbance of populations of important fauna confirmed on site	18 L	<ul style="list-style-type: none"> <li>• Site establishment, including site demarcation, accommodation, pollution control, access roads, protection of flora and protection of fauna as per the EMPr (section 8.2)</li> </ul>
	Disturbance of fauna along the Crocodile River within KNP	24 L	
	Mortality of fauna	18 L	<ul style="list-style-type: none"> <li>• Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3).</li> </ul>
	Increased illegal harvesting of plant and animal resources	22 L	
	Poaching and snaring of fauna on site and in the greater Kruger National Park	27 L	<ul style="list-style-type: none"> <li>• Erosion control, including excavation, backfilling and trenching as per the EMPr (section 8.5).</li> <li>• Alien plant control as per the EMPr (section 8.6).</li> <li>• Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>• Socio-economic management, including staff as per the EMPr (section 8.8).</li> <li>• Fire management as per the EMPr (section 8.9).</li> <li>• Rehabilitation as per the EMPr (section 8.10).</li> </ul>
<b>Land use and Agricultural potential</b>			
	None.		
<b>Heritage</b>			
	<i>Possible discovery of new important artefacts (positive</i>	16 L	<ul style="list-style-type: none"> <li>• Pre-construction planning, including planning</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
	<i>impact)</i>		and preparation as per the EMPr (section 8.1)
	Damage to and / or destruction of archaeological, paleontological or historical artefacts unearthed during construction	8 N	<ul style="list-style-type: none"> <li>Site establishment, including site demarcation, access roads and protection of cultural heritage as per the EMPr (section 8.2)</li> </ul>
<b>Visual</b>			
	Visual impact of construction, lighting and dust on adjacent tourism developments	21 L	<ul style="list-style-type: none"> <li>Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>Site establishment, including site demarcation, accommodation, pollution control and access roads as per the EMPr (section 8.2)</li> <li>Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3).</li> <li>Stockpiles, storage and handling as per the EMPr (section 8.4).</li> <li>Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5).</li> <li>Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>Socio-economic management, including staff, visual as per the EMPr (section 8.8).</li> <li>Fire management as per the EMPr (section 8.9).</li> <li>Rehabilitation as per the EMPr (section 8.10).</li> </ul>
	Visual impact of construction, lighting and dust on conservation areas within the region (KNP).	24 L	
<b>Socio-economic</b>			
	<i>Stimulation of the local economy, especially the local service delivery industry (i.e. accommodation, catering, cleaning, transport and security, etc.)(positive impact)</i>	24 L	<ul style="list-style-type: none"> <li>Socio-economic planning as per the EMPR (section 7.4).</li> <li>Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>Site establishment, including accommodation and access roads as per the EMPr (section 8.2)</li> <li>Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>Socio-economic management, including staff as per the EMPr (section 8.8).</li> <li>Fire management as per the EMPr (section 8.9).</li> </ul>
	<i>Creation of short-term employment and business opportunities and the opportunity for skills development and on-site training (Positive impact).</i>	36 M	
	Noise, dust and safety impacts and disturbance to guests at Ngwenya Lodge	27 L	
	An increase in construction workers and associated increase in social problems for the community	16 L	
	Increase in casual workers and associated increase in poaching.	24 L	
	Increased risk of veld fires due to the presence of construction workers on site.	21 L	
<b>Municipal services and Traffic</b>			
	Increase in traffic on the surrounding local roads due to construction vehicles.	21 L	<ul style="list-style-type: none"> <li>Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>Site establishment, including access roads as per the EMPr (section 8.2)</li> </ul>
	Increase in the number and	21	

Activity	Impact summary	Significance	Proposed mitigation
	frequency of construction vehicles accessing the site and the resultant noise, dust, and safety impacts on other road users, residents of the local community and adjacent tourism developments.	L	<ul style="list-style-type: none"> <li>Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>Socio-economic management, including visual as per the EMPr (section 8.8).</li> </ul>
<b>Indirect impacts:</b>			
<b>Biodiversity (Flora)</b>			
	Loss of floral biodiversity and protected trees due to increased incidence of veld fires	22 L	<ul style="list-style-type: none"> <li>As above</li> </ul>
<b>Biodiversity (Fauna)</b>			
	Loss of faunal biodiversity due to increased incidence of veld fires	20 L	<ul style="list-style-type: none"> <li>As above</li> </ul>
<b>Socio-economics</b>			
	Loss of property and threat to human life due to increased incidence of veld fires	16 L	<ul style="list-style-type: none"> <li>As above</li> </ul>
<b>Traffic and services</b>			
	Degradation of local roads due to the increase in the numbers of heavy vehicles.	21 L	<ul style="list-style-type: none"> <li>As above</li> </ul>
<b>Cumulative impacts:</b>			
<b>Biodiversity (Flora)</b>			
	Cumulative loss of ecological function of sensitive habitats i.e. riparian forest.	39 M	<ul style="list-style-type: none"> <li>Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>Site establishment, including site demarcation, accommodation, pollution control, access roads, protection of flora, and protection of the riparian system as per the EMPr (section 8.2)</li> <li>Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3).</li> <li>Stockpiles, storage and handling as per the EMPr (section 8.4).</li> <li>Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5).</li> <li>Alien plant control as per the EMPr (section 8.6).</li> <li>Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>Fire management as per the EMPr (section 8.9).</li> <li>Rehabilitation as per the EMPr (section 8.10).</li> </ul>
	Cumulative reduction and damage to plant species of conservation importance: protected trees <i>Elaeodendron transvaalense</i> (NT), <i>Dalbergia melanoxylon</i> (NT), <i>Sclerocarya birrea</i> , <i>Combretum imberbe</i> , <i>Philenoptera violacea</i> and <i>Elaeodendron transvaalense</i> , <i>Aloe chabaudii</i> , <i>A. marlothii</i> , <i>A. spicata</i> , <i>A. parvibracteata</i>	24 L	
<b>Biodiversity (Fauna)</b>			
	Cumulative loss of faunal habitat.	24 L	<ul style="list-style-type: none"> <li>Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>Site establishment, including site demarcation, accommodation, pollution control, access roads, protection of flora, and protection of fauna as per the EMPr (section 8.2)</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
			<ul style="list-style-type: none"> <li>Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3).</li> <li>Erosion control, including excavation, backfilling and trenching as per the EMPr (section 8.5).</li> <li>Alien plant control as per the EMPr (section 8.6).</li> <li>Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>Socio-economic management, including staff as per the EMPr (section 8.8).</li> <li>Fire management as per the EMPr (section 8.9).</li> <li>Rehabilitation as per the EMPr (section 8.10).</li> </ul>
<b>Socio-economics</b>			
	<i>Community upliftment and the opportunity to up-grade and improve skills levels in the area (positive impact)</i>	24 L	<ul style="list-style-type: none"> <li>Socio-economic planning as per the EMPr (section 7.4).</li> <li>Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>Site establishment, including accommodation and access roads as per the EMPr (section 8.2)</li> <li>Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>Socio-economic management, including staff as per the EMPr (section 8.8).</li> <li>Fire management as per the EMPr (section 8.9).</li> </ul>
<b>Traffic and services</b>			
	Cumulative increase in traffic and the resultant noise, dust, and safety impacts on other road users, residents of the local community and adjacent tourism developments.	16 L	<ul style="list-style-type: none"> <li>Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>Site establishment, including access roads as per the EMPr (section 8.2)</li> <li>Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>Socio-economic management, including visual as per the EMPr (section 8.8).</li> </ul>
Operational Phase	<b>Direct impacts:</b>		
	<b>Ground Water</b>		
	Depletion of ground water resources due to over use and waste during operation.	22 L	<ul style="list-style-type: none"> <li>Biodiversity management, including access roads and resource management as per the EMPr (section 9.1)</li> </ul>
	Pollution and contamination of ground water	22 L	<ul style="list-style-type: none"> <li>Materials management, including solid liquid and hazardous waste, fuel and hazardous material as per the EMPr (section 9.2)</li> <li>Erosion control as per the EMPr (section 9.3)</li> <li>Socio economic management, including staff management as per the EMPr (section 9.5)</li> <li>Vehicles and equipment management as per the EMPr (section 9.4)</li> </ul>
	<b>Hydrology (Surface Water)</b>		
Disturbance and loss of ecological function of the habitat (physical structure) along the Crocodile	18 L	<ul style="list-style-type: none"> <li>Biodiversity management, including access roads, resource management, protection of</li> </ul>	



Activity	Impact summary	Significance	Proposed mitigation
	River and drainage lines		flora and alien plant control as per the EMPr (section 9.1) <ul style="list-style-type: none"> <li>• Materials management, including solid, liquid and hazardous waste, fuel and hazardous material as per the EMPr (section 9.2)</li> <li>• Erosion control as per the EMPr (section 9.3)</li> <li>• Vehicles and equipment management as per the EMPr (section 9.4)</li> <li>• Socio economic management, including staff management as per the EMPr (section 9.5)</li> <li>• Fire management as per the EMPr (section 9.6)</li> </ul>
	Pollution and contamination of surface water	20 L	
	Disturbance and loss of hydrological function (quality and fluctuation properties) along the Crocodile and drainage lines	18 L	
<b>Soil</b>			
	Soil contamination and pollution	18 L	<ul style="list-style-type: none"> <li>• Biodiversity management, including access roads, resource management, protection of flora and alien plant control as per the EMPr (section 9.1)</li> <li>• Materials management, including solid liquid and hazardous waste, fuel and hazardous material as per the EMPr (section 9.2)</li> <li>• Erosion control as per the EMPr (section 9.3)</li> <li>• Vehicles and equipment management as per the EMPr (section 9.4)</li> <li>• Socio economic management, including staff management as per the EMPr (section 9.5)</li> </ul>
	Soil erosion	18 L	
<b>Air</b>			
	Air pollution by emissions from increased numbers of private vehicles	33 M	<ul style="list-style-type: none"> <li>• Socio economic management, including staff management as per the EMPr (section 9.5)</li> </ul>
<b>Biodiversity (Flora)</b>			
	Disturbance of riparian areas	18 L	<ul style="list-style-type: none"> <li>• Biodiversity management, including access roads, resource management, protection of flora and alien plant control as per the EMPr (section 9.1)</li> <li>• Materials management, including solid liquid and hazardous waste, fuel and hazardous material as per the EMPr (section 9.2)</li> <li>• Erosion control as per the EMPr (section 9.3)</li> <li>• Vehicles and equipment management as per the EMPr (section 9.4)</li> <li>• Socio economic management, including staff management as per the EMPr (section 9.5)</li> <li>• Fire management as per the EMPr (section 9.6)</li> </ul>
	Destruction and damage to plant species of conservation importance: protected trees <i>Elaeodendron transvaalense</i> (NT), <i>Dalbergia melanoxylon</i> (NT), <i>Sclerocarya birrea</i> , <i>Combretum imberbe</i> , <i>Philenoptera violacea</i> and <i>Elaeodendron transvaalense</i> , <i>Aloe chabaudii</i> , <i>A. marlothii</i> , <i>A. spicata</i> , <i>A. parvibracteata</i>	20 L	
	Increase in exotic vegetation/alien species and bush encroachment into disturbed soils and areas in the event that the rehabilitation process is not successful.	22 L	
<b>Biodiversity (Fauna)</b>			
	Loss of faunal habitat	18 L	<ul style="list-style-type: none"> <li>• Biodiversity management, including access roads, resource management, protection of flora, alien plant control and protection of fauna as per the EMPr (section 9.1)</li> <li>• Materials management, including solid liquid and hazardous waste, fuel and hazardous material as per the EMPr (section 9.2)</li> <li>• Erosion control as per the EMPr (section 9.3)</li> <li>• Vehicles and equipment management as per the EMPr (section 9.4)</li> </ul>
	Faunal disturbances, displacement of taxa and changes in distribution and abundance	27 L	
	Mortality of fauna	20 L	
	Poaching and snaring of faunal species by staff.	24 L	



Activity	Impact summary	Significance	Proposed mitigation
			the EMPR (section 9.4) <ul style="list-style-type: none"> <li>Socio economic management, including staff management, and visual impact management as per the EMPR (section 9.5)</li> <li>Fire management as per the EMPR (section 9.6)</li> </ul>
<b>Land use and Agricultural potential</b>			
	None.		•
<b>Heritage</b>			
	None.		•
<b>Visual</b>			
	Potential visual impact on sensitive visual receptors in close proximity to the proposed development.	18 L	<ul style="list-style-type: none"> <li>Socio economic management, including staff management and visual impact management as per the EMPR (section 9.5)</li> </ul>
	Potential visual impact on sensitive visual receptors within the region	16 L	
	Potential visual impact on protected and conservation areas (i.e. Kruger National Park) within the study area.	20 L	
	The potential visual impact of safety and security lighting of the developments at night on sensitive visual receptors in close proximity i.e. KNP	20 L	
<b>Socio-economic</b>			
	<i>Stimulation of the local economy, especially the local service delivery industry (accommodation, catering, cleaning, transport, security etc.) (positive impact)</i>	33 M	<ul style="list-style-type: none"> <li>Socio economic management, including staff management, and visual impact management as per the EMPR (section 9.5)</li> </ul>
	<i>Creation of long term employment and business opportunities as well as opportunities for skills development and transfer (positive impact)</i>	48 M	
	<i>Creation of opportunities for local SMME's (positive impact)</i>	48 M	
	The potential visual impact of safety and security lighting of the developments at night on sensitive visual receptors in close proximity i.e. KNP	8 N	
<b>Municipal services and Traffic</b>			
	Increase in traffic on the surrounding roads.	30 L	<ul style="list-style-type: none"> <li>Socio economic management, including staff management and visual impact management as per the EMPR (section 9.5)</li> </ul>
	Increase in the number and frequency of vehicles accessing the site, and the resultant noise, dust, and safety impacts on other road users, residents of the local community and adjacent landowners.	30 L	
<b>Indirect impacts:</b>			
<b>Visual</b>			
	Visual impact of the proposed development of the timeshare	18 L	<ul style="list-style-type: none"> <li>Socio economic management, including staff management, and visual impact management</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
	resort on the sense of place and visual character of the region.		as per the EMPr (section 9.5)
<b>Cumulative impacts:</b>			
<b>Biodiversity (Flora)</b>			
	Cumulative disturbance of sensitive habitats.	22 L	<ul style="list-style-type: none"> <li>Biodiversity management, including access roads, resource management, protection of flora and alien plant control as per the EMPr (section 9.1)</li> <li>Materials management, including solid liquid and hazardous waste, fuel and hazardous material as per the EMPr (section 9.2)</li> <li>Erosion control as per the EMPr (section 9.3)</li> <li>Vehicles and equipment management as per the EMPr (section 9.4)</li> <li>Socio economic management, including staff management as per the EMPr (section 9.5)</li> <li>Fire management as per the EMPr (section 9.6)</li> </ul>
	Cumulative reduction and damage to plant species of conservation importance: protected trees <i>Elaeodendron transvaalense</i> (NT), <i>Dalbergia melanoxylon</i> (NT), <i>Sclerocarya birrea</i> , <i>Combretum imberbe</i> , <i>Philenoptera violacea</i> and <i>Elaeodendron transvaalense</i> , <i>Aloe chabaudii</i> , <i>A. marlothii</i> , <i>A. spicata</i> , <i>A. parvibracteata</i>	24 L	
<b>Visual</b>			
	The accumulation of built forms and within an otherwise natural environment.	22 L	<ul style="list-style-type: none"> <li>Socio economic management, including staff management and visual impact management as per the EMPr (section 9.5)</li> </ul>
<b>Socio-economics</b>			
	<i>Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area (positive impact)</i>	33 M	<ul style="list-style-type: none"> <li>Socio economic management, including staff management and visual impact management as per the EMPr (section 9.5)</li> </ul>
	<i>Promotion of social and economic development in the local communities and improvement in the overall wellbeing of the community (positive impact)</i>	27 L	
<b>Services and traffic</b>			
	Cumulative increase in traffic on the surrounding roads due to increased visitor numbers.	18 L	<ul style="list-style-type: none"> <li>Planning and compliance, including waste management as per the EMPr (section 7.1)</li> <li>Materials management, including solid liquid and hazardous waste, fuel and hazardous material as per the EMPr (section 9.2)</li> <li>Socio economic management, including staff management, and visual impact management as per the EMPr (section 9.5)</li> </ul>
	Cumulative increase in the number and frequency of vehicles accessing the site, and the resultant noise, dust, and safety impacts for other road users, adjacent tourism development and residents of the local communities.	22 L	
	Waste disposal practices will have an accumulative effect on the local landfill site's capacity to absorb waste.	22 L	

Activity	Impact summary	Significance	Proposed mitigation
<b>LAYOUT ALTERNATIVE (ALTERNATIVE 2)</b>			
Planning and Design Phase	<b>Direct impacts:</b>		
	<b>Ground Water</b>		
	None.		

Activity	Impact summary	Significance	Proposed mitigation
<b>Hydrology (Surface Water)</b>			
	Risk to ecological function of the riparian habitat along the Crocodile River  <i>This pertains to the placement of 3 birdhides, 5x chalet units and 3 sewage pump stations.</i>	33 M	<ul style="list-style-type: none"> <li>• Planning and compliance, including ground water, surface water and storm water management as per the EMPr (section 7.1).</li> <li>• Development footprint planning as per the EMPr (section 7.2).</li> </ul>
	Risk to hydrological function (quality and fluctuation properties) along the Crocodile River and drainage lines  <i>This pertains to the placement of 3 birdhides, 5x chalet units and 3 sewage pump stations.</i>	27 L	
<b>Soil</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Air</b>			
	None.		
<b>Biodiversity (Flora)</b>			
	Risk to ecological support areas: Protected Area Buffer	27 L	<ul style="list-style-type: none"> <li>• Planning and compliance, including protected species, storm water management and waste management as per the EMPr (section 7.1).</li> <li>• Development footprint planning as per the EMPr (section 7.2).</li> </ul>
	Risk to Delagoa Lowveld vegetation classified as Least Threatened	27 L	
	Risk to sensitive habitats, specifically the riparian habitat.  <i>This pertains to the placement of 3 sewage pump stations, 3 birdhides and 15 chalet units.</i>	36 M	
	Risk to Conservation Important Species and protected trees. i.e. <i>Elaeodendron transvaalense (NT), Dalbergia melanoxylon (NT), Sclerocarya birrea, Combretum imberbe, Philenoptera violacea and Elaeodendron transvaalense, Aloe chabaudii, A. marlothii, A. spicata, A. parvibracteata</i>	30 L	
<b>Biodiversity (Fauna)</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Land use and Agricultural potential</b>			
	None		•
<b>Heritage</b>			
	None.		
<b>Visual</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Socio-economic</b>			
	None.		
<b>Municipal services and Traffic</b>			
	None.		
<b>Indirect impacts:</b>			

Activity	Impact summary	Significance	Proposed mitigation
	None.		
	<b>Cumulative impacts:</b>		
	<b>Biodiversity (Flora)</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Biodiversity (Fauna)</b>		
	As per Alternative 1: Preferred Alternative		•
Construction Phase	<b>Direct impacts:</b>		
	<b>Ground Water</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Hydrology (Surface Water)</b>		
	Disturbance and loss of ecological function of the habitat (physical structure) along the Crocodile River and drainage lines.  <i>This pertains to the placement of 3 birdhides, 15 chalet units and 3 sewage pump stations being placed within the 32 m buffer and the riparian vegetation.</i>	32 M	<ul style="list-style-type: none"> <li>• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>• Site establishment, including site demarcation, accommodation, pollution control, access roads and protection of the riparian system as per the EMPr (section 8.2)</li> <li>• Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3).</li> <li>• Stockpiles, storage and handling as per the EMPr (section 8.4).</li> <li>• Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5).</li> <li>• Alien plant control as per the EMPr (section 8.6).</li> <li>• Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>• Socio-economic management, including staff, visual as per the EMPr (section 8.8).</li> <li>• Fire management as per the EMPr (section 8.9).</li> <li>• Rehabilitation as per the EMPr (section 8.10).</li> </ul>
	Pollution and contamination of surface water of the Crocodile River and drainage lines	30 L	
	Disturbance and loss of hydrological function (quality and fluctuation properties) of the Crocodile River and the drainage lines.  <i>This pertains to the placement of 3 birdhides, 15 chalet units and 3 sewage pump stations being placed within the 32 m buffer and the riparian vegetation.</i>	32 M	
	<b>Soil</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Air</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Biodiversity (Flora)</b>		
	<i>Removal of invader alien species found on site (positive impact).</i>	50 M	<ul style="list-style-type: none"> <li>• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1)</li> <li>• Site establishment, including site demarcation, accommodation, pollution control, access roads, protection of flora, and protection of the riparian system as per the EMPr (section 8.2)</li> <li>• Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the</li> </ul>
Loss of ecological support areas: protected area buffer and areas classified as Heavily modified/ other natural areas	28 L		
Loss of Delagoa Lowveld vegetation classified as Least Threatened	28 L		
Destruction of riparian areas due to placement of infrastructure	48 M		

Activity	Impact summary	Significance	Proposed mitigation
	within this habitat		EMPr (section 8.3).
	Disturbance of sensitive habitats, specifically riparian zones	27 L	<ul style="list-style-type: none"> <li>• Stockpiles, storage and handling as per the EMPr (section 8.4).</li> </ul>
	Destruction and damage to plant species of conservation importance: protected trees <i>Elaeodendron transvaalense</i> (NT), <i>Dalbergia melanoxylon</i> (NT), <i>Sclerocarya birrea</i> , <i>Combretum imberbe</i> , <i>Philenoptera violacea</i> and <i>Elaeodendron transvaalense</i> , <i>Aloe chabaudii</i> , <i>A. marlothii</i> , <i>A. spicata</i> , <i>A. parvibracteata</i>	24 L	<ul style="list-style-type: none"> <li>• Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5).</li> <li>• Alien plant control as per the EMPr (section 8.6).</li> <li>• Vehicles and equipment management as per the EMPr (section 8.7).</li> <li>• Fire management as per the EMPr (section 8.9).</li> </ul>
	Increase in exotic vegetation/alien species and bush encroachment into disturbed soils and areas	26 L	<ul style="list-style-type: none"> <li>• Rehabilitation as per the EMPr (section 8.10).</li> </ul>
<b>Biodiversity (Fauna)</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Land use and Agricultural potential</b>			
	None.		
<b>Heritage</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Visual</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Socio-economic</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Municipal services and Traffic</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Indirect impacts:</b>			
<b>Biodiversity (Flora)</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Biodiversity (Fauna)</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Socio-economics</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Traffic and services</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Cumulative impacts:</b>			
<b>Biodiversity (Flora)</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Biodiversity (Fauna)</b>			
<b>Socio-economics</b>			
	As per Alternative 1: Preferred Alternative		•
<b>Traffic and services</b>			
	As per Alternative 1: Preferred Alternative		•

Activity	Impact summary	Significance	Proposed mitigation
Operational Phase	<b>Direct impacts:</b>		
	<b>Ground Water</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Hydrology (Surface Water)</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Soil</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Air</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Biodiversity (Flora)</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Biodiversity (Fauna)</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Land use and Agricultural potential</b>		
	None.		•
	<b>Heritage</b>		
	None.		•
	<b>Visual</b>		
	As per Alternative 1: Preferred Alternative		
	<b>Socio-economic</b>		
	As per Alternative 1: Preferred Alternative		
	<b>Municipal services and Traffic</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Indirect impacts:</b>		
	<b>Visual</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Cumulative impacts:</b>		
	<b>Biodiversity (Flora)</b>		
	As per Alternative 1: Preferred Alternative		•
	<b>Visual</b>		
As per Alternative 1: Preferred Alternative		•	
<b>Socio-economics</b>			
As per Alternative 1: Preferred Alternative		•	
<b>Services and traffic</b>			
As per Alternative 1: Preferred Alternative		•	

Please refer to Appendix F for the full impact assessment

## 2. ENVIRONMENTAL IMPACT STATEMENT

The study area is situated in Delagoa Lowveld within the Lowveld Bioregion in the Savanna Biome which is considered well protected and has a conservation status of **Least Concern**. It is **not listed as a Threatened Ecosystem** (Notice 1002 of Government Gazette 34809, 9 December 2011) nor is the study area situated in a floristic centre of endemism.

The entire study area is situated within the **Ecological Support Areas (ESA): Protected Area Buffers** unit. ESA's are "areas that are not essential for meeting (conservation) targets, but play an important role in supporting the functioning of CBA's and that deliver important ecosystem services" (Lötter et al., 2014). Protected Area Buffers are areas that surround proclaimed protected areas that moderate the negative impacts of land-uses that may affect the ecological functioning of those protected areas (in this case the KNP). Permissible activities/land uses include low and high impact tourism and linear structures. In this regard, the proposed expansion of Ngwenya Lodge falls within the guidelines where the development will fall within Heavily/Moderately modified areas and Other Natural Areas.

Most of the terrestrial ecosystems within the study area are classified as **Heavily Modified or Moderately Modified Areas** by the Mpumalanga Biodiversity Sector Plan (MBSP). The scattered untransformed sections are classified as **Other Natural Areas**.

Two untransformed vegetation communities were identified within the study area, namely Disturbed Riparian Forest/Thicket and Degraded Woodland/Thicket which a sensitivity rating of **high** and **moderate** respectively. The transformed areas are assessed as having a **low** sensitivity rating. One Nationally **protected** plant species was confirmed to occur, namely *Philenoptera violacea*. Two **Near Threatened** plants were confirmed to occur, namely *Elaeodendron transvaalense* and *Dalbergia melanoxylon*. Seven plant species that are **protected** under either the National Forests Act (No. 30 of 1998) or the Mpumalanga Nature Conservation Act (No.10 of 1998), namely *Aloe chabaudii* var. *chabaudii*, *A. parvibracteata* and *A. marlothii* subsp. *marlothii*, *Combretum imberbe*, *Elaeodendron transvaalense* and *Sclerocarya birrea* subsp. *caffra*, were confirmed to occur.

Two conservation- important mammals are listed as **Vulnerable** and were confirmed during fieldwork, namely Hippopotamus (*Hippopotamus amphibius*) and African Elephant. The White-backed Vulture assessed as **Critically Endangered** was confirmed flying over the Ngwenya Lodge site.

According to the MBSP freshwater assessment, the Crocodile River is an ESA wetland area. It is classified by NFEPA as channelled valley-bottom wetlands whereby the Crocodile River has a condition of DEF (i.e. 'heavily modified' – riverine wetland associated with a D, E, F or Z ecological category river).

The sub-catchment within which the study area falls has been classified by the MBSP as an '**ESA Important Sub-catchment**', but does include large sections of 'Heavily Modified' areas. The sub-catchment is important as it is a **Fish Support Area (FSA)**, as per NFEPA.

No Stone Age, Iron Age or historical settlements, structures, features, assemblages or artefacts were recorded during the survey. Also, no graveyards or individual graves were recorded.

The construction and operation of the proposed Ngwenya expansion will have a visual impact on the scenic resources of the study area especially on the KNP and the existing Ngwenya Timeshare owners/guests. Owing to the fact that Ngwenya Lodge has been in operation for many years, the visual impact is already in place, thereby reducing the overall impact substantially. However, mitigation of some of the visual impact is possible and will go far in reducing the magnitude of visual impacts discussed by softening the appearance of the development within its context.

A waste water treatment facility (WWTF) has been constructed on an adjacent property to service the existing Ngwenya Lodge and the proposed expansions. Equipment changes will need to be made to this existing WWTF in order to handle the increased capacity.

Power will be supplied from existing Eskom lines.

## Preferred Alternative: Alternative 1

Development Zone 1 and all its associated infrastructure falls within the Degraded Woodland/Thicket vegetation which has a **moderate** sensitivity rating.

Majority of the chalet units in Development Zone 2 are located within the Degraded Woodland/Thicket vegetation which has a **moderate** sensitivity rating, however, 8 chalet units are located within the Riparian Forest which has a **high** sensitivity rating.

Majority of Development Zone 3 is located within transformed vegetation which has a **low** sensitivity rating, however a portion of the restaurant and covered parking area is located within the riparian vegetation, the 32m buffer and the setback line, all of which have a **high** sensitivity.

All of the chalet units, boma, pool, putt-putt course and the retail and information centre in Development Zone 4 are located within the transformed vegetation community which as a **low** sensitivity rating. Three of the chalet units are located within the riparian vegetation (**high** sensitivity), while two other units encroach into this habitat slightly.

In Development Zone 5 the hotel reception, some covered parking and 17 rooms are located within the transformed vegetation community which as a **low** sensitivity rating. The remainder of the rooms are located within the Degraded Woodland/Thicket vegetation which has a **moderate** sensitivity rating.

Certain bird hides/ viewpoints are located within the 32 m buffer of the Crocodile River, the riparian vegetation and are in front of the setback line for the Crocodile River. It should be noted that the bird hides will use a tread lightly approach and will be on elevated platforms to limit the amount of vegetation to be cleared.

All areas with a high sensitivity rating have been avoided with the exception of 5 small low impact bird hides/lookout points, 4 sewage pump stations, a portion of the restaurant and covered parking and 13 chalet units. The 1:100 year flood line along the Crocodile River is respected.

### **Statement:**

The construction impacts of the Preferred Alternative, if effectively and sufficiently managed according to the mitigation measures proposed in this report, specialist reports and the draft environmental management programme (EMPr), will mostly be of **low** significance, post mitigation. It should be noted that a **moderate** post mitigation significance rating is anticipated in terms of disturbance and loss of ecological and hydrological function and destruction of the riparian areas. This is mainly due to the placement of 3 sewage pump stations, 3 bird hides, 13 chalet units and a portion of the restaurant within the 32 m buffer of the drainage lines and the riparian habitat, areas deemed to have a high sensitivity. It should be noted that the 3 bird hides will use a tread lightly approach, will be on elevated platforms to limit the amount of vegetation to be cleared. No post mitigation impacts of high significance are expected.

Operational impacts can be similarly mitigated and residual impacts are expected to be of low significance overall. However, it should be noted that post mitigation significance is anticipated to be **moderate** in terms of air pollution due to emissions from increase number of private vehicles to the area. No post mitigation impacts of high significance are expected.

Positive impacts, which will be applicable to all alternatives, include job creation and employment opportunities for both the construction and operational phases, skills transfer and development. Diversifying the tourism offerings within the region will also have an overall positive impact.

Additionally, the Preferred Alternative entails the construction of a new restaurant, an amenity that will serve both the existing guests of Ngwenya Lodge, as well as the proposed expansion. The Preferred Alternative also has 7 less chalet units, resulting in an overall reduction in water and electricity use.



With the above in mind, it is recommended that the Preferred Alternative be supported on the condition that all mitigation measures mentioned in this report, the specialist studies and the draft EMPr are implemented and adhered to throughout the project lifecycle. No fatal flaws are evident.

#### Layout Alternative: Alternative 2

In the Layout Alternative most arguments for the Preferred Alternative hold true.

The layout of the proposed expansion is that of the Preferred Alternative with the exception that Development Zone 3 will consist of 7 chalet units as opposed to a restaurant. 5 of these units will be located within the riparian vegetation which has a high sensitivity rating.

#### **Statement**

The construction impacts of the Layout Alternative as that of the Preferred Alternative, with mostly **low** significance ratings, post mitigation. It should be noted that a **moderate** post mitigation significance rating is anticipated in terms of disturbance and loss of ecological and hydrological function and destruction of the riparian areas. This is mainly due to the placement of 3 sewage pump stations, 3 bird hides and 18 chalet units within the 32 m buffer of the drainage lines and the riparian habitat, areas deemed to have a high sensitivity. It should be noted that the 3 bird hides will use a tread lightly approach, will be on elevated platforms to limit the amount of vegetation to be cleared. No post mitigation impacts of high significance are expected.

The operational impacts for the Layout Alternative will be as that of the Preferred Alternative.

While the construction and operational impacts for both the Preferred and Layout Alternatives are very similar in nature, the Layout Alternative consists of 7 additional chalet units resulting in an increased number of guests and therefore an increase in water and power usage. There will also not be the added advantage of another restaurant to service the additional number of guest beds in the proposed expansion. This could place undue pressure on the existing restaurant on site, which does not have the capacity to service the existing Ngwenya Lodge and the proposed expansion.

In light of this, it is recommended that the Layout Alternative is not supported.

#### No-go Alternative

The No-go Alternative implies that the proposed expansion of Ngwenya Lodge will not take place. In this scenario receiving environment will not be negatively impacted upon in any manner, particularly with regard to biodiversity and surface water.

It should be noted that while no negative impacts will be incurred, the same can be said for positive impacts such as, the creation of employment and job opportunities, skills transfer and development.

## **SECTION E. RECOMMENDATION OF PRACTITIONER**

The proposed expansion of Ngwenya Lodge will take place in predominately disturbed/transformed areas and is considered a 'brownfields' site. Limited encroachment into sensitive areas will occur and the 1:100 flood line of the Crocodile River is respected.

As discussed in the preceding section, all significant negative impacts can be successfully mitigated and managed to acceptable levels (moderate to low) during the entire project lifecycle.

All mitigation measures as detailed in this BAR, the attached specialist reports and the draft EMPr must be implemented and adhered to for all phases of the project i.e. planning, construction and operation.

In addition, the following specific recommendations apply:

### Planning and Design

- The following buffers are to be implemented around the riparian zones:
  - 42 m buffer zone from the edge of the Crocodile River
  - 17 m around the ephemeral drainage lines
- Buildings and other hardened surface infrastructure (including storm water attenuation measures) will be located outside of buffered watercourses, sensitive areas and riparian habitat where possible.
- All permanent structures and infrastructure must be located outside/above of the 1:100 year floodline.
- All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.
- The sensitivity map must be used as a decision tool to guide the layout design for the chalet units and safari lodge. Development on areas of high environmental sensitivity must be avoided.
- All areas that are to be developed should be checked by a suitably experienced botanist to locate all conservation-important species. These plants should be marked, and the relevant permits applied for before removal, and translocated to nearby suitable habitat prior to vegetation being cleared
- A follow-up survey in late summer (February / March) should take place to search for the succulent *Aloe komatiensis* and the dwarf shrub *Pavetta zeyheri subsp. microlancea*. These two species are listed as Endangered and are confirmed from just outside the study area.
- All nationally and provincially protected plant species would require a permit to destroy them. It is recommended that plants that can be translocated, such as Aloe species, be rescued and relocated to adjacent suitable habitat if they are found to be within the development footprint.

### Construction

- No construction camps are allowed in or within 20m of riparian and/or wetland areas.
- No stockpile areas are to be located in or within 20m of riparian and/or wetland areas.
- All areas that are to be developed should be checked by a suitably experienced botanist to locate all conservation-important species. These plants should be marked, and the relevant permits applied for before removal, and translocated to nearby suitable habitat prior to vegetation being cleared.
- Where possible, all future development to take place over existing Transformed areas to preserve the remaining natural vegetation on the site.
- Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. No vegetation outside of the demarcated construction areas may be removed whatsoever.
- According to the National Environmental Management: Biodiversity Act 2004 (Act 10 of 2004) Alien and Invasive Species Lists, 2014 all declared alien invasive plant species need to be removed from wetland areas. It is therefore recommended that the developers implement an alien plant control program to combat the infestation present. This program should include regular inspections and follow-ups.
- No natural watercourse is to be used for the cleaning of tools or any other apparatus. This includes for purposes of bathing, or the washing of clothes etc.
- The construction of pathways (disturbance zones) in or adjacent to the riparian areas is to be closely managed and strictly controlled to minimize damage to riparian areas.
- Construction should preferably take place during the low flow/winter months in order to minimize the risk of sediment and debris being washed into riparian areas.

- Stockpiling of soil and of supplies for the construction camps must take place clearly away (at least 20 m where possible) from the edge of riparian areas to prevent soil being washed into the riparian areas habitat.
- During the construction and operation phases erosion and siltation measures should be implemented (e.g. the use of temporary silt traps downstream of construction areas).
- No poaching or snaring of any game is permitted. The contractor must regularly undertake checks of the surrounding natural vegetation and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. The contractor must implement fines in this regard.

### Operation

- Regulate and control movement over the site. Personnel, vehicles and equipment to move along designated routes.
- Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.
- No protected trees or plants may be removed without the relevant permits from the local authority.
- Maintenance workers and guests may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.
- The operator must develop a management and monitoring programme for alien and invasive species detailing basic ID information, actions to prevent the establishment of invasive plants and methods of removal of site during construction.
- No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint

## **SECTION F: APPENDIXES**

### Appendix A: Maps

- A.1: Locality
- A.2.1: Preferred Alternative- Layout
- A.2.2: Layout Alternative- Layout
- A.3.1: Preferred Alternative- Sensitivity
- A.3.2: Layout Alternative- Sensitivity
- A.3.3: Preferred Alternative- MBSP
- A.3.4: Layout Alternative- MBSP

### Appendix B: Photographs

### Appendix C: Specialist reports

- C.1: Ecology Report
- C.2: Heritage Report
- C.3: Visual Report
- C.4: Riparian and Wetland Report

### Appendix D: Public Participation

### Appendix E: Impact Assessment

### Appendix F: Environmental Management Programme (EMPr)

### Appendix G: Details of EAP and expertise

### Appendix H: Specialist's declaration of interest

### Appendix I: Additional Information



## APPENDIX A: MAPS



## APPENDIX B: PHOTOGRAPHS





APPENDIX C: SPECIALIST REPORTS  
APPENDIX C.1: ECOLOGY REPORT



## APPENDIX C.2: HERITAGE IMPACT ASSESSMENT



## APPENDIX C.3: VISUAL IMPACT REPORT



## APPENDIX C.4: RIPARIAN AND WETLAND REPORT





## APPENDIX D: PUBLIC PARTICIPATION



## APPENDIX E: IMPACT TABLES



## APPENDIX F: EMPR



## APPENDIX G: DETAILS OF EAP





## APPENDIX H: SPECIALIST DECLARATION



## APPENDIX I: ADDITIONAL INFORMATION