(EIA)ECOLOGICAL SURVEY REPORT FOR THE PROPOSED TOWNSHIP ESTABLISHMENT IN SKHWAHLANE ON THE REMAINDER OF THE FARM MATABULA 701 JU, NKOMAZI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

Prepared by Africa Ecological and Development Services

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REPORT IDENTIFICATION

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Project Title: Proposed Township establishment in Skhwahlane on the remainder of the farm Matabula 701 JU, Nkomazi Local Municipality, Mpumalanga Province

Specialist report: Ecological Survey

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SACNASP Pr No 100011/11 Aquatic science

Qualifications

Master of Science in Natural Sciences, University of Venda (2013).

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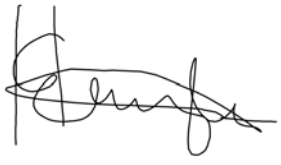
This report is certified correct and represents the findings on the proposed site capability and suitability to support intended development

I declare that this report reflects a true reflection of what is existing on site and we have no conflict of interests to the project proposed.

Report signed off:  **Mr Munzhelele HE**

22/11/2020

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EXECUTIVE SUMMARY

An extensive survey was undertaken on 14 and 15 November 2020 to confirm conditions of site proposed on which findings of the surveys undertaken revealed a site suitability and capability for the proposed development in conjunction with the existing rules and regulations. Following the findings of different surveys undertaken the outcomes the necessary measures developed will be abided with.

Prior to site visit a desktop study was undertaken to review details of existing literature about the area. Relevant existing literatures were also reviewed to establish background data of the proposed site and have understanding of the site.

Mpumalanga Biodiversity plan was also reviewed in order to compliment relevant data.

On conclusion all findings of surveys undertaken confirmed proposed area to still be having an ecosystem which is still having functionality and still with some connections with other systems in the overall catchment.

1. INTRODUCTION

1.1 Background

As stipulated in the master National environmental management Act and National Environmental management biodiversity Act and other environmental legislations; South African government is committed to sustainable development without a compromise on both human needs and protection of natural resources. Sustainable development principles are well observed and followed when considering authorizations for all development projects.

This report gives all the details on the current biological diversity, land use and natural resources status of the site where proposed development will take place.

Locality of proposed site did support a proposed activity and has high suitability and capability for sustenance of the kind of envisaged development considering the growing population that led to need for more space for residential area and they also had to force encroachment without authorization

This specialist report provides a baseline and impact assessment of the ecosystems that could be affected by the proposed development. This report gives details of the vegetation survey and habitat survey which were done as means to determine the current ecological state of the area.

All three of Mpumalanga's biomes are home to important biodiversity, but it also has grasslands that the majority of rare, threatened and endemic species are found

1.2 Aim and objectives

The aims of this study were as outlined below:

- Provide baseline data on habitat and species on and adjacent to the site
- Investigate potential impacts that may occur during construction and/or operational stages
- Provide advice on legislative framework relating to habitats and species on site.
- Suggest mitigation measures to be employed during the construction and operational stage.
- Identify and assess the possible impacts that are likely to be caused by the development and their significant.
- Check and assess possibility for existence of threatened ecosystems and species.

2. STUDY AREA

2.1 Geographic Area

The area is located at Skhwahlane on the remainder of the farm Matabula 701 JU, Nkomazi Local Municipality, Mpumalanga Province

Site is located at the following geographical positioning system recorded point (GPS):

Latitude: 25°46'26.0S

Longitude: 31°46'32.1"E

Once on site the actual proposed site is located in Sikhwahlane village where there is a perennial stream flowing along the area from South west to eastern side. A layout plan

for proposed land use footprint goes across the perennial river on the north western side and also on the south eastern side.

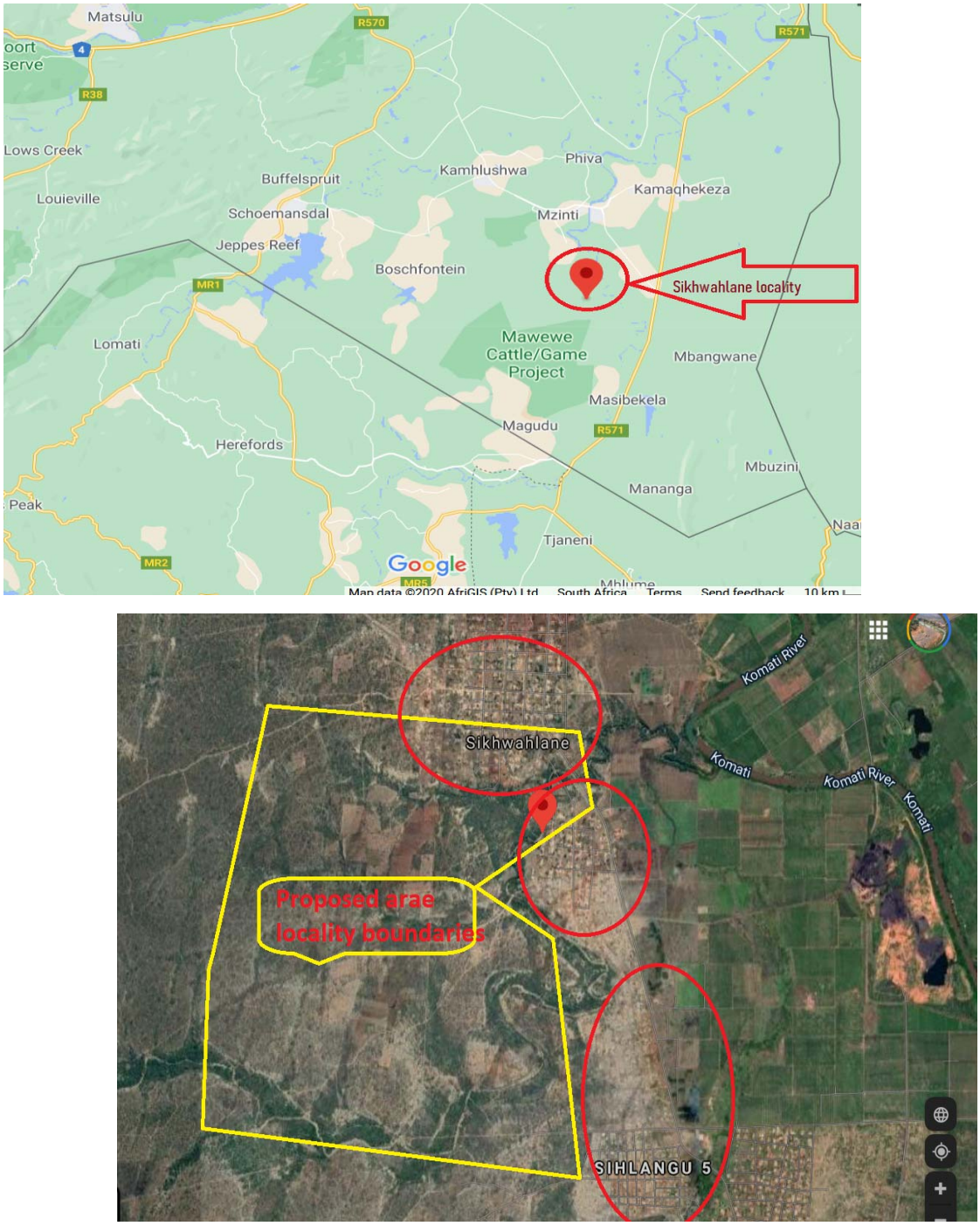


Figure 2.1.1: Locality map and aerial photo

2.2 Drainage Areas

The proposed area of the development is located within Inkomati and crocodile river catchment with Inkomati being the main one. Drainage system of the area is characterized by a number of streams; wetlands; and flood plains. The nearest river to proposed site is an un named non perennial river which is a seasonal one which flows water when it rains in summer or period of enough rainfall. Connection of the main channels can clearly be seen on attached drainage maps together with aerial photo from google.

Figure 2.2.1: indication of drainage systems for Inkomati river

2.3 Relief and Topography

Topography of the area is characterized of flat; gentle and undulating slopes. Mountains are located on the eastern side. High areas are at average of about 3000m above sea level., regional landscapes span a high degree of topographic and climatic variability, including the more temperate and higher-altitude regions of the Highveld and North-Eastern Escarpment, and the hotter, more tropical and lower-lying regions of the 'Lowveld'.

2.4 Climate

Mpumalanga falls into a generally warm, summer rainfall area. In Mpumalanga, the summers are warm, muggy, and wet; the winters are short, cool, and dry; and it is mostly clear year round. Over the course of the year, the temperature typically varies from 43°F to 79°F and is rarely below 38°F or above 86°F. The *cool season* lasts for *2.3* months, from May 29 *to* August 7, with an average daily high temperature below *70°F*. The coldest day of the year is June 30, with an average low of *43°F* and high of *68°F*.

3. Land use

Main Land use in the regional level varies from mines; conservation areas; industrial; game farming and agricultural land uses. Specific to the area of study main land uses are agricultural farms that include sugar cane farms. On the proposed area main land use is currently a grazing land and local people also benefit for various ecosystem services.

4. METHODOLOGY

The scope of the fieldwork was informed by research informed by desktop data analysis, knowledge of the study area, discussions with Darlington Borough Council, E3 Partnership Report 2005, and the timing and timescale of the study. A detailed field survey was undertaken with focus on all biological diversity aspects. Variety of surveys that were undertaken are indicated with their findings in this report.

This study considered collection of data considering all existing previous record in order to have informative data for decision making. The following surveys were done as outlined below. Data was collected for both fauna and flora by means of field surveys.

4.1. Provincial Habitat and Biomes overview

Assessment has been done for both terrestrial ecosystems and aquatic ecosystems as outlined below:

4.1.1 Regional background as confirmed on existing literature

As confirmed on various research papers together with Mpumalanga biodiversity sector plan a number of details are summarized below:

The vision of the MBSP is that healthy and sustainably-managed biodiversity assets and ecological infrastructure of Mpumalanga continue to underpin widespread, shared human benefits through the ongoing delivery of a range of ecosystem services. Its specific objectives are to:

Serve as the primary source of biodiversity information for all land-use planning and decision-making in Mpumalanga, to be used in conjunction with information from other sectors.

Ensure that Mpumalanga's ecological infrastructure is maintained, ecosystem fragmentation and loss is avoided, and the resilience of ecosystems and human communities to the impacts of climate change is strengthened.

Provide a spatial framework for environmentally sustainable development and resource-use.

Inform municipalities and other land-use planners and regulators about spatial biodiversity priorities in order to promote the wise management of biodiversity, and to streamline and monitor land-use decision-making.

Focus on-the-ground conservation and restoration action in biodiversity priority areas, thus supporting the MTPA in implementing its biodiversity mandate, including working with landowners to consolidate and expand the provincial protected area network.

Mainstream biodiversity conservation into the day-to-day activities of a range of development and production sectors whose primary business is not biodiversity conservation, thus promoting greater synergy between biodiversity conservation and development through implementation of the MBSP.

Terrestrial ecosystems:

Different Biomes that characterize the region include grasslands; forests and grasslands of which their nature and characteristics differ based on where they are located.

Mpumalanga incorporates elements of three different biomes grassland (occurring in the central highveld and escarpment regions, and covering the bulk of the Province), savanna (occurring on the foothills and plains), and forest (on south and east-facing slopes and in river valleys).

Mpumalanga's grasslands are mainly found in the cool, open highveld landscapes of the Province, above 1 000 m and with an average rainfall of over 700 mm/yr. Frost, hail storms and lightning strikes are common. These events, combined with the natural occurrence of fire, favour grassland plants over woody species and helps maintain the mostly open, treeless character of these landscapes.

Mpumalanga's grasslands occur mostly on deep, fertile soils of high agricultural value. For this reason, a large proportion of this landscape has already been modified for the cultivation of crops and timber or for intensive animal production. Extensive livestock grazing can be reasonably biodiversity-friendly, provided good management and sustainable stocking rates are applied.

The many rare and endangered species characteristic of Mpumalanga's grasslands are an amazing biodiversity asset. However, because of their localised distributions and short flowering durations, they are difficult to account for in environmental impact assessments, and specialist skills are required to locate and identify them reliably. Highest plant biodiversity is usually found in rocky grassland habitats and on sandy soils, and lowest on clay soils (except on soils derived from dolomite).

Savanna, found in the hotter lower-lying areas of the Province, is characterized by a mixture of trees, shrubs and grass; it is commonly referred to as 'bushveld', and, at lower altitudes, 'low-end'. Mpumalanga's savannas include tall, dense wood-land in the warmer, wetter areas as well as more open woodland in the drier and cooler areas; it incorporates wooded, shrubby hill slopes, dense thickets, and grassy plains with scattered trees or bush-clumps. Such habitat diversity results from complex interactions between climate and fire, topography, geology and soils, and herbivory (by animals ranging

Mpumalanga, forests occur in small, scattered patches associated with steep, south-facing and often fire-free slopes, on sensitive soils not suited to cultivation. In many instances, forest patches occur in deeply-incised river valleys in the escarpment region. They require high rainfall (over 770 mm/yr) and are supported through the dry season by groundwater from associated streams and added precipitation in the form of mist. Indigenous forests *protect* water sources rather than dry them out, as is the case with timber plantations of pine and gum trees.

Despite their scattered distribution and small patch size (with an average size of 4 ha), Mpumalanga's forests support a rich diversity of plant and animal species. Maintaining these forests in a healthy state is dependent on the connectedness of patches, achieved through riverine linkages that allow access by specialised forest fauna such as birds and monkeys.

Biome	Area(km^2)	%Mpumalanga	% Old ands	% Natural	Number of vegetation types
Grasslands	49 284	64	8.9	507	23
Savannah	26 649	359	3.2	76.8	29
Forests	400	0.5	0.1	96	14

Table 4.1.1.1 Biomes regional coverage statistics

Threatened ecosystems and endemic vegetation types

Nearly one quarter (20%) of the vegetation types in Mpumalanga are nationally gazetted as threatened. This means that these ecosystems have lost — or are at risk of losing – vital aspects of their structure, function or composition, and have been classified as vulnerable (V), endangered (EN) or critically endangered (CR). The assessment of ecosystem threat status is based on the proportion of each ecosystem that remains intact relative to a set of thresholds. (Readers requiring a more detailed explanation of how ecosystem threat status is calculated are referred to Chapter 3 of the National Biodiversity Assessment 2011: Synthesis Report).

The majority of the threatened ecosystems in Mpumalanga occur in grasslands, with most of them falling into the Vulnerable or Endangered categories. It is concerning that in the years since the publication of the MBCP, a greater proportion of Mpumalanga's ecosystems have become threatened, and have shifted from being classed as vulnerable to endangered

Freshwater Ecosystems

Mpumalanga contains over 4 000 wetlands, numerous river systems (including five major catchment areas) and a large proportion of South Africa's Strategic Water Source Areas (areas accounting for more than 50% of annual run-off). Most of the wetlands occur in grasslands of the wetter highveld and escarpment regions, with the greatest concentration of pans in the Chrissiesmeer area near Ermelo. These wetlands represent high value ecological infrastructure for securing water for human use.

Most of the wetlands in Mpumalanga fall into the category commonly referred to as 'palustrine', which includes seepage wetlands and pans

Although all of them are of high biodiversity and ecological value, there are three wetland areas that are of particular significance in Mpumalanga Province

The Wakkerstroom wetland complex in the south-east of the Province, supports an exceptionally rich diversity of birds, including rare and threatened species such as the endemic Rudd's lark, the white-winged flufftail and the wattled crane (all of which are critically endangered), as well as rare mammals such as the endangered oribi antelope, endemic golden moles and the Cape molerat. This area has become a popular birding destination and is at the heart of a thriving ecotourism industry.

The wetlands in the Wakkerstroom complex feed the headwaters of the Buffalo, Pongola, Usuthu and Vaal Rivers. The Wakkerstroom wetlands, and the grasslands in which they occur, have been recently placed under formal protection as a Protected Environment. There are, however, also significant coal deposits in the surrounding area, which means that a careful balance has to be sought between biodiversity conservation and mining activity.

Verloren Valei, on the Steenkampsberg plateau near the town of Dullstroom, is a declared Ramsar site (a wetland of international importance). It is of high value for both bio-diversity conservation and water supply, feeding the upper catchments of the

Olifants and Crocodile Rivers, two of South Africa's most important river systems which ultimately flow into Mozambique. It supports a number of Red List bird, frog and mammal species, and provides suitable breeding habitat for, amongst other species, the critically endan-gered wattled crane. It also has a high species richness of ground orchids, six endemic butterfly species, and it provides important breeding habitat for numerous fish, amphib-ians and reptiles. This wetland system is currently protected within a provincial nature reserve.

The Chrissiesmeer Pan Area, near Ermelo (also called the Mpumalanga Lake District), includes more than 270 wetlands within a 20 km radius, representing the highest con-centration of pans and wetlands, and the largest freshwater lake in South Africa. It quali-fies as a Ramsar Site, and has been identified as an Important Bird Area (IBA) because it supports extremely high numbers of birds (especially wetland-dependent species). It is a threatened ecosystem, and has been delineated as a Freshwater Ecosystem Priority Area and a Critical Biodiversity Area. The headwaters of the Vaal, Olifants and Komati Rivers are fed by the wetlands in this area. For all of these reasons, the Chrissiesmeer Panveld area has been included in a recently-proclaimed Protected Environment, through the Mpumalanga biodiversity stewardship programme

Centres of endemism

Although the Province occupies only 6% of South Africa's land surface, it accounts for approximately 21% of its plant species diversity and contributes significantly to high levels of endemism in plants, mammals and fish in particular. This diversity is not evenly distributed throughout the Province, but instead is concentrated in four of centres of endemism and species richness, which fall into a broad region of endemism within Mpumalanga, known as the Drakensberg Afromontane Region. This occurs along the high-lying mountainous areas in the east and is demarcated by groups of plants with more or less similar geographical distributions, very often correlated with underlying geology. They contain a large number of narrowly endemic, Red Data listed species that have highly restricted distributions, and consequently can be easily lost through habitat modification

The **Barberton Centre of Endemism** is dominated by surface outcrops of ancient

volcanic (ultramafic) and sedimentary rocks which have associated with them many unusual and unique species. Outcrops of serpentine (so-called ‘greenstone’) occur throughout the Barberton Centre, giving rise to soils with high magnesium: calcium ratios

and high concentrations of heavy metals such as nickel and chromium that are potentially toxic to many plants. This has resulted in a distinctive flora including many edaphic (soil) specialists, most of which occur in grassland areas, with a few woody serpentine-endemic plants occurring in lower-lying, savanna areas.

Species of special concern

Species of special concern are those that have particular ecological, economic or cultural importance and include: those that are rare, endemic or threatened; species with unusual distributions; and medicinal and other indigenous species that are exploited commercially or for traditional use. Mpumalanga is home to approximately 334 plant species alone that are considered to be of special conservation concern; these species are rare, endemic, threatened, declining or data-deficient, and are included in the Red Data List of South African Plants. Figures for animal groups are less readily available, as the Red Lists for these groups of organisms are still in preparation.

The species of plants found in Mpumalanga account for 21% of South Africa’s flora. An estimated 189 species are endemic to the Province, 146 are classified as threatened (19 Critically Endangered, 31 Endangered, and 96 Vulnerable) and 334 are considered to be of high conservation concern. The majority (64 %) of these plant species are soft herbs and bulbous plants (geophytes) situated in the grassland biome, including taxa such as *Aloe* (15 species), *Gladiolus* (12 species), *Disa* (10 species), *Ledebouria* (9 species), *Streptocarpus* (11), *Brachystelma* (9) and 10 species of cycads. Many of the local endemics are of conservation concern and these are found in the centers of endemism described

Mpumalanga is faunally very diverse, and accounts for about 65% of the mammalian species found in South Africa. The Province hosts four species that are provincially endemic (3 species of golden moles and 1 species of bat), seven that are South African endemics (4 species of golden moles, 1 species of mole-rat, 1 other rodent species and 1 species of primate), two taxa endemic to South Africa & Lesotho (1 golden mole & 1 antelope) and one taxon (antelope) endemic to South Africa, Lesotho & Swaziland. These species make a significant contribution to the high rate of mammalian endemism in the southern African sub-region, and the Province plays an important role in the conservation of these taxa and their genetic variability. Most of the endemic taxa occur in grassland landscapes. Currently, 14 mammalian species in Mpumalanga are classed as threatened on the IUCN Red List (1 CR, 3 EN and 10 VU). The Mpumalanga Province offers a wide variety of habitats within the savanna, forest and grassland biomes and this definitely accounts for the high species richness in the Province.

Mpumalanga is home to approximately 67% of South Africa's bird species. 71 of the 575 bird species in the Province appear in the Red Data List, including critically endangered species such as Rudd's Lark, the White-winged Flufftail, the Eurasian Bittern, the Blue Swallow and the Wattled Crane. Although Mpumalanga does not host any provincial endemics, it forms an important part of the distribution range of red-listed South African endemics such as the Yellow-breasted Pipit, Rudd's Lark and Botha's Lark. It is also the stronghold of several threatened grassland and wetland-dependent bird species with restricted distributions. Certain species such as the Saddle-Billed Stork, White-headed Vulture and Lappet-faced Vulture are dependent on the savannas of the Mpumalanga Lowveld for survival. Twelve Important Birding Areas (IBAs

Mpumalanga has the second highest number of endemic freshwater fish species in South Africa. Fish are usually at the top of the food chain in aquatic ecosystems and form an important food source for terrestrial animals such as mammals and birds, and people. Catchments and fish sanctuaries in the eastern part of Mpumalanga are most important for conservation of threatened fish species, whose survival is placed at risk by decreased perennial flows of clean, sediment-free water. The placement of structures such as weirs and dams obstruct fish migration pathways and breeding patterns, and stocking rivers with alien, predatory fish species such as bass, reduces the chances of survival of indigenous fish species in Mpumalanga

Based on a provincial assessment, 65% of the reptile species that occur in Mpumalanga are threatened, despite their widespread distributions. Four species are known to be endemic to Mpumalanga including: Haacke's flat gecko, Mariepskop flat gecko and Rondavel flat gecko (both undescribed species of the genus *Afroedura*), and Wilhelm's flat lizard. The giant girdled lizard (the 'sungazer') although shared with other provinces is endemic to mesic grasslands and the lizards are considered threatened due to loss of suitable habitat.

None of the amphibians in Mpumalanga are known to be endemic, but many (nearly 16%) are threatened or have restricted distributions and limited breeding habitat. Many of the wetlands and pans along Mpumalanga's escarpment are important for the conservation of threatened amphibian species, although the greatest diversity occurs in the warm lowveld areas.

Eight species in particular are considered important for setting conservation priorities because they have a restricted distribution within the Province. These include: the Karoo toad, Natal cascade frog, spotted shovel-nosed frog, yellow-striped reed frog, plain stream frog, the greater leaf-folding frog, and the whistling rain frog. Although the giant bullfrog occurs

elsewhere in South Africa, the Mpumalanga populations are greatly at risk due to the limited distribution in the Province, a declining population and ongoing habitat modification from various land-use pressures.

This neglected group of organisms plays an essential role in maintaining ecosystem functioning, but, there is little data available on the invertebrate species of Mpumalanga. It is known, however, that the central, grassland regions of the Province are important for the conservation of threatened species of invertebrates, especially butterflies, dragonflies and damselflies.

Of Mpumalanga's 383 butterfly species, nine are threatened (1 CR, 7 EN and 1 VU), one near-threatened and a further six species rare or extremely rare. The Province also contains about 48% of all taxa covered in the recent red listing conservation assessment for butterflies for RSA, Lesotho and Swaziland and around 18% of the endemic taxa in the atlas region.

Overall area is amongst one of the critical habitat sites although specific site proposed is now a degraded and fragmented habitat due to encroached residential sites. Critical and endangered ecosystems do not occur on the proposed area.

Assessment for possible feeding grounds: proposed site is a highly feeding ground supporting area kind of habitat for most of species. Underground burrowing animals also likely to exist in the area.

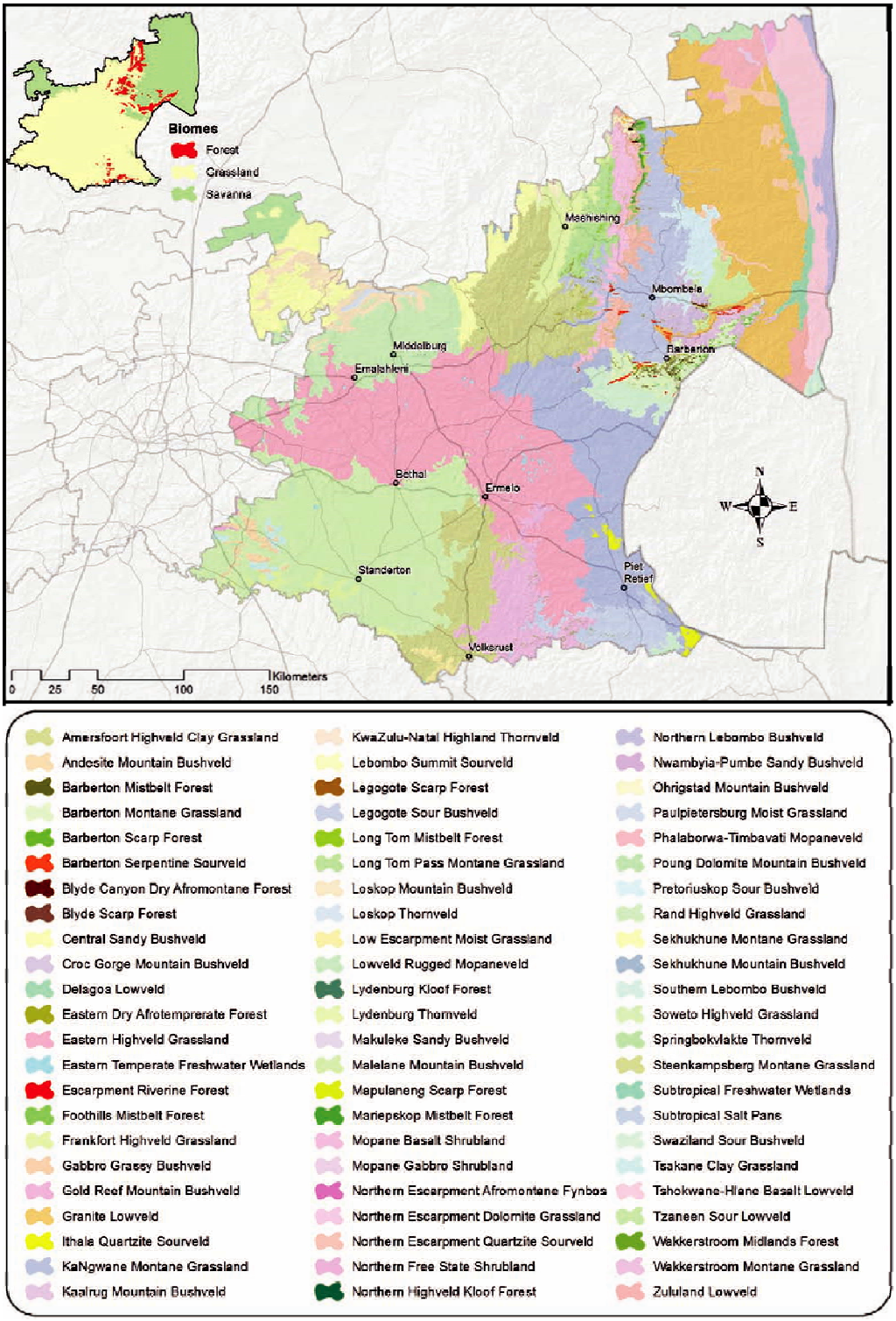
Nesting sites assessment: this was done to check existence of rare species such as parrots and ground horn bill. No sites were located.

Species movement patterns was also explored to test if there are any species with consideration of most dominant plant keystone species that might be influential but none was confirmed.

4.2. Vegetation survey

A desktop review study confirmed that the area falls under savanna biome vegetation open woodland which forms part of Lowveld bushveld characterized by sparse vegetation. Is also have existence of Legogote sourveld bushveld pockets that exist. Granite Lowveld and endangered Legogote sourveld is one of the types of vegetation that occur on greater parts of the area.

During vegetation survey different plant species were identified on site and recorded focusing on specific site of the proposed development. This included trees, shrubs and grass and herbs. The identified species are presented on a tables below as per their different categories. Protected tree species as per National Forest Act 84 of 1998 are also indicated on the table below. Area is still rich in species composition.



4.2.1 Map showing vegetation types of Mpumalanga

Scientific name	Common names	Occurrence level	%cover Dominancy	Protected	Indigenous /invasive	Life Form
Sclerocaryabirrea	Marula	Many	18%	Yes	Ind	Tree
Lannea discolor	Wild plum	Few	3%		Ind	Tree
Philenoptera violancea	Apple leaf	Many	16.8%	Yes	Ind	Tree
Rhus leptodictya	Mountain karee	Many	8%		Ind	Tree
Spirostachys Africana	Tamboti		4%		Ind	Tree
Rhuslancea	Karee	Many	12%		Ind	Tree
Vachellia robusta	Broadpodrobust thorn	Few	11%		Ind	Tree
Ehretia rigida	puzzle bush	Medium	10%		Ind	Shrub
Dichrostachyscinerea	Sickle bush	Many	65%		Ind	Shrub
Dalbergia melanoxylon	zebratree		19%		Ind	Shrubs
Ziziphusmucronata	Buffalo thorn	Few	7%		Ind	Tree
Maytenusheterophylla	Tshipandwa	Abundant	3.5%		Ind	Shrubs
Piliostigima thonningii	Camel'sfoot	Few	13%		Ind	Tree
Berchemia discolor	Brown ivory	Few	7.3%		Ind	Tree
Acacia tortilis	Umbrella thorn	Few	15%		Ind	Tree
Senna petersiana	Monkey pod	Few	9%		Ind	shrub
CombretumHereroense	Russetbushwillow	Few	9.6%		Ind	Shrub
Diospyrosmespiliformis	Jackals berry	Few	10.2%		Ind	Tree
Toddalia asiatica	Orange climber	Many	14%		Ind	Climber
Xanthocarcis zambesiaca	Nyala tree	Few	11%		Ind	Tree
Ximenia cafra	Large sour plum	Few	5.5%		Ind	Shrub
Combretum imberbe	Lead wood	Few	9.6%	Yes	Ind	Shrub
Terminelia sericea	Silver cluster leaf	Many	19%			Tree
Piliostigma thonnigii	Camel's foot	Few	5.9%		Ind	Shrub
Acacia robusta	Black thorn	Few	10%		Ind	Tree
Acacia Senegal	Slenderhook thorn	Few	22%		Ind	Tree
Lannea Schweinfurthii	False marula	Few	3%		Ind	Tree
Cassia abbreviata	Sjambok pod	Few	5.1%		Ind	tree
Grewia bicolar	White raisin	Many	19.5%		Ind	Tree
Mystroxylon aethiopicum	Kooboo berry	Few	7,7%		Ind	Tree
Schotia brachypetala	Weeping boerbean	Few	7%		Ind	Tree
Gardenia volkensii	Bushveld gardenia	Many	16,8%		Ind	Tree

Grewia hexamta	Giant raisin	Few	5,10%		Ind	Tree
Peltophorum africanum	African wattle	Many	12%		Ind	Tree
Opuntia ficus indica	Prickly pear	Few	1,003%		Invasive	Cacti
Melia azedarach	Syringe	Few	3,6%		Invasive	Tree
Albizia harveyi	Sickle leaved albizia	Few	8,12%		Ind	Tree
Euphorbia cupularis	Dead man's tree	Few	0.002%		Ind	Tree
Strychnos madagascarienis	Monkey orange	Many	7,10%		Ind	Tree
Strychnos madagascarienis	Black monkey orange	Many	7,10%		Ind	Tree
Senegalia burley	Black monkey thorn	Few	4,6%		Ind	Tree
Senegalia nigrescens	Knob thorn	Few	5,9%		Ind	Tree

Table 4.2.1 shows vegetation species composition occurrence on proposed site

Vegetation survey revealed that it is part of savannah of the lowveld. Upper layers are comprised of woody species which include trees and shrubs while the lower layer comprised of herbs; grass; climbers and runners of various species. Majority of trees that are still in good condition are existing on the surrounding area other than the proposed site. Trees that exist are still very mature trees that never got disturbed.

Amongst the identified species they were all still occurring in acceptable numbers and still comprise a uniform habitat and important part of the ecosystem.

Locality for species also differed based on soil type and terrain. Marula trees were more established on eastern side of the river although generally they spread more in areas that have deep greyish soil. Shrubs and thorny trees were more located on the dark loamy clay soils. Aloe species that were identified were in existence in most of area in high numbers and showed no threat of exploitation although some locals confirmed to be using this plant to treat corona infections.

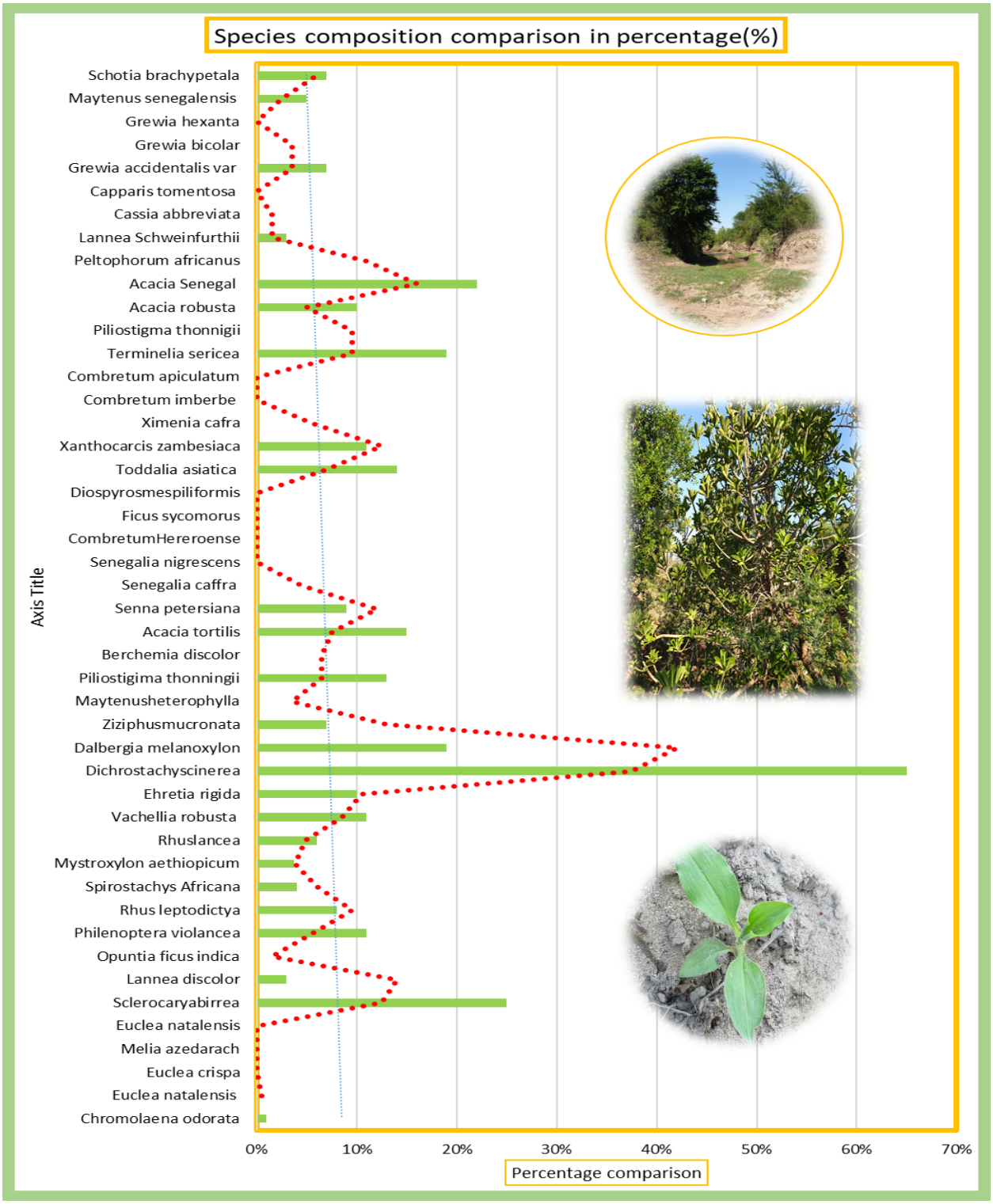


Figure 4.2.1: Graph showing species composition trend

Grass were also identified during field survey by means of walking through a line transect which was demarcated at an interval of 10m apart and 30m long. Grass are one of the important habitat species as they also comprise a habitat biome. Grass plays an essential role in nature as they are a major source of food. They provide shelter and nesting material. They also form important part of food chain for those species that utilize grass. They play a major habitat for Rodents; Birds and Insects species. During field survey grasses were found to be grazed condition.

Data on grass composition is presented on a table below.

Scientific name	Common name
Themeda triandra	Red grass
Enteropogon macrostachyus	Mopane grass
Cenchrus ciliaris	Foxtail buffalo grass
Panicum maximum	Guinea grass
Eragrostisrigidior	Curly leaf grass
Monocymbiumcresiiforme	Boat grass
Hyparrherniatamba	Berg gras
Setaria incrassate	Vlei bristle grass
Eragrostis racemosa	Narrow heart love grass
Merxmuelleradisticha	Mountain wire grass
Tragus berteronianus	Carrot seed grass
Hyparrherniahirta	Thatching grass
Hyperthelia Dissoluta	Yellow thatching grass
Andropogon Gayanus	Blue grass
Monocymbium ceresiiforme	Boat grass
Heteropogon Contortus	Spear grass
Elionurus Muticus	Wire grass
Setaria Sphacelata	Golden bristle grass

Table 4.1.2: Shows grass composition of the proposed area

4.2.1 Problem plants and herbaceous plants identified

Most of the identified plants were the indicators of disturbed area especially considering extent of bush encroachment of sickle bush.

Scientific Name	Common Names	Life form	Category
Boerhavia diffusa	spiderling	Herb	Exotic
Achyranthes aspera	Burweed ,Moxato	Herb	Probably exotic
Amaranthus deflexus	Perennial pig weed	Herb	Indigenous
Amaranthus hybridus	Pig weed	Herb	Exotic
Amaranthus spinosus	Thorny pig weed	Herb	Exotic
Amaranthus viridis	Slender amaranth	Herb	Exotic
Ageratina adenophora	Crofton weed	Herb	Exotic
Bidens pilosa	Common black jack	Herb	Exotic
Conyza sumatrensis	Tall fleabane	Herb	Exotic
Portulaca oleracea	porslein	Herb	Exotic
Senecio consanguineous	Starvation senecio	Herb	Exotic
Tagetes minuta	Tall khaki weed	Herb	Exotic
Xanthium strumarium	Large cocklebur	Herb	Exotic
Crotalaria sphaerocarpa	Wild lurcene	Herb	Indigenous
Corchorus trilocularis	Wild jute /delele	Herb	Indigenous
Mirabilis jalapa	Four-o'clocks	Herb	Exotic
Datura ferox	Large thorn apple	Herb	Exotic
Solanum elaeagnifolium	Silver leaf bitter apple	Herb	Exotic
Richardia brasiliensis	Mexican richardia	Herb	Exotic
Tribulus terrestris	Devil's thorn	Herb	Indigenous
Stylochiton natalensis	Bushveld arum	Herb	Indigenous

Table 4.2.1.1: Shows problem plant species composition

4.3. Reptile and amphibian survey

This was done by direct observation during a transect walk and indirect observation of callings from amphibians and reptile movement over the dry plants. No reptiles were identified during field visit although the following are likely to be found: Moles, Chameleons, and Lizards various snakes. Area is also a favorable snake such as green mambas and pythons. These are indicated on the attached appendix(s). Amphibians are highly likely to be found in the area since the area do have some seasonal wetlands and non-perennial river. Although snakes were not physically sited they definitely exist in this suitable habitat.

4.4. Bird survey

Birds are known to be some of the mobile species that once and again fly over to different habitats searching for food and also for breeding sites. Birds were observed during site assessment. Also there were no protected bird species that were identified during field visit or either on existing documents but they are highly likely to be sighted considering data from Mpumalanga biodiversity sector plan which indicated some species that exist in the Province. Since bird species are not stationed at one area; they are likely to be observed and or be occurring on the nearby habitats. In general, this area falls under the area of high ecological value which tends to support more bird species such as doves because of tree species that are loved by birds. More bird's callings were heard during field survey although couldn't easily be spotted.

The following birds species were seen during site assessments: mostly prominent crests (brownbul); ***hadeba ibis***; African mourning dove; red eyed dove; dark –capped bulbul. Sparrows and eagles together with owls are also likely to be found in this area. Ravens were also identified. Ground hornbill is also highly likely to be found in this area since it is its perfect habitat.

4.5 Mammal survey

Mammals are one of the species that are sensitive to disturbed and human settlement areas. Although mammals were not sited but they are likely to be found in the area. It is still favorable habitat for most of small mammals.

4.6 Butterfly; Beetles; Locusts, Ants and dragon fly survey

Butterflies and dragon fly are species that like to be found in wet areas and also during flowering season. Although this is the case none of these species were identified in the area; and are also likely to be found during wet seasons when temporary ponds can be established after rains. None of protected species or rare have been identified under this category. Dragon flies are also having a potential of existing in this area. Ants were seen although not identified for rare species; locusts were sited also but no key threatened species identified.

4.7 Stream; wetland survey and existence of sensitive area(s)

The area is located on Inkomati and crocodile river catchment which is highly supportive and conducive for most of wetlands. Few temporary seasonal wetlands zones were located. The type of soil also sandy to loamy greyish in color soil and loamy dark grey in color. Wetland delineation assessment was also commissioned to assess and present results; this is presented on a separate report.

Type of stream which has been identified is a non-perennial one which only flow water when it rains. Other than the few patches of temporary wetlands identified there were no other sensitive areas.

4.8 **CRITICAL BIODIVERSITY AREAS ASSESSMENT**

A confirmation has been done using desktop analysis on GIS and field validation to confirm status of critical biodiversity area.

As confirmed during field survey the area is under a natural area remaining layer remnants due to its locality in a rural area which makes it become a grazing area.

Does have connections with existing habitats on the western side only due to existing land uses on both sides.

Most of critical biodiversity areas that exist in the region does not cover an area where proposed site is located.

5. MITIGATION MEASURES TO BE TAKEN INTO ACCOUNT

The following mitigation measures must be taken into account during development should there be such kind of resources to be taken care of during development.

The Impact Mitigation Hierarchy (DEA et al., 2013)

5.1 Restrictions based on findings to minimize ecological impacts

Considering that the site is located is still having high biodiversity the following restrictions must be considered to avoid and or minimize possible impacts on the stream which is located in this area together with its riparian zone:

A special control measures for erosion will have to be developed so that when construction happen proper measures will be in place. Flood attenuation measure must be developed and all stream flow regulations must be adhered to without any compromise. Sediment trapping measures must be developed before commencement of the development activities.

Phosphate assimilation must also be in place should there be any agricultural activities that will involve fertilizer use. Carbon storage must be encouraged by protecting most of the indigenous vegetation in the area. All households to be taking place must be forced and compelled to include big trees in their plots since they can't be afforded to be lost.

General observation during site visit confirmed that currently local people are very conservative of their existing vegetation; all marula trees were never cut or disturbed like it is in other regions. Structure of vegetation still representative of a complete savannah woodland as appear in documented data.

Sand mining must be controlled strongly to avoid dangers that can never be reversed in long term to safe guard aquatic life down the catchment.

Waste dumping must be discouraged by all means as most of waste was dumped on river basin and in the bush.

6. RED DATA PLANT EXISTENSE ON SITE

A review on red data plant list was done to check their existence on proposed site and those that were identified are indicated on a table list below

SA AFRICAN RED DATA PLANT LIST BASED ON IUCN CLASSIFICATION		
SCIENTIFIC NAME	**COMMON NAMES**	**CATEGORY**
Sclero carya birea	Marula/mufula(v)	Least concern(LC)
Lannea discolor	Wild plum	Least concern(LC)
Diospros mespilioformis	African ebony/Musuma(v)	Least concern(LC)
Dichrostachyscinerea	Sickle bush	Least concern(LC)
Dalbergia melanoxylon	Zebra wood,Xilutsi	Near threatened(NT)
Combretum collinum	Weeping bush willow/Muvuvha	Least concern(LC)
Lannea schweiafurthii	False marula	Least concern(LC)
Ehretia rigida	Puzzle bush	Least concern(LC)
Combretum imberbe	Lead wood	Least concern(LC)
Grewia bicolar	White raisin	Least concern(LC)
Cassia abbreviata	Sjambok pod	Least concern(LC)
Acacia robusta	Black thorn	Least concern(LC)
Spirostachys Africana	Tamboti	Least concern(LC)
Acacia Senegal	Slender three hook thorn	Least concern(LC)
Acacia tortilis	Umbrella thorn	Least concern(LC)
Ziziphus mucronata	Buffalo thorn	Least concern(LC)
Schotia brachypetala	Weeping boerbean	Least concern(LC)
Xanthocarcis zambesiaca	Nyala tree	Least concern(LC)
Philenoptera violancea	Apple leaf	Least concern(LC)
Copparis tomentosa	Woolly caper bush	Least concern(LC)

Table 6.1: shows red data plant species

7. EVALUATION OF ECOLOGICAL IMPACTS

The criteria for the description and assessment of environmental impacts were drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April1998) in terms of the Environment Conservation Act (ECA), 1989 (Act 107 of 1989). Although the ECA EIA Regulations have been repealed, the Guideline Document still provides good guidance for significance determination (Charles J.K.1994).

The level of detail as depicted in the EIA regulations were fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value, ranging from one (1) to five (5), depending on its definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. The impact assessment criteria used to determine the impact of the proposed development are as follows:

- Nature of the impact;
- The Source of the Impact;
- Affected Stakeholders;
- Extent - The physical and spatial scale of the impact;
- Duration - The lifetime of the impact, that is measured in relation to the lifetime of the proposed development;

Below table outline impact ranking of the proposed development in and around the proposed area considering its ecological footprint.

Considering that proposed area has been demarcated for residential stands; for it being in the rural area where most of rural activities does not have extensive impact on

vegetation system it will automatically get vegetation kept safe and will also lead to promotion of vegetation safe guarding.

During site survey it was confirmed that community is still in harmony with their vegetation. It was confirmed that they do not destroy vegetation.

Nature of Impact	Development stage associated with	IMPACT RANKING,WEGHING AND SCALING							
		extent	Duration	Intensity	Probability	Weighting factor	Significance rating	Mitigation efficiency	Significance following
Removal of vegetation	**A**	5	3	4	5	5	10-1	2.0	0-1
Destabilization of soil	**A** **B**	2	2	3		3	20-39	1.0	20-39
Compaction of soil	**A** **B**	2	2	3	3	3	20-39	1.0	20-39
Spread of invasive alien plant seeds	**A**	2	2	1	3	2	20-39	0.6	20-39
Habitat fragmentation	**A**	3	3	3	3	3	0-19	1.0	0-1

Figure 7.1: Assessment of impact which is likely to happen during development

Figure 7.1 above listed possible cumulative impacts that might take place on proposed area during establishment of houses in futures. Their description is therefore listed on table below:

Cumulative impacts likely to occur	Impact description rate	Impact percentage prediction of occurrence
Removal of vegetation	High	30%
Destabilization of soil	Medium	15%
Compaction of soil	Medium	5%
Spread of invasive alien plant seeds	Low	10%
Habitat fragmentation	High	40%

Table 7.1.1: Cumulative impact assessment

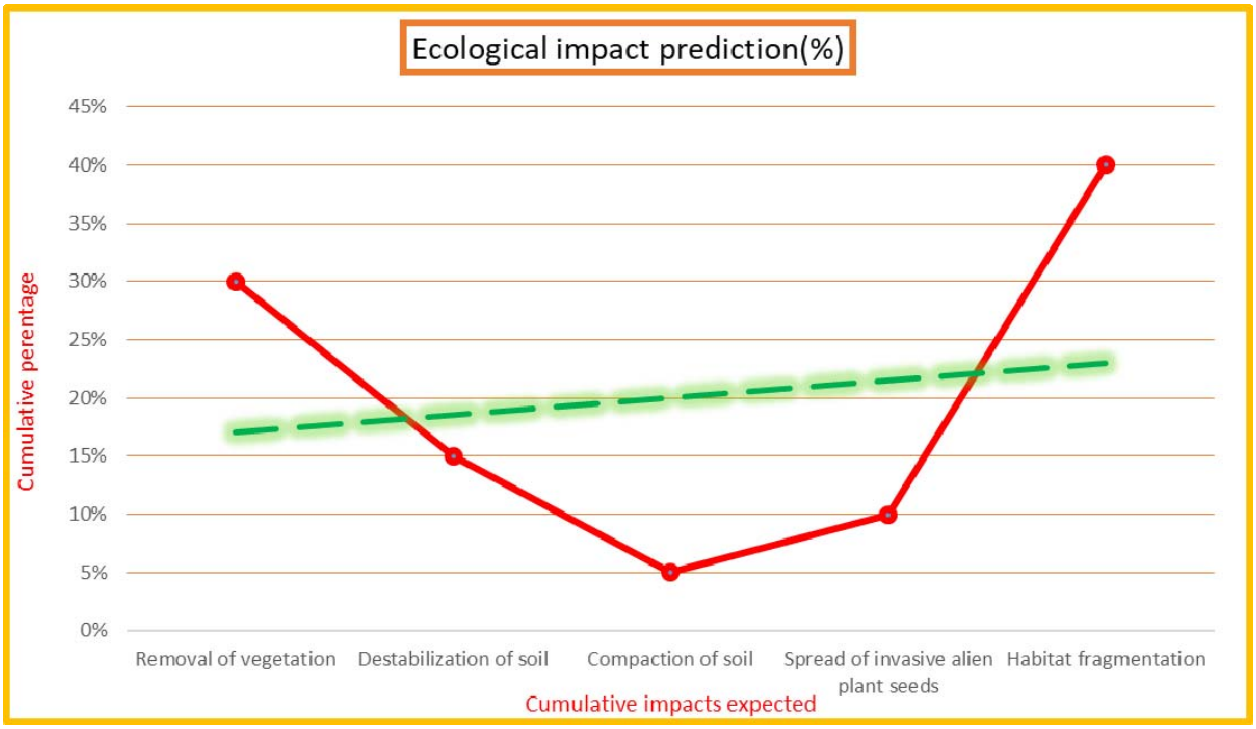


Figure 7.1.1.: Graph showing predicted cumulative impacts analysis

8. CONCLUSION AND RECOMMENDATIONS

The proposed development will be located on the on a savannah biome of Lowveld bushveld which is having low species composition with shrubs and trees. Main land use in the area is agriculture.

- A specialist (Environmental officer) must be appointed to deal with all environmental issues as indicated on the impact assessment. This will assist in implementing an environmental friendly development.
- A license to disturb or cut indigenous trees and also protected trees must be applied for from the Department of Agriculture, forestry and fisheries as per National Forest Act, 1998 (Act No. 84 of 1998)
- National Environmental management biodiversity 2004 (Act No 10 of 2004) (NEMBA) must also be considered when dealing with invasive alien plants so that all measure can be based on this legislation and its regulations.
- Environmental management plan must be developed to cater for detailed mitigations during all development phases and for a catchment possible indirect impacts.
- Minimize cutting down of big indigenous trees where possible but also ensure that protected tree is not removed since they are few unless the lay out plan doesn't allow or can't be altered.
- Transportation of material must be done with care in order to minimize the transportation of alien plants seeds from one point to another.
- People must be encouraged to include big trees within their plans in order to promote conservation of vegetation. This will help to promote insitu conservation of most of species.

- Municipality must promote an eco-rural development in the area in order to safe guard existing vegetation.
- A buffer zone of 200m must be complied to without any compromise to protect riparian vegetation.

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APPENDIX A: LEGISLATION CONSIDERED AND RELEVANT

The criteria it was necessary to list relevant legislation for reference while working in the area and further guidance in order to improve compliance. Therefore, all legislations applicable are listed below:

Name	Overview
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.
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.
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.
National Spatial Biodiversity Assessment, 2004	The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.
National Biodiversity Assessment, 2011 (NBA)	The purpose of the NBA is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors.
National Biodiversity Framework (NBF)	The purpose of the NSF is to provide a framework to co-ordinate and align the efforts of the many organisations and individuals involved in conserving and managing South Africa's biodiversity, in support of sustainable development. The NBF provides a framework for conservation and development which is detailed in 33 Priority Actions.
List of Threatened species / ecosystems	The purpose of listing threatened ecosystems is primarily to reduce the rate of ecosystem and species extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems. Threatened ecosystems are identified using different criteria such as: • Irreversible loss of natural habitat • Ecosystem degradation and loss of integrity • Limited extent and imminent threat • Threatened plant and animal species associations • Priority areas for meeting explicit biodiversity targets as defined in a systematic biodiversity plan

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).
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.
Municipal Systems Act (Act No. 32 of 2000)	This Act aims to empower local government to fulfil its Constitutional objects, regulate key municipal organisational, planning participatory and service delivery systems.
Spatial Planning and Land Use Management Act (Act No. 16 of 2013)	This Act is a framework act for all spatial planning and land use management legislation in South Africa. It seeks to promote consistency and uniformity in procedures and decision-making in this field.
Convention of Biological Diversity (CBD)	South Africa is a signatory to the CBD, which requests countries to: • Establish a system of protected areas to conserve biodiversity; • Develop guidelines for the selection, establishment and management of protected areas;
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.
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.
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National Spatial Biodiversity Assessment, 2004	The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.

National Biodiversity Assessment, 2011 (NBA)	The purpose of the NBA is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors.
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APPENDIX B: Red data Species Checklist Considered

(National Environmental Management Biodiversity Act (Act 10 of 2004)

REPTILIA						
SCIENTIFIC NAME	**COMMON NAME**	**CRITICALLY ANDANGERED**	**ENDANGERED**	**VULNERABLE**	**PROTECTED**	**LIKELY TOEXIST ON PROPOSED AREA**
Caretta caretta	Loggerhead Sea Turtle	✓				
Dermochelys coriacea	Leatherback Sea Turtle	✓				
Eretmochelys imbricate	Hawksbill Sea Turtle	✓				
Chelonia mydas	Green Turtle		✓			
Cordylus giganteus	Giant Girdled Lizard		✓			
Lepidochelys olivacea	Olive Ridley Turtle		✓			
Psarnrnobates geornetricus	Geometric Tortoise		✓			
Bitis gabonica	Gabon Adder				✓	
Bitis schneideri	Namaqua Dwarf Adder				✓	
Bradypodion taeniabronchum	Smith's Dwarf Chameleon				✓	
Cordylus cataphractus	Armadillo Girdled Lizard				✓	
Crocodylus niloticus	Nile crocodile				✓	
Python natalensis	African Rock Python				✓	✓
AVES						
SCIENTIFIC NAME	**COMMON NAME**	**CRITICALLY ANDANGERED**	**ENDANGERED**	**VULNERABLE**	**PROTECTED**	**LIKELY TOEXIST ON PROPOSED AREA**
Grus carunculatus	Wattled Crane	✓				
Hirundo atrocaerulea	Blue Swallow	✓				
Neophron percnopterus	Egyptian Vulture	✓				
Poicephalus robustus	Cape Parrot			✓		
Trigonoceps occipitalis	White-headed Vulture			✓		
Aquila rapax	Tawny Eagle			✓		

A rdeotis kori	Kori Bustard			✓		
Ciconia nigra	Black Stork			✓	✓	
Circaetus fasciolatus	Southern Banded Snake Eagle			✓	✓	
Eupodotis caerulescens	Blue Korhaan			✓	✓	
Falco fasciinucha	Taita Falcon			✓		
Falco naumanni	Lesser Kestrel			✓		
Falco peregrinus	Peregrine Falcon			✓		
Geronticus calvus	Bald Ibis			✓		
Neotis ludwigii	Ludwig's Bustard			✓		
Polemaetus bellicosus	Martial Eagle			✓		
Terathopius ecaudatus	Bateleur			✓		
Tyto capensis	Grass Owl			✓		
Bucowus leadeateri	Southern Ground-Hornbill				✓	
Circus ranivorus	African Marsh Harrier				✓	
Neotis denhami	Denham's Bustard				✓	
Spheniscus demersus	Jackass Penguin				✓	

MAMMALIA

SCIENTIFIC NAME	COMMON NAME	CRITICALLY ANDANGERED	ENDANGERED	VULNERABLE	PROTECTED	LIKELY TOEXIST ON PROPOSED AREA
Bunolagus monticularis	Riverine Rabbit	✓				✓
Chrysospalax villosus	Rough-haired Golden Mole	✓				
Arnblysomus robustus	Robust Golden Mole					
Damaliscus lunatus	Tsesebe			✓		
Diceros bicornis	Black Rhinoceros		✓			
Lycaon pictus	African Wild Dog		✓			
Neamblysomus gunningi	Gunning's Golden Mole		✓		✓	
Ourebia ourebi	Oribi		✓		✓	
Paraxerus palliates	Red Squirrel		✓		✓	
Acinonyx jubatus	Cheetah		✓			

Cricetomys gambianus	Giant rat		✓			
Manis temminckii	Pangolin		✓			
Neamblysomus julianae	Juliana's Golden Mole		✓			
Otomops martiensseni	Large-eared Free-tailed Bat		✓			
Panthera ***leo***	Lion		✓			
Panthera pardus	Leopard		✓			
Philantomba monticola	Blue Duiker		✓			
Atelerix frontalis	South African Hedgehog		✓			
Connochaetes gnou	Black Wildebeest		✓			
Crocuta	Spotted Hyena		✓			
Felis nigripes	Black-footed Cat		✓			
Parahyaena brunnea	Brown Hyena		✓			
Loxodonta africana	African elephant		✓			
Lutra maculicollis	Spotted-necked Otter		✓			✓
Mellivora capensis	Honey Badger		✓			✓
Redunca arundinum	Reedbuck		✓			
INVERTEBRATA						
SCIENTIFIC NAME	**COMMON NAME**	**CRITICALLY ANDANGERED**	**ENDANGERED**	**VULNERABLE**	**PROTECTED**	**LIKELY TOEXIST ON PROPOSED AREA**
Colophon spp - All species	Stag Beetles		✓			
Aloeides clarki	Coega Copper Butterfly					
Ceratogyrus spp - All species	Horned Baboon Spiders					
Echinodiscus bisperforatus	Pansy Shell			✓		
Dromica spp - All species	Tiger Beetles		✓			
Graphipterus assimilis	Velvet Ground Beetle					
Xadogenes spp - All species	Flat Rock Scorpions					

Halite's midae	South African Abalone				✓	
Xarpactira spp - All species	Common Baboon Spiders				✓	✓
Ichnestoma spp - *All* species	Fruit Chafer Beetles				✓	
Manticora spp - *All* species	Monster Tiger Beetles				✓	
Megacephala asperata	Tiger Beetle				✓	
Megacephala regalis	Tiger Beetle				✓	
Nigidius auriculatus	Stag Beetle				✓	✓
Oonotus adspersus	Stag Beetle				✓	
Oonotus interioris	Stag Beetle				✓	✓
Oonotus rex	Stag Beetle				✓	
Oonotus sericeus	Stag Beetle				✓	
Opisthacanthus spp - All species	Creeping Scorpions				✓	
Opistophthalmus spp - All species	Burrowing Scorpions				✓	
AMPHIBIA						
SCIENTIFIC NAME	**COMMON NAME**	**CRITICALLY ANDANGERED**	**ENDANGERED**	**VULNERABLE**	**PROTECTED**	**LIKELY TOEXIST ON PROPOSED AREA**
Pyxicephalus adspersus	Giant Bullfrog				✓	
Pyxicephalus edulis	African Bullfrog				✓	

Photos: Listed photos below shows view of the site in terms of vegetation cover and condition of the land as found during field surveys.

Photo 1: shows riparian vegetation along non Perennial River with sand mining

Photo 2: shows existing households with fences at about 30m from riparian zone

Photo 3: shows indicator herb for disturbed area

Photo 4: shows occurrence of variety of plant species composition

Photo 5: shows inside the perennial river were is dry with rocks

Photo 6: show ***Datura stramonium*** (large thorn apple) problem weed

Photo 7: Dammed water inside the perennial river just after rains two weeks ago

Photo 8: shows ***tragus beteronianus*** grass; and indicator of disturbed area

Photo 9: show wild cotton plant growing along the river bank

Photo 10: ***Capparis tomentosa lam*** (woolly caper bush climber)

Waste dumping was seen as the most pollution problem in the area. variety of soild wastes were found even on river channel were water flows. Lot of bottles were found crashed on the rocks that are in the river channel.

Those species that are favorable to grow on disturbed areas were also growing.

Photo 11: Shows waste dumped along the river bank most of which washed to the river

Photo 12: Shows ***Amaranthus deflecxus*** (perennial pig weed) growing on waste site

Photo 13: Shows ***Cleome gynandra*** (spider plant)

Photo 14: Shows ***Achyranthes aspera (Devil horse whip, chaff flower, bur weed)***

Photo 15: Shows common bush climbers found on dry woodlands

Photo 16: Shows ***thevetia peruviana (Yellow oleander)***

Photo 17: Shows existing cultivated field

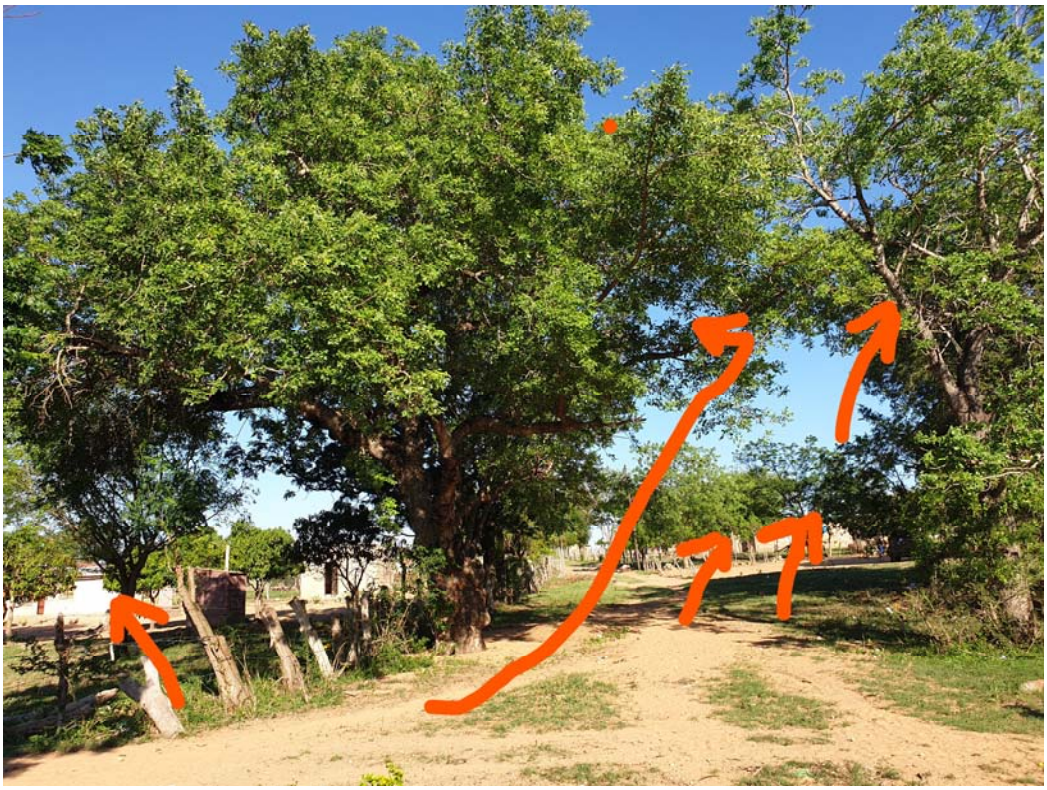


Photo 18: Shows Marula trees population with no harm from community

Photo 19: Shows some vegetation cutting by community

Photo 20: Shows ***Ambrosia artemisiifolia*** (bitter weed) problem plant

Photo 21: ***Gossypim herbaceum*** subsp. (wild cotton)

Photo 22: Shows a work which was sited feeding

Photo 23: ***Aloe ferox***

Photo 24: Prickly pear on site invasive cactus

Photo 25: ***Gardenia volkensii*** sub (Bushveld gardenia)

Photo 26: Fig trees along the river

Photo 27: Thicket comprised of different species

Photo 28: Fence made of poles from the existing bush as part of benefits with negative impact

Photo 29: View of riparian vegetation and dammed water

Photo 30: Ground cover with overgrazed grass

Photo 31: View of vegetation cover and soil which under story humus

Photo 32: Rill and sheet erosion as a result of overgrazing and vegetation removal

Most of waste is dumped right in the mid deep of the vegetation. And also along the river which makes them get washed into the river when it rains. As confirmed physically dumped nappies do leach into the ground whereby polluting water on surface and possibly ground water at long run. Was observed to be due to no dumping site nearby.

Photo 33: Dumping of waste in the bush

Photo 34: Small gullies that exist on the western side of the river

Photo 35***: Ximenia caffra*** (sour plum)

Photo 36: Vegetation change on species composition on the north western side

Photo 37: Existing grave yard on the western side

Photo 38: ***Lanea discolor*** (live long)

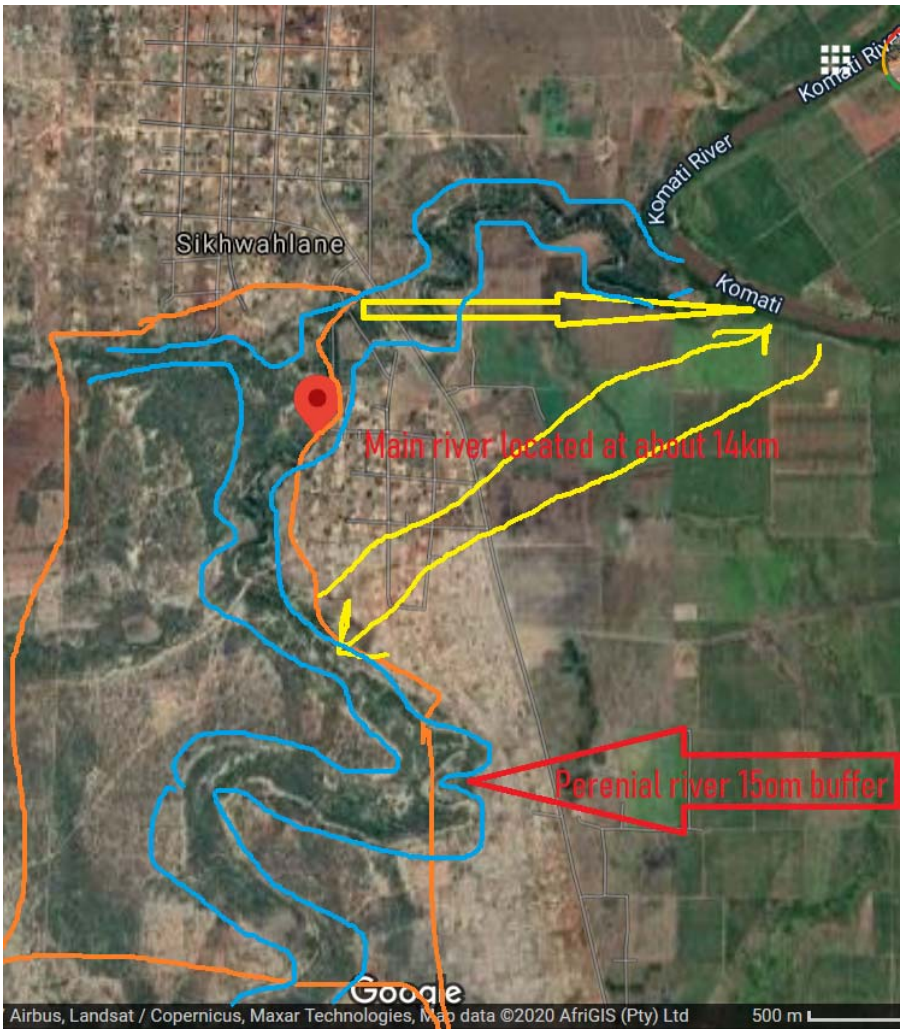
SENSITITY OVERVIEW AS REVEALED DURING ENVIRONMENTAL SCREENING

An overview of the area was undertaken through a desktop study using a recommended screening environmental tool as mandated by the national department of environmental forestry and fisheries which gazette that for every environmental impact assessment to be done for development projects screening for environmental sensitivity must be done.

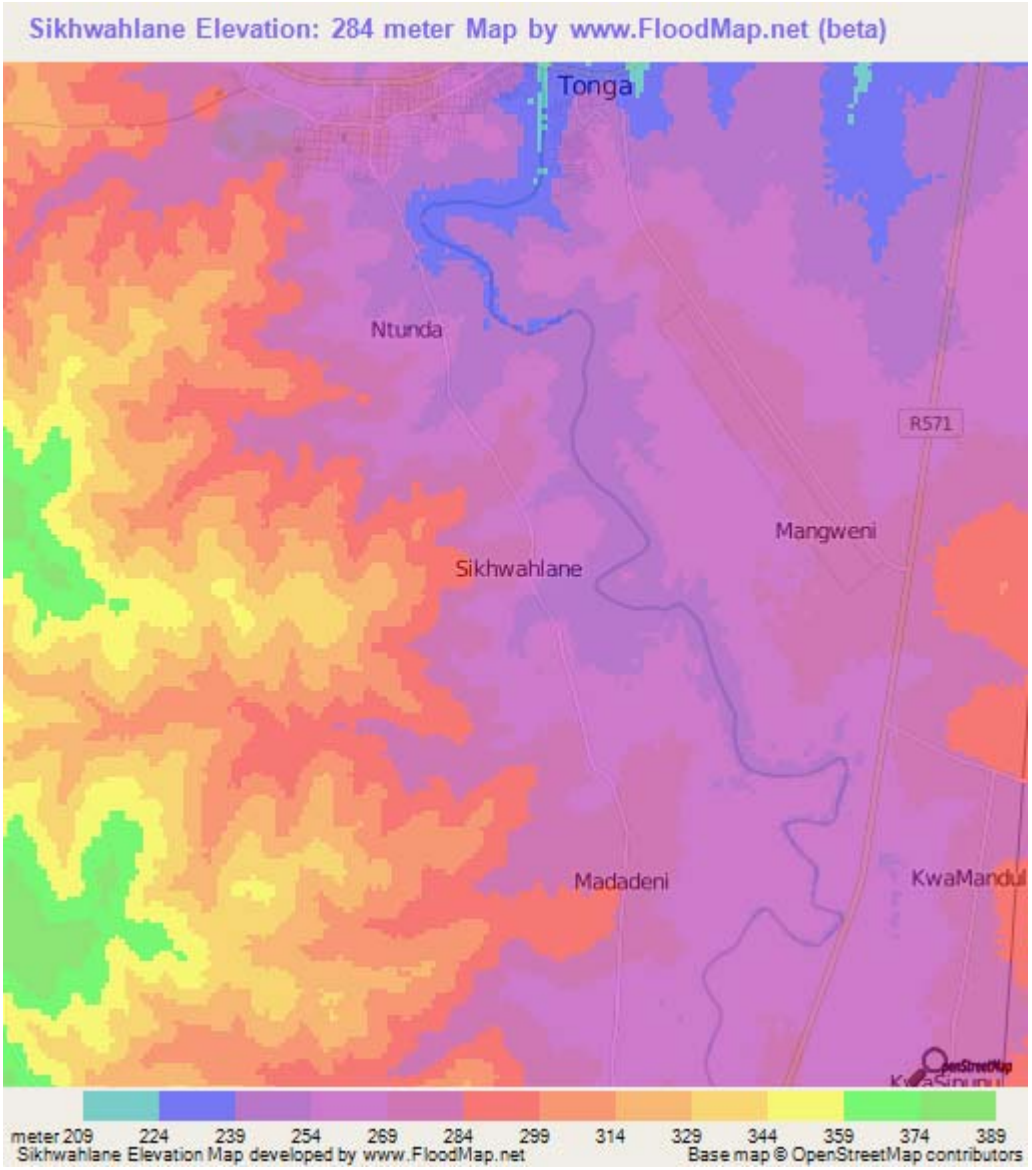
Development footprint will not have impact on the area in consideration of the type of development and a buffer zone outlined. The area found not to have any sensitive areas that would be affected by the development except non perennial stream.

Development footprint determination

Analysis of development footprint was done in consideration of layout plan which has been overlaid on google map which revealed all physical ground features of the proposed area wherein a perennial river was considered the main sensitive area.
In order to protect and minimize impact on riparian vegetation a 150 to 200m buffer zone must be established along the river in consideration of the 10-year flood line.
Flood line for this perennial river was observed at an estimated distance of 50m from the main river channel when the river flushes out. Considering the recommended buffer zone will help to protect the houses.



Drainange map with reference to layout plan


Sikhwahlane Elevation: 284 meter Map by www.FloodMap.net (beta)
Tonga
Ntunda
R571
Mangweni
Sikhwahlane
Madadeni
KwaMandul
meter 209 224 239 254 269 284 299 314 329 344 359 374 389
Sikhwahlane Elevation Map developed by www.FloodMap.net
Base map © OpenStreetMap contributors