

**PRELIMINARY ECOLOGICAL SURVEY FOR  
PROPOSED MBOZA BRIDGE,  
NORTHERN KWAZULU-NATAL PROVINCE**



Compiled for: **Royal HaskoningDHV** by:  
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## ABBREVIATIONS

AOO	Area of Occupancy
CBA	Critical Biodiversity Area
DEAT	Department of Environmental Affairs and Tourism
Mamsl	Metres Above Mean Sea Level
NEMBA ToPS	National Environmental Management: Biodiversity Act Threatened or Protected Species (No. 10 of 2004)
NFA	National Forests Act (No. 30 of 1998)
PRECIS	National Herbarium Pretoria Computerised Information System
SANBI	South African National Biodiversity Institute

## TERMINOLOGY

Arboreal	Living in or amongst trees
Biodiversity	The structural, functional and compositional attributes of an area, ranging from genes to landscapes.
Degraded	An ecosystem that is in a poor ecological state, usually through impacts such as invasion by alien plants, severe overgrazing, poor burning regimes, etc. These systems still contain a moderate proportion of indigenous flora.
Geophyte	Plants that produce their growth points from organs stored below the ground, an adaption to survive frost, drought and / or fire.
Rupicolous	Faunal species living on and amongst rocks (several lizard species).
Transformed	Transformed ecosystems are no longer natural and contain little or no indigenous flora. Examples include agricultural lands, plantations, urban areas, etc.

## **DETAILS OF SPECIALIST**

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### ***Appointment of specialist***

Mr. C. L. Cook was appointed by Royal HaskoningDHV (RHDHV) to undertake a specialist ecological assessment for the proposed Mboza Bridge across the Phongola River located between Ward 10 of Jozini and Ward 13 of uMhlabuyalingana Local Municipality, linking the Zinhlabeni and Mboza communities within the Mkanyakude District Municipality, KwaZulu-Natal.

The Phongola (Mboza) Bridge project consists of a vehicular bridge of approximately 110 m in length and a 4.5 km long new gravel road that will provide safe linkage for communities on both sides of the Phongola River; with vehicles or for pedestrian access. Communities (including scholars) presently use a boat to cross the river at this site, which is unsustainable and not safe.

### **Summary of expertise**

#### **Clayton Cook:**

- Registered professional member of The South African Council for Natural Scientific Professions (Zoological Science), registration number 400084/04.
- Ecological and Specialist Faunal/Herpetological consultant since 1997.
- Conducted over 300 preliminary as well as specialist ecological surveys.
- Conducted over 250 preliminary faunal surveys and 100 specialist faunal and herpetological surveys.
- Conducted over 200 wetland delineations as well as over 50 functional assessments.
- Regional Organiser for Gauteng Province for the South African Frog Atlas Project 1999-2003.
- Published a scientific paper on *Pyxicephalus adspersus*, 8 scientific conference presentations, co-wrote the species accounts for the genus *Pyxicephalus* for the Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland South African Red as well as W.R.C Report No. 1258/1/06 on "A Biophysical framework for The Sustainable Management Of Wetlands In Limpopo Province With Nylsvley as a Reference Model".
- Attended 5 national and international herpetological congresses & 3 expert workshops, lectured zoology and botanical science at University of Limpopo (2001-2004).
- Lead researcher of a 3 year W.R.C. project on the status of frog species in the Kruger National Park as well as the impacts of water quality on tadpoles (2009-2012). Water Research Commission (WRC) report WRC PROJECT K5/1928: Assessment Of The Current Biodiversity Of The Wetland Amphibians Associated With Major River Systems Of The

Kruger National Park (And The Physical And Chemical Factors Affecting Their Distribution).  
VLOK, W<sup>1</sup>, Fouche, P<sup>2</sup>, Cook, C.L.<sup>3</sup> and Pieterse, I<sup>4</sup>.

### **Declaration of Independence**

I Clayton Lance Cook declare that I have been appointed as independent consulting ecologist with no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2010. I have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. Remuneration for my services by the proponent is not linked to approval by any decision-making authority responsible for authorising this development.



C.L. Cook

*30<sup>th</sup> of November 2015*

### **Indemnity and specific conditions relating to the report**

The findings and recommendations in this report are based on best scientific practices, available information, professional experience and judgement. Due diligence has been observed throughout the preparation of the document. Clayton Cook accepts no liability for any claim, demand, cost or inconvenience arising from this report or its contents and by accepting this report recipients indemnify the author, contributors and collaborators from any such liability. This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

# 1. BACKGROUND INFORMATION

Royal HaskoningDHV (RHDHV) have been appointed by the KwaZulu-Natal Department of Transport (KZN DoT) to perform feasibility studies and to investigate, design, and manage the construction for the proposed Phongola Bridge (No.3513) located between Ward 10 of Jozini and Ward 13 of uMhlabuyalingana Local Municipality, linking the Zinhlabeni and Mboza communities within the Mkanyakude District Municipality, KwaZulu-Natal.

The intention for the project is to construct a bridge crossing with associated road across the Phongola River, to link the Zinhlabeni and Mboza communities in the Mkanyakude District Municipality, KwaZulu-Natal (see Figure 1 locality map). The proposed site (GPS co-ordinates: 27°11'17"S 32°14'20"E) is located on the Phongola River about 3.5 km to the west of the Mboza Clinic off District Road D183. At this site the main channel of the river is approximately 55 m wide and 3 m deep and is frequently inundated with water. The nearest existing bridge is 12 km south of this crossing point. The affected social facilities are Mboza school and clinic, Esipondweni Hospital, Manaba Primary School and Mzinyeni Primary School to the West.

A pedestrian bridge comprising of a suspended structure with abutments constructed outside of the riverbanks, was previously authorised at the same location (Ref: DC27/0009/2014 NEAS: KZN/EIA/0001216/2013) on 27 November 2013. The community thereafter aired their need for a vehicular bridge and requested that the site which had been earmarked for the pedestrian bridge be retained for the vehicle bridge and that the approach road be improved.

## 1.1 Objectives of the Preliminary Ecological Survey

- To provide a description of the vegetation as well as fauna with special emphasis of threatened plant or animal species occurring or likely to occur on the proposed Mboza Bridge site.
- To describe the available habitats on site including areas of important conservation value or areas most likely to form important habitat for remaining threatened plant and animal species on or around the proposed two alternative Mboza Bridge site.

## 1.2 Scope of study

- A specialist ecological survey with special emphasis on the current status of threatened plant and animal species (Red Listed/Data Species), within the proposed Mboza Bridge site based on one site visit conducted during an El Nino drought cycle; as well as using historic as well as published literature and distribution records.
- An assessment of the ecological habitats, evaluating conservation importance and significance with special emphasis on the current status of threatened plant and animal species (Red Data/Listed Species), within the proposed Mboza Bridge site.
- To compile a sensitivity map for the proposed Mboza Bridge site.
- Documentation of the findings of the study in a report.



## 2. METHODOLOGY

### 2.1 Predictive methods

A 1:50 000 map of the study area was provided showing existing infrastructure and the proposed Mboza Bridge site. This was used as far as possible in order to identify potential “hot-spots” adjacent to the proposed bridge, e.g. Patches of undisturbed Lowveld Riverine as well as Sub-tropical Alluvial vegetation, Phongola River and palustrine wetlands including permanent and seasonally inundated pans. Satellite imagery of the area was obtained from Google Earth™ was studied in order to get a three dimensional impression of the topography and current and historic land use.

### 2.2 Literature Survey

A detailed literature search was undertaken to assess the current status of the vegetation as well as threatened plant species as well as fauna that have been historically known to occur in the Northern KZN study area (2732 AA) quarter degree grid cell, within which the proposed Mboza Bridge site is located. The literature search was undertaken utilizing *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description as well as *National Red List of Threatened Plants of South Africa* (Raimondo *et al*, 2009) as well as the internet using the South African National Biodiversity Institutes (SANBI's), POSA (<http://posa.sanbi.org>) to produce a list of the most likely occurring species, which were searched for during fieldwork. Conservation-important plants include those listed as species of conservation concern by Raimondo *et al.*(2009) or protected species as listed under the National Forests Act (NFA) (No. 30 of 1998) or the National Environmental Management: Biodiversity Act Threatened or Protected Species (NEMBA ToPS) (No. 10 of 2004). Faunal literature survey included the use of *The Mammals of the Southern African Subregion* (Skinner & Chimimba 2005) and *The Red Data Book of the Mammals of South Africa: A Conservation Assessment* (Friedmann and Daly (editors) 2004) as well as ADU's MammalMAP [http://vmus.adu.org.za/vm\\_sp\\_list.php](http://vmus.adu.org.za/vm_sp_list.php) accessed on the 30<sup>th</sup> of November 2015) for mammals. Hockey, P.A.R., Dean, W.R.J., Ryan, P.G. (eds). 2005. *Roberts- Birds of Southern Africa VII<sup>th</sup> ed.* And BARNES, K.N. (ed.) (2000) *The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland* for avifauna (birds) as well as internet SABAP2 (<http://sabap2.adu.org.za> accessed on the 30<sup>th</sup> of November 2015). *A Complete Guide to the Frogs of Southern Africa* (du Preez & Carruthers 2009) and *The Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter *et al.* 2004) for amphibians as well as SAFAP FrogMAP (<http://vmus.adu.org.za>). The *Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001) and *South African Red Data Book-Reptiles and Amphibians* (Branch 1988) as well as SARCA (<http://sarca.adu.org.za> accessed on the 30<sup>th</sup> of November for reptiles).



## **2.3 Fieldwork**

Field work for the preliminary ecological survey was conducted on the 5<sup>th</sup> of November 2015. During the field survey, the riparian zone of the Phongola River was initially surveyed at the proposed Mboza Bridge site as well as 100m upstream and downstream from the site. More intensive vegetation surveys were undertaken at the proposed Mboza Bridge site as well as adjacent 50m. . Data pertaining to the vegetation physiognomy and floristic composition (species richness and canopy cover of each species) was collected in the field. A list of all plant species present, including trees, shrubs, grasses, forbs, geophytes and succulents were made. Faunal records were gathered using visual cues such as sightings, tracks and scats, active searching as well as auditory recognition for birds

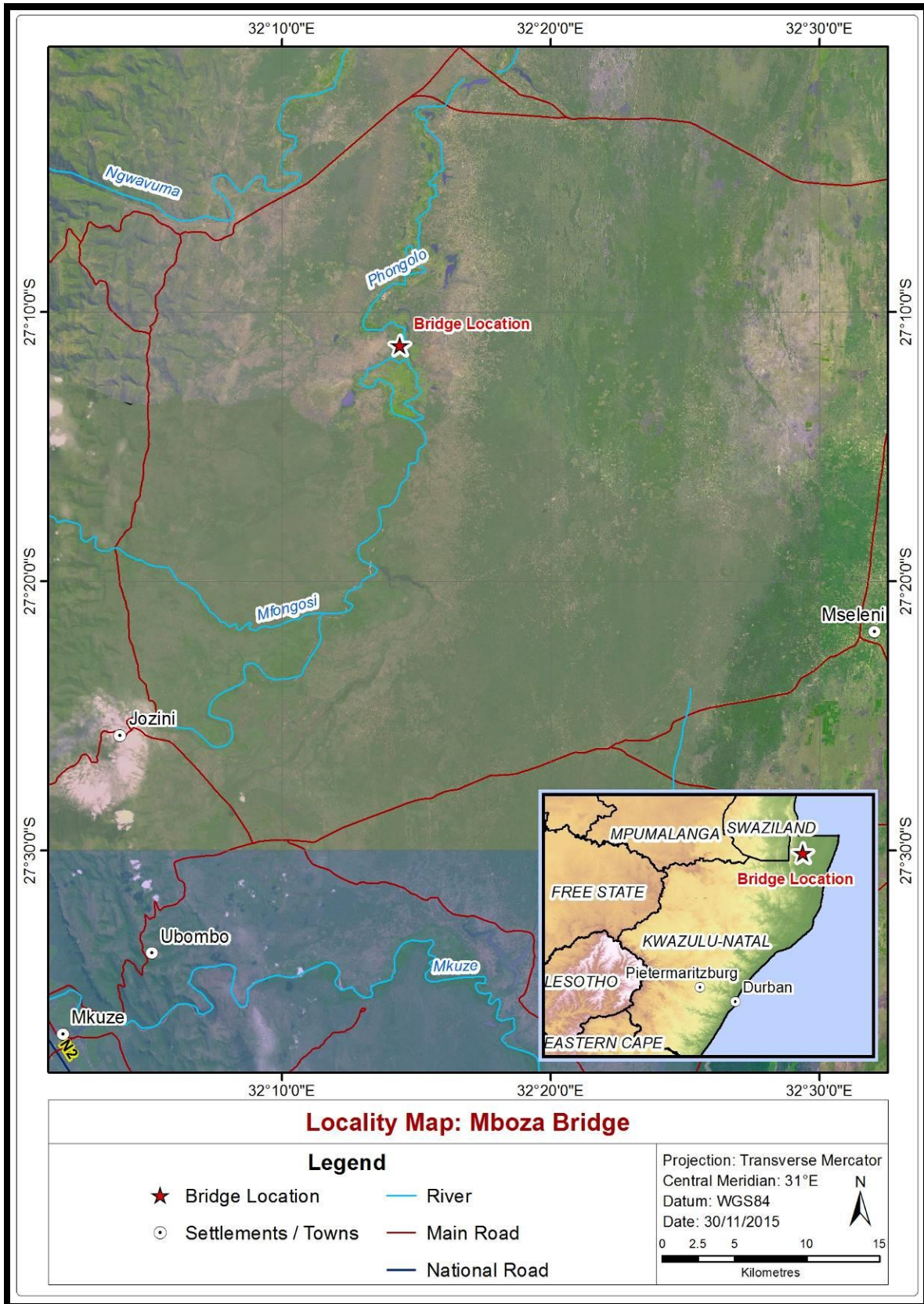
## **2.4 Assumptions, Limitations and Knowledge Gaps**

### **2.4.1. Seasonality**

The vegetation and faunal surveys were restricted to a single season during an El Nino drought cycle. The faunal and vegetations assessments were based on a single site survey in the current summer season, and only species of plants visible and / or flowering in mid-summer were detected. It is possible that plants which flower at other times of the year are under represented, especially geophytes which flower after adequate rainfall. Thus only those flowering plants that flowered at the time of the visit could be identified with high levels of confidence. Some of the more rare and cryptic species may have been overlooked due to their inconspicuous growth forms. Many of the rare and endangered succulent species can only be distinguished (in the field or veld) from their very similar relatives on the basis of their reproductive parts. These plants flower during different times of the year. Multiple visits to any site during the different seasons of the year could therefore increase the chances to record a larger portion of the total species complex associated with the area. The survey of the study site is however considered as successful with a correct identification of the different vegetation units as well as habitat availability and suitability for any threatened plant species.

### **2.4.2 Overlooked Species**

Certain plant species, particularly geophytes, will only flower in seasons when conditions are optimal and may thus remain undetected, even over a survey that encompasses several seasons. Other plant species may be overlooked because of very small size and / or extreme rarity. Several faunal species are highly secretive and may remain undetected over extensive surveys conducted for extended periods.



**Figure1.** Locality map of the proposed Mboza Bridge site.

**Mboza Bridge: Preliminary Ecological Survey**

### 3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

#### 3.1 Location

The proposed scheme is located within the far northern part of KwaZulu-Natal (KZN) between the Swaziland and Mozambique borders, and further bordered by the Indian Ocean and a number of nature and game reserves i.e. Pongolapoort, Ndumo, Tembe Elephant, Kosi Bay, iSimangaliso (Greater St Lucia), Mkuze and Zululand Rhino Reserves. The region is divided from Swaziland by the Lebombo Mountains forming the high elevations to the west and is drained by the Phongolo River and tributaries thereof forming the lowest elevations. The proposed Mboza Bridge is situated across the Phongola River, to link the Zinhlabeni and Mboza communities in the Mkanyakude District Municipality, Northern KwaZulu-Natal. The proposed site (GPS co-ordinates: 27°11'17"S 32°14'20"E) approximately 3.5 km to the west of the Mboza Clinic off District Road D183. The adjacent floodplain is heavily transformed into small-scale vegetable crops as well as fruit tree orchards adjacent to the Phongola River.

#### 3.2 Vegetation

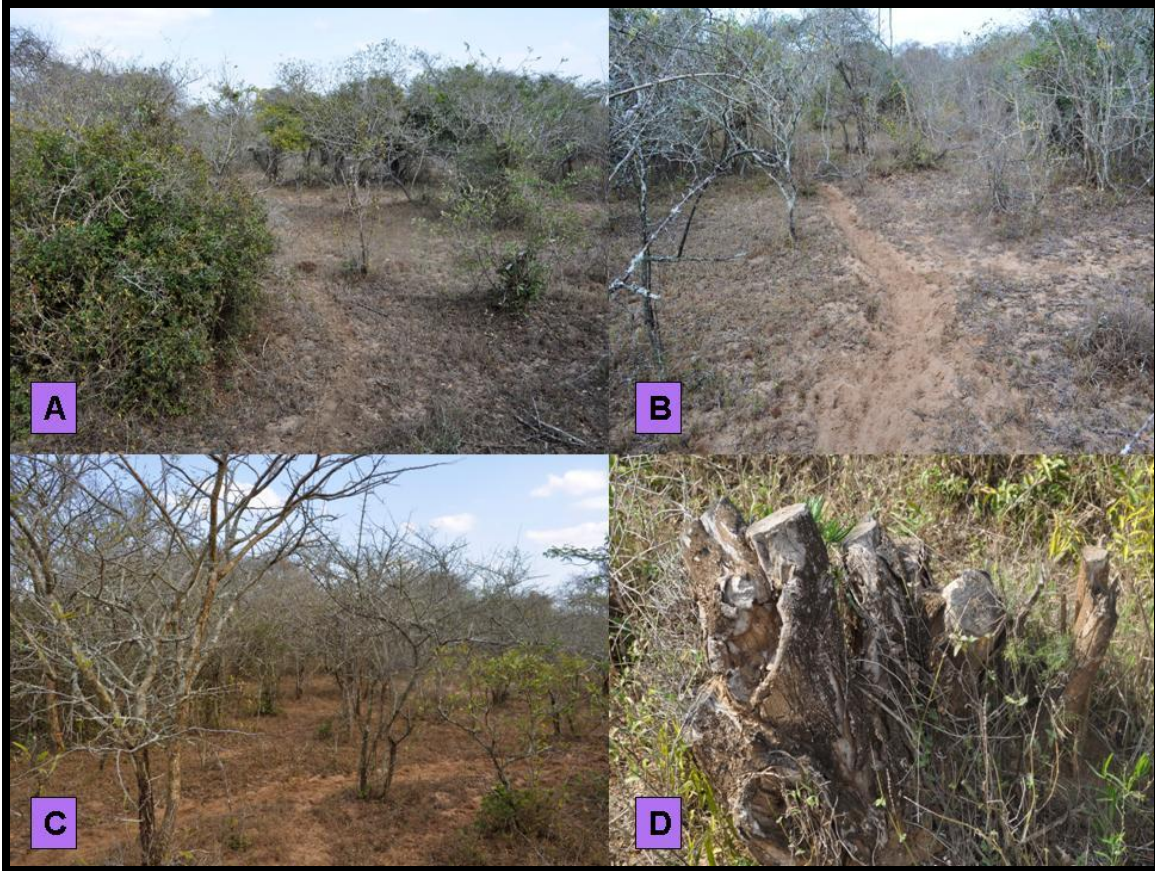
As the proposed Mboza Bridge project is situated around rural homesteads and agricultural areas the majority of natural vegetation consisting of Western Maputaland Clay Bushveld (SVI 20) has been transformed into rural homesteads with small scale agricultural lands as well as livestock enclosures (kraals) or degraded through wood harvesting, bush encroachment as well as extensive overgrazing of forb and herb layers. The area is utilised in various ways ranging from houses to ploughed lands, kraals to cleared bushveld used for grazing purposes. As a result the natural vegetation has become degraded and is mostly transformed. The vegetation comprises of a mixed but mainly compound leaved short (5-10 m) woodlands and wooded grasslands. A few large indigenous tree species are scattered around the homesteads including *Senegalia (Acacia) nigrescens*, *Schotia brachypetala*, *Spirostachys africana*, *Ziziphus mucronata*. Several large protected Marula *Sclerocarya birrea* subsp. *caffra* were observed adjacent to the road reserve as well as homesteads.

The proposed Mboza Bridge site is situated within a transformed section of Lowveld Riverine Forest within the riparian zone of the Phongola River as well as the adjacent heavily transformed Subtropical Alluvial Vegetation within the floodplain. Large sections have been completely transformed due to small-scale agricultural activities within the Phongola floodplain.

**Table1.** Vegetation units observed around the proposed Mboza Bridge site.

MBOZA BRIDGE					
	Vegetation Type	Conservation Target	Protected	Remaining	Conservation Status
Foa 1	Lowveld Riverine Forest	100 %	50 %		Critically endangered
Aza 7	Subtropical Alluvial Vegetation	31 %	?	?	Least threatened
SVI 20	Western Maputaland Clay Bushveld	19 %	11.30 %	65.70 %	Vulnerable





**Figure2. A collage of photographs displaying the current impacts observed adjacent to the existing rural homesteads adjacent to the Mboza bridge** **A:** Embedded within the bottomland positions within the Western Maputaland Clay Bushveld are scattered patches of Makatini Clay Thicket. **B:** Most of the area is communally owned and severely degraded due to overgrazing by goats and cattle, altered fire regimes and heavy infestations by *Chromolaena odorata*\*. *Opuntia* spp. and *Lantana camara*\* infestations are high. **C:** Thicket formation in certain areas by smaller *Vachellia* and *Senegalia* spp. due to altered fire regimes and overgrazing. **D:** Evidence of wood harvesting activities throughout the area.

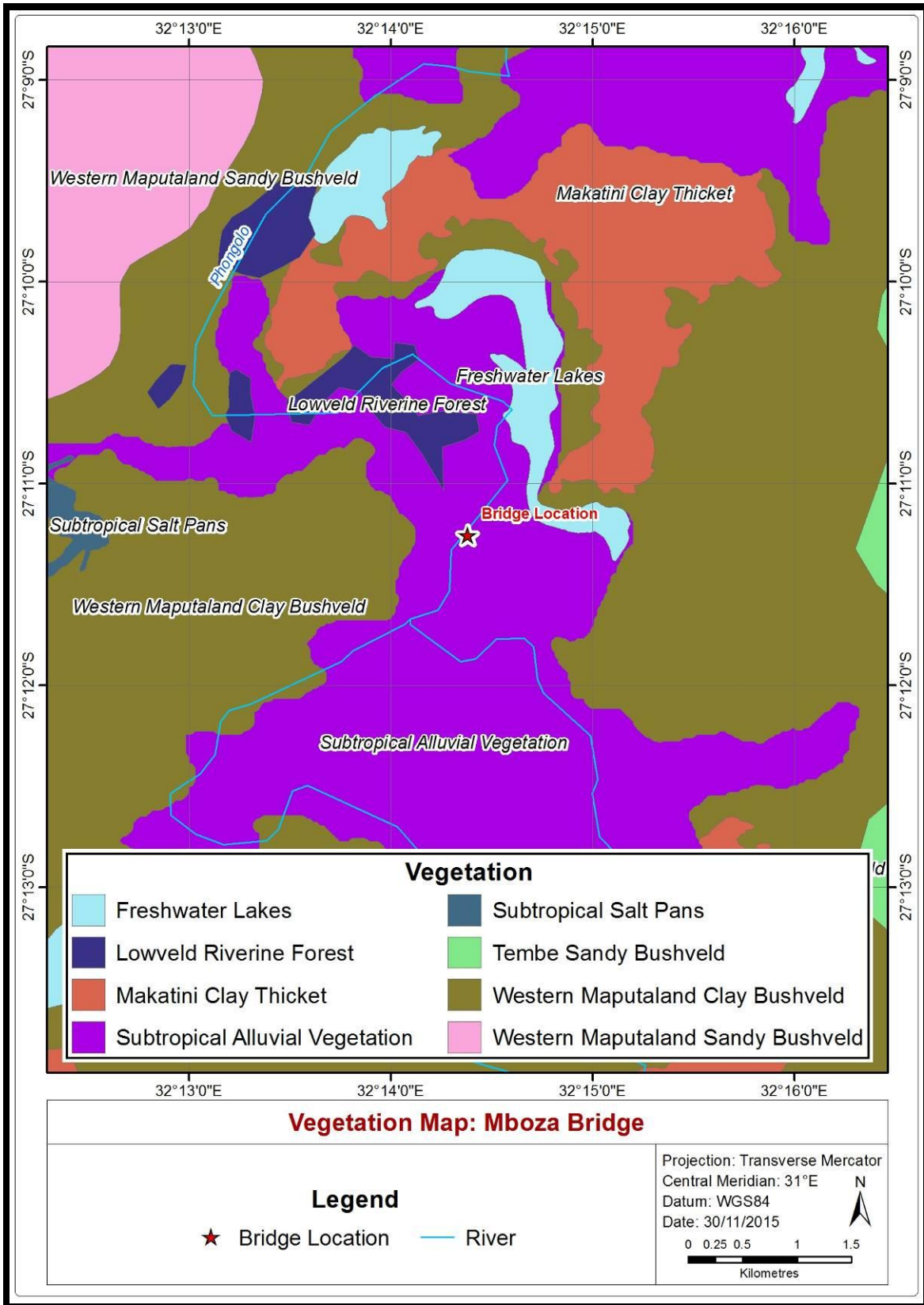


Figure3. Vegetation map of the Mboza bridge site.



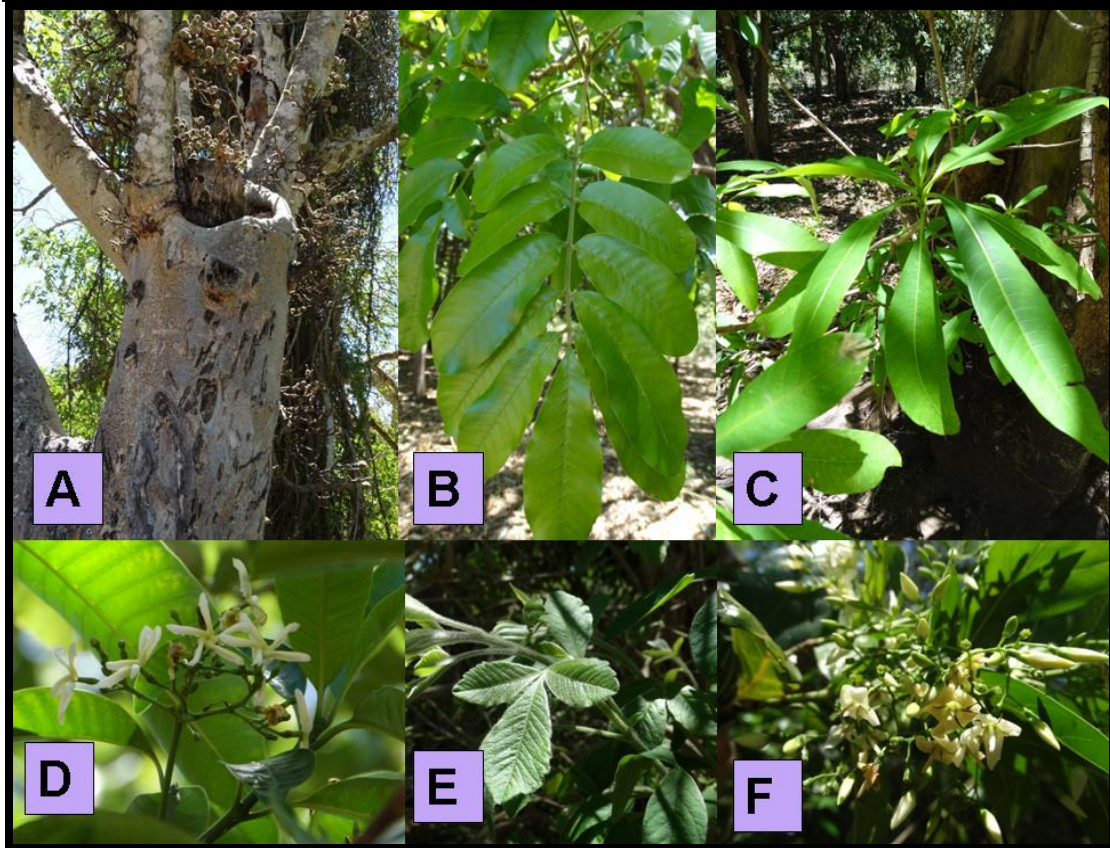
### 3.3 Lowveld Riverine Forest (FOa 1)



<b>Vegetation Type</b>	Lowveld Riverine Forest (FOa 1) & Subtropical Alluvial Vegetation (Aza 7)	<b>Tree cover</b>	0-60 %
<b>Soil</b>	Recent alluvial deposits with deep, fine-textured soils (eg. Dundee soil Form).	<b>Shrub cover</b>	0-40 %
<b>Topography</b>	Phongola River	<b>Herb cover (weedy pioneers)</b>	0-30%
<b>Land use</b>	Rural-agricultural (Livestock drinking & small-scale agricultural lands, orchards)	<b>Grass cover</b>	0-40%
<b>Dominant Tree spp.</b>	<i>Ficus sycomorus</i> , <i>Eckebergia capensis</i> , <i>Trichilia emetica</i> , <i>Vachellia robusta</i> subsp. <i>clavigera</i> , <i>Combretum erythrophyllum</i> , <b><i>Sclerocarya birrea</i> subsp. <i>caffra</i></b> <sup>°</sup> , <i>Tabernaemontanum elegens</i> , <i>Rauvolfia caffra</i> , <i>Vachellia xanthophloea</i> , <i>Ziziphus mucronata</i>		
<b>Dominant Shrubs</b>	<i>Kraussia floribunda</i> , <i>Grewia caffra</i> , <i>Grewia occidentalis</i> , <i>Searsia pyroides</i> var. <i>intergifolia</i> , <i>Dichrostachys cinerea</i> , <i>Vachellia nilotica</i> , <i>Euclea natalensis</i> , <i>Strychnos madagascariensis</i> , <i>Strychnos spinosa</i> , <i>Gymnosporia buxifolia</i> , <i>Carisa tetramera</i> , <i>Ehretia riguida</i> subsp.		

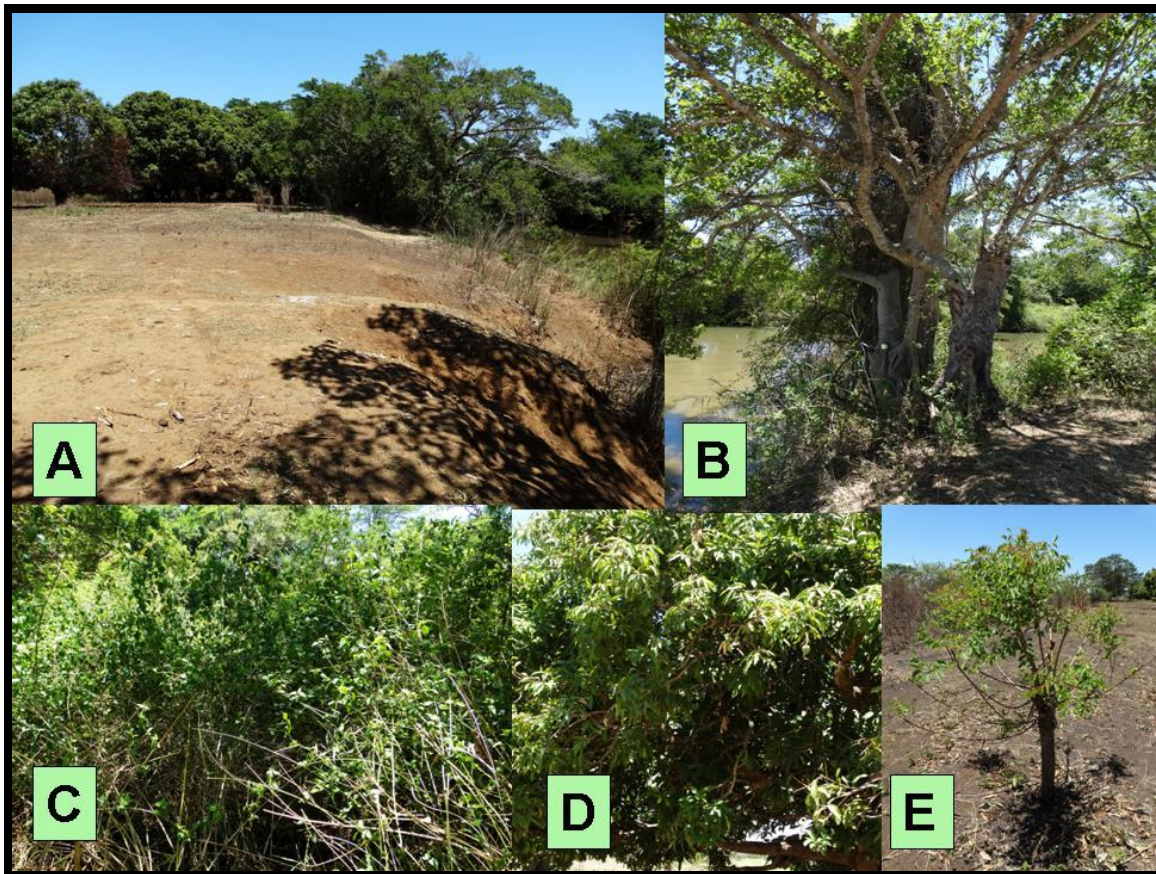
<sup>°</sup> Protected Tree Species

	<i>rigida</i> , <i>Grewia bicolor</i> , <i>Gardenia volkensii</i> .
<b>Dominant Grasses</b>	<i>Eragrostis ciliaris</i> , <i>E. pallens</i> , <i>Panicum maximum</i> , <i>Setaria sphacelata</i> , <i>Tragus berteronianus</i> , <i>Digitaria eriantha</i> , <i>Cynodon dactylon</i> , <i>Phragmites mauritianus</i> , <i>Urochloa mossambicensis</i> <i>Setaria incrassata</i> .
<b>Dominant Herbs</b>	<i>Solanum panduriforme</i> , <i>Tagetes minuta</i> *, <i>Bidens pilosa</i> *, <i>Zinnia peruviana</i> *
<b>Alien Invasive Vegetation</b>	<i>Opuntia ficus-indica</i> *, <i>Melia azedarach</i> *, <i>Psidium guajava</i> , <i>Caesalpinia decapetala</i> , <i>Opuntia monacantha</i> *, <i>Opuntia imbricata</i> *, <i>Lantana camara</i> *, <i>Agave sisalana</i> *, <i>Cereus jamacara</i> *
<b>Protected Tree Species</b>	<i>Sclerocarya birrea</i> subsp. <i>caffra</i>
<b>Conservation Status</b>	Critically Endangered
<b>Sensitivity</b>	Medium-High



**Figure 4.** A conglomerate of photographs displaying the dominant tree and shrub species observed upstream and downstream from the proposed Mboza Bridge. **A:** Sycamore Fig (*Ficus sycomorus*); **B:** Natal Mahogany (*Trichilia emetica*), **C:** Quinine Tree (*Rauvolfia caffra*), **D:** Toad Tree (*Tabernaemontanum elegans*), **E:** River Firethorn Current (*Searsia pyroides* var. *gracilis*) and **F:** Rhino-Coffee (*Kraussia floribunda*).





**Figure 5. A collage of photographs displaying the dominant vegetation observed within the proposed Mboza bridge site. A:** The proposed bridge site is situated within an approximately 25 m completely transformed section of the riparian zone. The indigenous riparian vegetation has been completely removed although remnant patches occur upstream and downstream from the proposed Mboza bridge site. **B:** The riparian zone is dominated by large Sycamore Figs (*Ficus sycomorus*), Cape Ash (*Eckebergia capensis*), Natal Mahogany (*Trichilia emetica*), Quinine Tree (*Rauvolfia caffra*) as well as River Bushwillow (*Combretum erythrophylum*). **C:** Extensive bush and thicket formation adjacent to the disturbed margins of the riparian zone. Alien vegetation included *Chromolaena odorata*, *Cesalpinia decapetala* and *Lantana camara*. **D:** The approach road to the proposed Mboza bridge on the southern embankments of the Phongola River will result in the destruction of a single Mango Tree (*Mangifera indica*), **(E):** a small (<2m) protected Marula (*Sclerocarya birrea* subsp. *caffra*), a single Cape Ash (*Eckebergia capensis*) and Natal Mahogany (*Trichilia emetica*) on the northern embankments.

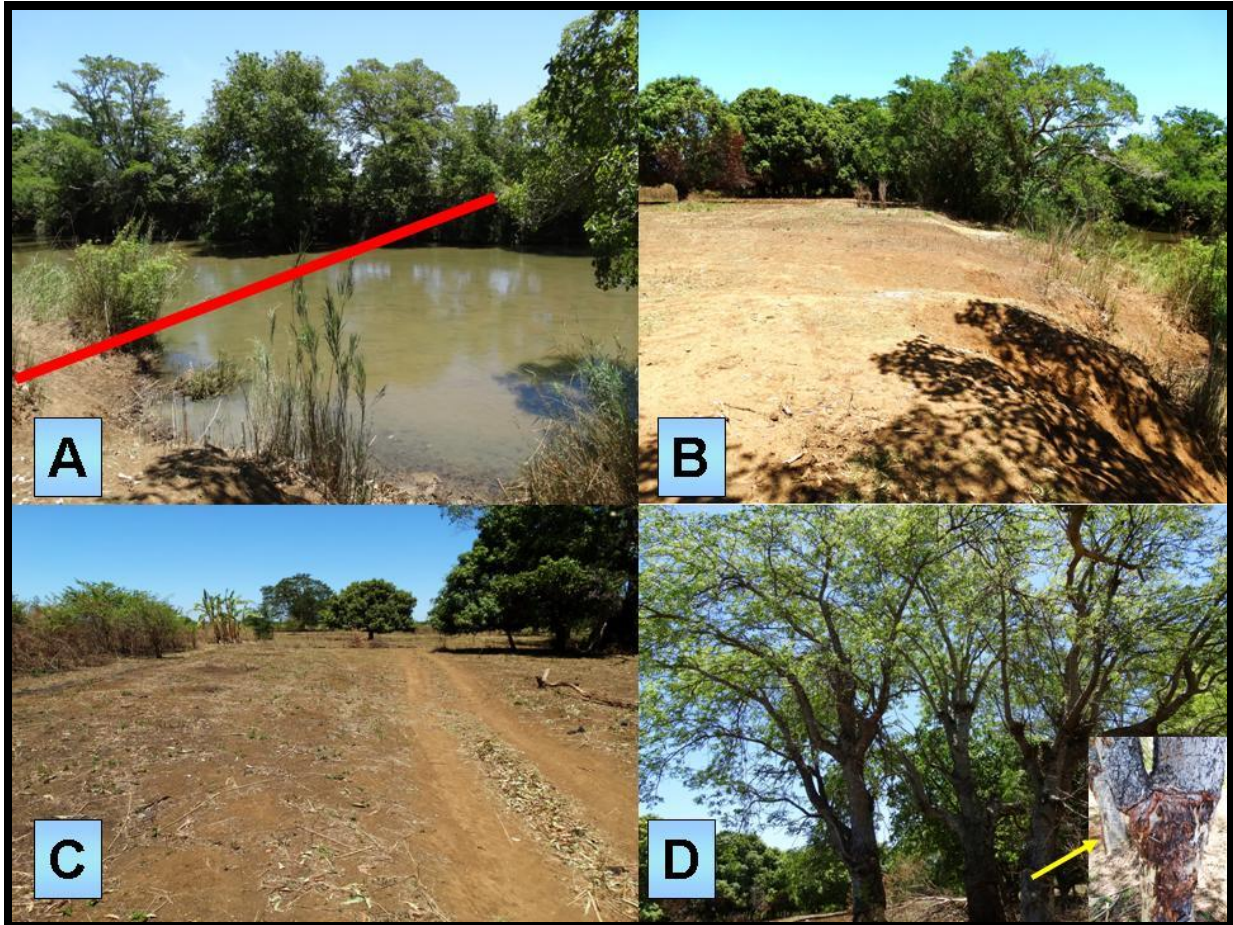
The proposed Mboza Bridge site comprises mainly of a transformed and degraded section of Lowveld Riverine Forest (FOa 1) as well as Subtropical Alluvial Vegetation (Aza 7) vegetation unit<sup>2</sup>. The southern embankment of the proposed Mboza Bridge comprises an already completely transformed section of the riparian zone. All trees, shrubs and herbs have been cleared for approximately 25 m and the area contains limited vegetation and utilised for livestock drinking activities. A single large Sycamore Fig (*Ficus sycomorus*) occurs immediately adjacent or downstream from the proposed bridge alignment. Approximately 25m upstream from the bridge site are several large Sycamore Figs (*Ficus sycomorus*), Cape Ash (*Eckebergia capensis*), Natal Mahogany (*Trichilia emetica*), Weeping Boer-Bean (*Schotia brachypetala*), and Quinine Tree (*Rauvolfia caffra*). Tree cover ranged from approximately 0-100 % coverage) with the larger indigenous trees forming a closed canopy. The shrub and small tree layer comprises 0-40% coverage with several Toad Trees (*Tabernaemontanum elegens*), Rhin-Coffee (*Kraussia floribunda*), Climbing Raisin (*Grewia caffra*). Dense thickets of alien invasive Triffid Weed (*Chromolaena odorata*), Lantana (*Lantana camara*) and Mauritius Thorn (*Ceasalpinia decapetala*) occur within the disturbed margins of the riparian zone. In-stream vegetation was dominated by a small patch of Mauritius Reed (*Phragmites mauritianus*).

A single small (<2m) protected Marula *Sclerocarya birrea* subsp. *caffra* was observed adjacent to the approach road reserve and bridge site. Three larger Marula occur approximately 15m from the current access road and should not be impacted by the proposed Mboza bridge development. The trees have been ring-barked for traditional medicinal purposes. The Department of Agriculture, Forestry and Fisheries (DAFF) will have to be approached to obtain the required permits for the removal of any protected tree species.

Forbs were dominated by pioneer weedy plant species such as Peanut Butter Senna (*Senna didymobotrya*\*), Lantana (*Lantana camara*\*), Tall Fleabane (*Conyza albida*), Flax-Leaf Fleabane (*Conyza bonariensis*), Common Black jack (*Bidens pilosa*), Tall Khaki weed (*Tagetes minuta*) Mexican Poppy (*Argemone ochroleuca*), Fine-leaved Verbena (*Verbena aristigera*) The grassland areas on the banks have been used for grazing purposes are grazed to the ground level and are dominated by the grasses *Eragrostis ciliaris*, *E. pallens*, *Panicum maximum*, *Setaria sphacelata*, *Tragus berteronianus*, *Digitaria eriantha*, *Cynodon dactylon*, *Phragmites mauritianus*, *Urochloa mossambicensis* *Setaria incrassate*. The grasses cover approximately 0-40% of the area and the forbs 0-5 %.

Vegetation clearance must be restricted to the single Mango (single Mango Tree (*Mangifera indica*), a small (<2m) protected Marula (*Sclerocarya birrea* subsp. *caffra*), a single Cape Ash (*Eckebergia capensis*) and Natal Mahogany (*Trichilia emetica*) on the northern embankments. No rare or threatened plants were recorded within these degraded and transformed vegetation units within and adjacent to the proposed Mboza bridge site. It is imperative that no further damage occurs to the adjacent highly sensitive riverine vegetation both upstream and downstream from the proposed bridge site. These areas are considered as having **High Conservation value** as well as having **High ecological functioning**.





**Figure 6. A collage of photographs displaying the Mboza bridge site. A:** The proposed bridge bisects the Phongola River and riparian zone for approximately 110m. The bridge will result in the destruction of two indigenous riparian trees as well as smaller shrub species such as Rhino-Coffee (*Kraussia floribunda*) and Climbing Raisin (*Grewia caffra*) on the northern embankments. **B:** The proposed bridge will not result in the destruction of any riparian vegetation on the southern embankments. **C:** The approach road and road reserve are dominated by completely transformed old agricultural lands, livestock pathways and adjacent Mango orchard. **D:** Three large protected Marula *Sclerocarya birrea* subsp. *caffra* occur approximately 15m from the current access road and should not be impacted by the proposed Mboza bridge development

### 3.4 Protected Species

One protected tree species was recorded adjacent to the proposed Mboza Bridge and approach road alignment namely four Marula *Sclerocarya. birrea* ssp. *caffra*. The Department of Water Affairs and Forestry (now Department of Forestry and Fisheries) developed a list of protected tree species. In terms of Section 15(1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization. The Department of Agriculture, Forestry and Fisheries (DAFF) will have to be approached to obtain the required permits for the removal or relocation of any protected tree species. If the small Marula needs to be removed in should be carefully excavated with a bulldozer and re-planted away from any construction activities. The three larger Marula occur approximately 15m from the existing access road and should not be impacted by the proposed Mboza bridge or approach road.

### 3.5 Red Data Species

**Table2.** A list of red data a species for the 2732 AA QDGC according to POSA online checklist.

Family	Scientific Name	Conservation Status	Likelihood of occurrence
APOCYNACEAE	<i>Brachystelma chlorozonum</i> E.A.Bruce	NT	Highly Unlikely
CELASTRACEAE	<i>Elaeodendron croceum</i> (Thunb.) DC.	Declining	Highly Unlikely
CELASTRACEAE	<i>Pterocelastrus rostratus</i> (Thunb.) Walp.	Declining	No chance
COMBRETACEAE	<i>Combretum mkuzense</i> J.D.Carr & Retief	NT	No chance
HYACINTHACEAE	<i>Drimia altissima</i> (L.f.) Ker Gawl.	Declining	Highly Unlikely
ORCHIDACEAE	<i>Ansellia africana</i> Lindl.	Declining	Possibly in adjacent trees
ZAMIACEAE	<i>Encephalartos lebomboensis</i> I.Verd.	EN	No chance

No red listed plant species were observed during the current brief field survey or are likely to occur within the transformed and degraded riparian vegetation proposed for the Mboza Bridge site. No epiphytic Leopard Orchids *Ansellia africana* were observed in the adjacent large riparian trees. As a precautionary measure a suitably qualified ecologist should inspect the site prior to construction activities to ascertain if any rare or threatened plant species have emerged or were accidentally missed during the previous field survey prior to sufficient rainfall.

# PRELIMINARY FAUNAL SURVEY

The preliminary faunal survey focused mainly on mammals, birds, reptiles and amphibians of the study area. The survey focused on the current status of threatened animal species occurring, or likely to occur within the study area, describing the available and sensitive habitats, identifying potential impacts resulting from the Mboza bridge development and providing mitigation measures for the identified impacts. Faunal data was obtained during a single site visit of the proposed development site carried out on foot on the 5<sup>th</sup> of November 2015.

All animals (mammals (larger), birds, reptiles and amphibians) seen or heard; were recorded. Use was also made of indirect evidence such as nests, feathers and animal tracks (footprints, droppings) to identify animals. Previous surveys, literature investigations; personal records and historic data supplemented the initial survey. The literature search was undertaken utilizing *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description. *The Mammals of the Southern African Sub-region* (Skinner & Chimimba 2005) and *The Red Data Book of the Mammals of South Africa: A Conservation Assessment* (Friedmann and Daly (editors) 2004) for mammals. *Roberts-Birds of Southern Africa VII<sup>th</sup> ed.* (Hockey, Dean and Ryan (editors); 2005) and *The Eskom Red Data Book of Birds of South Africa* (Barnes,2000) for avifauna (birds). *A Complete Guide to the Frogs of Southern Africa* (du Preez & Carruthers 2009) and the *Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland* (Minter *et al.* 2004) for amphibians. *The Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001) and *South African Red Data Book- Reptiles and Amphibians* (Branch 1988) for reptiles.

The majority Western Maputaland Clay Bushveld within the adjacent rural-agricultural homesteads is in various stages of transformation and degradation. Scattered indigenous tree species as well as extensive thickets and bush-encroached areas occur. The Subtropical Alluvial Vegetation within the extensive floodplain of the Phongola River has been extensively utilized for small-scale agricultural activities. The grass, herb and forb layer suffer from extensive overgrazing, mostly from goats and cattle. Cattle were observed grazing within the floodplain as well as seasonal and permanent pans. Their grazing and trampling activities result in the compaction and erosion of hydric soils and damage to the hygrophilous vegetation. However, the opportunistic feeding patterns of goats can have a severe impact on both the composition and productivity of this eco-region. In addition, goats are known to be more destructive than cattle at higher stocking densities (Skead 1988).

High livestock densities also pose considerable threat to wildlife, since high numbers of domesticated animals generally cause a displacement of game, as there is less suitable habitat available. Furthermore, wild predators and scavengers such as the Black-backed Jackal, Caracal, Leopard and the White-Backed Vulture have been eradicated by livestock farmers who see these animals as a threat to their livelihoods. Poisoned carcasses are often used for this purpose; this method is indiscriminate and therefore poses considerable threat to all predators and scavengers; especially the threatened Cape Vulture. Poaching and illegal hunting (dogs) are further reducing the remnant faunal populations. The remaining Riverine Forest adjacent to the Phongola River offers suitable habitat for several faunal species, especially birds.

**Existing Impacts on the fauna on and surrounding the site included:**

- The proposed Mboza Bridge project is situated within a rural agricultural environment which are dominated by completely transformed vegetation (old agricultural lands and orchards) dominated by degraded bushveld as well as extensive thickets with consist of limited habitat diversity or impoverished habitats.
- Due to an on-going drought the vegetation has been heavily impacted and the hygrophilous vegetation within the adjacent wetland habitats has been heavily overgrazed or even destroyed in certain areas.
- High levels of human disturbances associated with the existing villages and habitat degradation and transformation due to present agricultural activities as well as livestock enclosures. This has resulted in impoverished habitats with limited faunal diversity.
- Increased human presence and human disturbances surrounding the site results in increased disturbances on the site such as overgrazing by cattle, dumping, sand mining activities, hunting and poaching, harvesting of traditional medicinal plants and bark.
- Previous and current agricultural activities (oldlands) have transformed the majority of the floodplain of the Phongola River.
- Wood harvesting activities as well as clearance of riverine forest along the Phongola River has a high impact on arboreal faunal species as well as increased erosion potential of the adjacent macro-channel embankments.
- Extensive overgrazing by livestock (especially cattle and goats) result in limited vegetative or grass cover or refuge habitat for remaining faunal species.
- Cattle have eroded the macro-channel embankment due to daily drinking activities. The adjacent grassland vegetation as well as herbs have all been overgrazed.
- Extensive alien invasive thickets (*Chromolaena odorata*, *Lantana camara* and *Caesalpinia decapetala*) occur within the disturbed areas along the riparian zone of the Phongola River.
- Frequent burning of remaining patches of bushveld severely restricts vegetative cover and potential refuge habitat for remaining faunal species.
- Hunting with dogs as well as feral cats around the villages. Dogs and cats have a high impact on remaining faunal species. Several hunting dogs were observed during the brief field survey. Extensive human pathways occur adjacent to the Phongola River and the dogs are taken daily for hunting within the closed wooded riparian zone (pers. comm. with local).



## **4.1 AMPHIBIANS**

Amphibians are an important component of South Africa's exceptional biodiversity (Siegfried 1989) and are such worthy of both research and conservation effort. This is made additionally relevant by international concern over globally declining amphibian populations, a phenomenon currently undergoing intensive investigation but as yet is poorly understood (Wyman 1990; Wake 1991). Amphibians have declined dramatically in many areas of the world. These declines seem to have worsened over the past 25 years and amphibians are now more threatened than either mammals or birds, though comparisons with other taxa are confounded by a shortage of reliable data.

Most frogs have a biphasic life cycle, where eggs laid in water develop into tadpoles and these live in the water until they metamorphose into juvenile frogs living on the land. This fact, coupled with being covered by a semi-permeable skin makes frogs particularly vulnerable to pollutants and other environmental stresses. Consequently frogs are useful environmental bio-monitors (bio-indicators) and may act as an early warning system for the quality of the environment.

Breeding in African frogs is strongly dependent on rain, especially in the drier parts of the country where surface water only remains for a short duration. The majority of frog species in the Kwazulu-Natal Province can be classified as explosive breeders. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles.

As the survey was undertaken for only 1 day during daylight hours of the summer wet months (November) during an El Nino drought cycle; only a small proportion of species are present. Limited surface water was present within the flood-plain and river fed pans. Ideally, a herpetological survey should be undertaken throughout the duration of the wet season (November-March) including several nocturnal surveys. It is only during this period that accurate frog species lists can be compiled. During this survey; fieldwork was augmented with species lists compiled from personal records; data from the South African Frog Atlas Project (SAFAP)(1999-2003) and published data, and the list provided below is therefore regarded as likely to be fairly comprehensive.





**Figure7: A conglomerate of photographs of frog species likely to occur within suitable wetland habitat (pans and inundated grassland) adjacent to the Mboza Bridge site. A:** Painted Reed Frog (*Hyperolius marmoratus taeniatus*), **B:** Water Lily Frog (*Hyperolius pusillus*), **C:** Brown-Backed Tree Frog (*Leptopelis mossambicus*) juvenile colouration, **D:** Golden Leaf-Folding Frog (*Afrixalus aureus*); **E:** Brown-Backed Tree Frog (*Leptopelis mossambicus*) adult colouration), **F:** Mottled Shovel-nosed Frog (*Hemisus marmoratus*), **G:** Banded Rubber Frog (*Phrynomantis bifasciatus*), **H:** Southern Foam Nest Frog (*Chiromantis xerampelina*), **I:** Bubbling Kassina (*Kassina senegalensis*), **J:** Flat-backed Toad (*Amietophrynus maculatus*), **K:** Tremelo Sand Frog (*Tomopterna cryptotis*), **L:** Eastern Olive Toad (*Amietophrynus garmani*), **M:** Tinker Reed Frog (*Hyperolius tuberilinguis*), **N:** Bushveld Rain Frog (*Breviceps adspersus*), **O:** Dwarf Puddle Frog (*Phrynobatrachus mababiensis*) and **P:** Plain Grass Frog (*Ptychadena anchietae*).

**Table3.** Frog species recorded within the 2732 AA QDGC or are likely to occur within suitable habitat adjacent to the proposed Mboza Bridge site.

Family	Common name	Genus	Species	Red list category	Atlas region endemic
Arthroleptidae	Brownbacked Tree Frog	<i>Leptopelis</i>	<i>mossambicus</i>	Least Concern	
Brevicipitidae	Bushveld Rain Frog	<i>Breviceps</i>	<i>adpersus</i>	Least Concern	
Brevicipitidae	Mozambique Rain Frog	<i>Breviceps</i>	<i>mossambicus</i>	Least Concern	
Bufonidae	Olive Toad	<i>Amietophrynus</i>	<i>garmani</i>	Least Concern	
Bufonidae	Guttural Toad	<i>Amietophrynus</i>	<i>gutturalis</i>	Least Concern	
Bufonidae	Northern Pygmy Toad	<i>Poyntonophrynus</i>	<i>fenoulheti</i>	Least Concern	
Bufonidae	Red Toad	<i>Schismaderma</i>	<i>carens</i>	Least Concern	
Hemisotidae	Spotted Shovel-nosed Frog	<i>Hemisus</i>	<i>guttatus</i>	Vulnerable	Yes
Hemisotidae	Mottled Shovel-nosed Frog	<i>Hemisus</i>	<i>marmoratus</i>	Least Concern	
Hyperoliidae	Golden Leaf-folding Frog	<i>Afrixalus</i>	<i>aureus</i>	Least Concern	
Hyperoliidae	Greater Leaf-folding Frog	<i>Afrixalus</i>	<i>forasinii</i>	Least Concern	
Hyperoliidae	Painted Reed Frog	<i>Hyperolius</i>	<i>marmoratus</i>	Least Concern	
Hyperoliidae	Tinker Reed Frog	<i>Hyperolius</i>	<i>tuberilinguis</i>	Least Concern	
Hyperoliidae	Redlegged Kassina	<i>Kassina</i>	<i>maculata</i>	Least Concern	
Hyperoliidae	Bubbling Kassina	<i>Kassina</i>	<i>senegalensis</i>	Least Concern	
Microhylidae	Banded Rubber Frog	<i>Phrynomantis</i>	<i>bifasciatus</i>	Least Concern	
Pipidae	Common Platanna	<i>Xenopus</i>	<i>laevis</i>	Least Concern	
Pipidae	Tropical Platanna	<i>Xenopus</i>	<i>muelleri</i>	Least Concern	
Ptychadenidae	Plain Grass Frog	<i>Ptychadena</i>	<i>anchietae</i>	Least Concern	

Ptychadenidae	Broadbanded Grass Frog	<i>Ptychadena</i>	<i>mossambica</i>	Least Concern	
Rhacophoridae	Southern Foam Nest Frog	<i>Chiromantis</i>	<i>xerampelina</i>	Least Concern	



**Figure8.** The Mottled Shovel-Nose Frog has been recorded within 2732AA QDGC. No suitable habitat occurs within the transformed Mboza Bridge site. The adjacent seasonally inundated pans and patches of floodplain grassland provides suitable breeding habitat.

## THREATENED AMPHIBIAN SPECIES

### SPOTTEDSHOVEL-NOSED FROG (*HEMISUS GUTTATUS*)

#### Geographic Range:

This species, which is known only from South Africa, occurs in southern Mpumalanga, and central and eastern KwaZulu-Natal, south to Durban on the coast (EOO of 51 000 km<sup>2</sup> and AOO conservatively estimated to be 1%). The northernmost coastal record is from Hluhluwe. It ranges from sea level up to over 1 000 m a.s.l. on the summit of the Lebombo Mountains. It has not been recorded from Swaziland, but it presumably occurs in this country (Measey *et al.* 2011). The only record of this elusive species in Mpumalanga was from Piet Retief, collected in 1964 by Poynton (Jacobsen 1989). This record was confirmed in November 2000 when individuals of this species were observed at two localities near Piet Retief (Theron and Braack 2001).

#### Population:

Breeding congregations of this species appear to be relatively small and widely dispersed. This species is considered to be severely fragmented as no subpopulation has >50% of individuals and >50% of sub-populations are considered non-viable( Measey *et al.* 2011).

#### Habitat and Ecology:

It inhabits grassland and savanna. It breeds in seasonal pans, swampy areas, and in pools near rivers. It nests in burrows in wet soil by temporary water and tadpoles move to water to develop.



**Major Threats:**

The main threats include habitat loss due to afforestation, sugar cane cultivation, urbanisation and invasive alien plants lowering the water table (Measey *et al.* 2011).

**Conservation Actions:**

The highest priority for conservation research of this species is to assess its ability to disperse. Understanding the impact of perceived threats and population size and trends is also required. This species occurs in the iSimangaliso Wetlands Park, the Hluhluwe-Imfolozi Game Reserve, and other protected areas (Bonamanzi, Twin Streams/Mtunzini) (Measey *et al.* 2011).

Listed as **Vulnerable** (B2 a, b (ii,iii,iv)) because its AOO is estimated to be 510 km<sup>2</sup>, its distribution is severely fragmented, and there is continuing decline in its area of occupation and the extent and quality of its habitat. The estimate of the area of occupation provided is conservative in nature; if additional surveys suggest it is more circumscribed, then a higher threat category should be considered (Measey *et al.* 2011).

More intensive surveys undertaken over extended periods are required in order to ascertain the current conservation status of Spotted Shovel-nosed Frogs (*Hemisus guttatus*) in the Mboza area. The proposed Mboza Bridge site and approach road provides no suitable habitat for Spotted Shovel-nosed Frogs.

**4.2 REPTILES**

All reptile species are sensitive to major habitat alteration and fragmentation. As a result of human presence in the area as well as on the site; coupled with habitat destruction and high levels of disturbances, alterations to the original reptilian fauna are expected to have already occurred. Removal of large riparian tree species and dead trunks for firewood collection destroys numerous habitats for many arboreal reptile species. Clearing of rock material destroys vital habitat for numerous rupicolous reptile species including the Agamids, Cordylids, Geckonids and Skinks. The majority of snake species hibernate in old tree trunks, termite mounds or under suitable rocks. The indiscriminate killing of all snake species results in the alteration of species composition, with the disappearance of the larger and the more sluggish snake species. The frequent burning of the understory and limited grassland vegetation has a high impact on remaining reptiles. Fires during the winter months will severely impact on the hibernating species, which are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as refuge areas increasing predation risks. The proposed Mboza bridge site does not constitute any significant habitat for any threatened reptile species, or reptiles in general. Five reptile species were recorded during the brief field survey mainly within the adjacent riverine forest upstream and downstream from the proposed Mboza bridge. A probable species list is provided in Table4 below.



**Figure9. A collage of photographs displaying the reptile species observed adjacent to the proposed Mboza Bridge site .** **A:** A White-throated or Rock Monitor (*Varanus albigularis*) was observed along an informal access road towards the Phongola River. **B:** An adult Flap-necked Chameleon was observed crossing the access road across the floodplain towards the Mboza Bridge Mbazwana. **C:** An adult male (blue head) Southern Tree Agama (*Acanthocercus atricolis*) and a camouflaged female were observed on a Knob-Thorn (*Senegalia nigrescens*) adjacent to the access road. **D:** An Olive Grass Snake (*Psammophis mossambicus*) was observed within the floodplain adjacent to the proposed Mboza Bridge site.

**Table4:** Reptile species that have been recorded in the 2732 AQA QDGC or are likely to occur in the study area due to suitable habitat, and may therefore be present. Actual species lists will most likely contain far fewer species due to high levels of habitat transformation.

Family	Common name	Genus	Species	Subspecies	Red list category	Atlas region endemic
Agamidae	Southern Tree Agama	<i>*Acanthocercus</i>	<i>atricollis</i>	<i>atricollis</i>	Least Concern (SARCA 2014)	
Chamaeleonidae	Flap-necked Chameleon	<i>*Chamaeleo</i>	<i>dilepis</i>	<i>dilepis</i>	Least Concern (SARCA 2014)	
Colubridae	Southern Twig Snake	<i>Thelotornis</i>	<i>capensis</i>	<i>capensis</i>	Least Concern (SARCA 2014)	
Cordylidae	Lebombo Flat Lizard	<i>Platysaurus</i>	<i>lebomboensis</i>		Least Concern (SARCA 2014)	
Cordylidae	Warren's Girdled Lizard	<i>Smaug</i>	<i>warreni</i>		Least Concern (SARCA 2014)	
Elapidae	Mozambique Spitting Cobra	<i>Naja</i>	<i>mossambica</i>		Least Concern (SARCA 2014)	
Gekkonidae	Spotted Gecko	<i>Pachydactylus</i>	<i>maculatus</i>		Least Concern (SARCA 2014)	
Gekkonidae	Van Son's Gecko	<i>Pachydactylus</i>	<i>vansoni</i>		Least Concern (SARCA 2014)	
Gerrhosauridae	Common Giant Plated Lizard	<i>Matobosaurus</i>	<i>validus</i>		Least Concern (SARCA 2014)	
Lacertidae	Common Rough-scaled Lizard	<i>Meroles</i>	<i>squamulosus</i>		Least Concern (SARCA 2014)	

Lacertidae	Ornate Sandveld Lizard	<i>Nucras</i>	<i>ornata</i>		Least Concern (SARCA 2014)	
Lamprophiidae	Black-headed Centipede-eater	<i>Aparallactus</i>	<i>capensis</i>		Least Concern (SARCA 2014)	
Lamprophiidae	Bibron's Stiletto Snake	<i>Atractaspis</i>	<i>bibronii</i>		Least Concern (SARCA 2014)	
Lamprophiidae	Brown House Snake	<i>Boaedon</i>	<i>capensis</i>		Least Concern (SARCA 2014)	
Lamprophiidae	Common File Snake	<i>Gonionotophis</i>	<i>capensis</i>	<i>capensis</i>	Least Concern (SARCA 2014)	
Lamprophiidae	*Olive Grass Snake	<i>Psammophis</i>	<i>mossambicus</i>		Least Concern (SARCA 2014)	
Lamprophiidae	Speckled Quill-snouted Snake	<i>Xenocalamus</i>	<i>transvaalensis</i>		Least Concern (SARCA 2014)	
Leptotyphlopidae	Incognito Thread Snake	<i>Leptotyphlops</i>	<i>incognitus</i>		Least Concern (SARCA 2014)	
Scincidae	Wahlberg's Snake-eyed Skink	<i>Afroablepharus</i>	<i>wahlbergii</i>		Least Concern (SARCA 2014)	
Scincidae	Lowveld Dwarf Burrowing Skink	<i>Scelotes</i>	<i>bidigittatus</i>		Least Concern (SARCA 2014)	Yes
Scincidae	Mozambique Dwarf Burrowing Skink	<i>Scelotes</i>	<i>mossambicus</i>		Least Concern (SARCA 2014)	
Scincidae	*Rainbow Skink	<i>Trachylepis</i>	<i>margaritifer</i>		Least Concern	



					(SARCA 2014)	
Scincidae	*Variable Skink	<i>Trachylepis</i>	<i> varia</i>		Least Concern (SARCA 2014)	
Varanidae	*Rock Monitor	<i>Varanus</i>	<i>albigularis</i>	<i>albigularis</i>	Least Concern (SARCA 2014)	

**\* recorded during brief field survey**

#### **Threatened Reptile Species**

No threatened reptile species have been recorded for the 2732 AA QDGC or are likely to occur within the bridge site or the immediate open areas surrounding the Mboza bridge due to extensive habitat transformation and degradation. The closed woodland riparian zone upstream and downstream from the bridge site provide important habitat for arboreal reptile species as well as the aquatic Water Monitor (*Varanus niloticus*).

#### **4.3 AVIFAUNA/BIRDS**

Forty-Four (44) bird species were recorded during the brief field survey (total 8 hours). Species recorded during the field survey are common, widespread and typical of a riverine forest and woodland/bushveld environment. Several Purple Crested Turacos as well as Trumpeter Hornbills were observed calling and feeding within the fruiting figs within the remnant patches of riverine forest. Three roosting Black-crowned Night Herons were flushed from the large Sycamore Fig Tree immediately upstream from the proposed Mboza Bridge site. A Malachite Kingfisher was observed foraging within the Phongola River. . The majority of bird species were recorded within the remnant riverine forest and scattered woodland pockets adjacent to the Mboza Bridge site. High levels of human disturbance as well as habitat transformation and degradation occurs within the proposed Mboza bridge site as well as along the road reserves of the approach road and results in the disappearance of the more secretive or sensitive bird species.



**Figure10.** A Malachite Kingfisher (*Alcedo cristata*) was observed foraging within the Phongola River.

**Table5:** Bird species recorded during brief field survey (8 hrs).

Roberts' Number	Common name	Scientific Name
58	Reed Cormorant	<i>Phalacrocorax africanus</i>
76	Black-Crowned Night-Heron	<i>Nycticorax nycticorax</i>
94	Hadedah Ibis	<i>Bostrychia hagedash</i>
102	Egyptian Goose	<i>Alopochen aegyptiacus</i>
148	African Fish Eagle	<i>Haliaeetus vocifer</i>
160	African Goshawk	<i>Accipiter tachiro</i>
196	Natal Spurfowl	<i>Pternistis natalensis</i>
203	Helmeted Guineafowl	<i>Numida meleagris</i>
352	Red-Eyed Dove	<i>Streptopelia semitorquata</i>
354	Cape Turtle Dove	<i>Streptopelia capicola</i>
355	Laughing Dove	<i>Streptopelia senegalensis</i>
361	African Green-Pigeon	<i>Treron calvus</i>
371	Purple-Crested Turaco	<i>Gallirex porphyreolophus</i>
391	Burchell's Coucal	<i>Centropus burchellii</i>
424	Speckled Mousebird	<i>Colius striatus</i>
431	Malachite Kingfisher	<i>Alcedo cristata</i>
435	Brown-Hooded Kingfisher	<i>Halycon albiventris</i>
444	Little Bee-eater	<i>Merops pusillus</i>
447	Lilac-breasted Roller	<i>Coracias caudatus</i>
455	Trumpeter Hornbill	<i>Bycanistes bucinator</i>
459	Southern Yellow-billed Hornbill	<i>Tockus lecomelas</i>
464	Blackcollared Barbet	<i>Lybius torquatus</i>
470	Yellow-Fronted Tinkerbird	<i>Pogoniulus chrysoconus</i>
483	Golden-tailed Woodpecker	<i>Campethera abingoni</i>
541	Fork-Tailed Drongo	<i>Dicrurus ludwigii</i>
545	Black-Headed Oriole	<i>Oriolus larvatus</i>
548	Pied Crow	<i>Corvus albus</i>
563	Southern Pied Babbler	<i>Urdoides bicolor</i>
568	Dark-capped (Black-eyed) Bulbul	<i>Pycnonotus barbatus</i>
572	Greenbul (Sombre Bulbul)	<i>Andropodus importunus</i>
577	Olive Thrush	<i>Turdus olivaceus</i>
600	Red-Capped Robin-Chat	<i>Cossypha natalensis</i>
657	Green-backed Camaroptera	<i>Camaroptera brachyura</i>
683	Tawny-Flanked Prinia	<i>Prinia flavicans</i>
736	Southern Boubou	<i>Laniarius ferrugineus</i>
750	Olive Bush-Shrike	<i>Telophorus olivaceus</i>
793	Collared Sunbird	<i>Hedydipna collaris</i>
796	Cape White-Eye	<i>Zosterops pallidus</i>

814	Masked Weaver	<i>Ploceus velatus</i>
815	Lesser Masked Weaver	<i>Ploceus intermedius</i>
824	Southern Red Bishop	<i>Euplectes orix</i>
840	African Firefinch	<i>Logonosticta rubicrata</i>
857	Bronze Mannikin	<i>Spermestes cucullata</i>
846	Common Waxbill	<i>Estrilda astrild</i>

## THREATENED AVIFAUNAL SPECIES

**Table6.** List of threatened and near-threatened bird species that have been recorded within the 2710\_3210 pentad as well as distribution records according to Eskom's Red Data Book of Birds of South Africa, Swaziland and Lesotho Barnes (2000).

Robert's Nr.	Common Name	Scientific Name	Conservation Status
49	Great White Pelican	<i>Pelecanus onocrotalus</i>	Near-threatened
50	Pink-Backed Pelican	<i>Pelecanus rufescens</i>	Near-threatened
84	Black Stork	<i>Ciconia nigra</i>	Near-threatened
86	Woolly-Necked Stork	<i>Ciconia episcopus</i>	Near-threatened
87	African Openbill	<i>Anastomus lammelligerus</i>	Near-threatened
88	Saddle-Billed Stork	<i>Ephippiorhynchus senegalensis</i>	Endangered
89	Marabou Stork	<i>Leptoptilos crumineferus</i>	Near-threatened
90	Yellow-billed Stork	<i>Mycteria ibis</i>	Near-threatened
101	African Finfoot	<i>Podica senegalensis</i>	Vulnerable
114	African Pygmy Goose	<i>Nettapus auritus</i>	Near-threatened
118	Secretarybird	<i>Sagittarius serpentarius</i>	Near-threatened
123	White-Backed Vulture	<i>Gyps africanus</i>	Vulnerable
129	Bathawk	<i>Macheiramphus alcinus</i>	Near-threatened
132	Tawny Eagle	<i>Aquila rapax</i>	Vulnerable
144	Southern Banded Snake Eagle	<i>Circaetus fasciolatus</i>	Vulnerable
140	Martial Eagle	<i>Polemaetus bellicosus</i>	Vulnerable
146	Bateleur	<i>Terathopius ecaudatus</i>	Vulnerable
165	African Marsh Harrier	<i>Circus ranivorus</i>	Vulnerable

172	Lanner Falcon	<i>Falco biarmicus</i>	Near-threatened
238	Black-bellied Korhaan or Bustard	<i>Eupodotis melanogaster</i>	Near-threatened
241	Lesser Jacana	<i>Microparra capensis</i>	Near-Threatened
242	Greater Painted Snipe	<i>Rostratula benghalensis</i>	Near-threatened
257	Blackwinged Lapwing or Plover	<i>Vanellus melanopterus</i>	Near-threatened
304	Red-winged or Collared Pratincole	<i>Glareola pranticola</i>	Near-Threatened
388	Black Coucal	<i>Centropu grillii</i>	Near-threatened
407	Natal or Swamp Nightjar	<i>Caprimulgus natalensis</i>	Vulnerable
430	Half-collared Kingfisher	<i>Alcedo semitorqata</i>	Near-threatened
490	African Broadbill	<i>Smithornis capensis</i>	Near-threatened
642	Broad-tailed Warbler	<i>Schoenicola brevirostris</i>	Near-threatened
649	Rudd's Apalis	<i>Apalis thoracica</i>	Near-threatened
704	Woodwards' Batis	<i>Batis fratum</i>	Near-threatened
730	Pink-throated or Rosy-throated Longclaw	<i>Macronyx ameliae</i>	Near-threatened
772	Red-billed Oxpecker	<i>Buphagus erythrorhyncus</i>	Near-threatened
782	Neergaard's Sunbird	<i>Cinnyris neergaardi</i>	Near-threatened
838	Pink-throated Twinspot	<i>Hypargos margaritatus</i>	Near-threatened
859	Magpie or Pied Mannikin	<i>Lonchura fringilloides</i>	Near-threatened
871	Lemon-breasted Canary	<i>Serinus citrinpectus</i>	Near-threatened

Several of the above-mentioned bird species have been downgraded to 'Least-Concern' during the updated RDB (2014). Several threatened bird species have been recorded in the 2732 AA within which the study area is situated. The major causal factors for population declines include habitat loss, transformation and degradation through wood harvesting, destruction of riverine and wetland/marsh habitat; agricultural and livestock modification; poisoning (persecuted directly and indirectly); shooting (especially raptors); invasion of alien vegetation and human made structures (lines, pylons, drownings in reservoirs, road fatalities etc.).

No threatened bird species were recorded during the brief survey but suitable habitat occurs within the Phongola River and fringing riverine forest or riparian zone for certain red listed bird species including Pels Fishing Owl, African Finfoot, Half-collared Kingfisher, European Roller and White-backed Night Heron. The adjacent floodplain areas could offer suitable foraging areas for Yellow-billed Storks during high-rainfall flooding events. The high levels of human disturbances within the proposed Mboza bridge site; severely restricts the likelihood of any of the above-mentioned threatened bird species occurring within the proposed Mboza bridge site. If any threatened bird species occur it is highly unlikely that the Mboza bridge servitude following an existing informal access road, livestock pathways and transformed riparian zone will form critical habitat for any threatened bird species. The construction of the Mboza bridge will have no significant impact on any threatened bird species if construction activities are restricted to the bridge site.

#### **4.4 MAMMALS**

No small mammal trapping was conducted. Fieldwork was augmented with previous surveys in similar habitats as well as published data. The area was initially traversed on foot to ascertain the presence of available refuges. Limited suitable refuges such as burrows, artificially created rock piles, stumps were observed. The majority of mammal species likely to occur around the homesteads are urban exploiters such as the House Rat and House Mouse as well as feral cats. Several mounds of the African Mole as well as burrows on the Natal Multimammate Mouse were observed in the sandier sections within the adjacent Phongola River floodplain. Evidence of Water Mongoose (Litrine) as well as Cape Clawless Otters were observed adjacent to a permanently inundated pan 800m to the south of the proposed Mboza Bridge site. Evidence of Common Duiker was observed within the closed wooded pockets adjacent to the Phongola River. Vervet Monkeys were observed foraging within a fruiting Sycamore Fig adjacent to the Phongola River. A Slender Mongooses were observed darting across an informal access road towards the Phongola River.

Mammal species recorded within the study area as well as those that may occur within the study area, on the basis of available distribution records and known habitat requirement, are included in the Table 7 below.

**Table7:** Mammal species recorded during field survey. Species in bold were recorded during the brief survey Identification was determined by visual observations and animal tracks (footprints and droppings).

<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
Common Molerat	<i>Cryptomys hottentotus</i>
Natal Multimammate Mouse	<i>Mastomys natalensis</i>
Scrub Hare	<i>Lepus saxtalis</i>
Striped Mouse	<i>Rhabdomys pumilio</i>
Grey Climbing Mouse	<i>Dendromus melanotis</i>
Brant's Climbing Mouse	<i>Dendromus mesomelas</i>
Bushveld Gerbil	<i>Tatera leucogaster</i>
*House mouse	<i>Mus musculus</i>
*House Rat	<i>Rattus rattus</i>
*Domestic Dog	<i>Canis familiaris</i>
*Feral Cat	<i>Felis catus</i>
Common Duiker	<i>Sylvicapra grimmia</i>
Bushbuck	<i>Tragelaphus scriptus</i>



Vervet Monkey	<i>Cercopithecus aethiops pygerythrus</i>
Water Mongoose	<i>Atilax paludinosus</i>
Cape Clawless Otter	<i>Aonyx capensis</i>
Slender Mongoose	<i>Galarella sanguinea</i>
Striped Polecat	<i>Ictonyx striatus</i>
Large-spotted Genet	<i>Genetta tigrina</i>
Porcupine	<i>Hystrix africaeaustralis</i>

\* introduced species

#### **Habitat available for Sensitive or Endangered Mammal Species**

According to *The Mammals of the Southern African Subregion* (Skinner and Chimimba 2005) the study area falls within the distribution ranges of 7 species which are placed into one of known threatened species (1) Critically Endangered; (1) Endangered, (3) Vulnerable and (1) Near-threatened) as well as 15 species which are presently listed as Lower Risk/conservation dependent. No actual observations of any sensitive or endangered mammals were recorded during the brief survey. More comprehensive surveys undertaken over extended periods will deliver a more representative species list for the site.

**Table8.** Mammal species of conservation importance possibly occurring within the 2732 AA QDGC (using habitat availability and distribution according to Skinner & Chimimba 2005 as an indicator of presence). The majority of species below will be restricted to the conservation areas (provincial and private nature reserves).

SCIENTIFIC NAMES	COMMON NAMES	SARDB	Criteria
<b>ORDER CHIROPTERA</b>			
<i>Cloeotis percivalli</i>	Short-eared trident bat	VU	A2bc + A3bc; C1
<b>ORDER PROBOSCIDEA</b>			
<i>Loxodonta africana</i>	African Savanna Elephant	VU	A2a
<b>ORDER PHOLIDOTA</b>			
<i>Manis temminckii</i>	Ground Pangolin	LR/nt	
<b>ORDER CARNIVORA</b>			
* <i>Panthera leo</i>	Lion	VU	A2abcd
* <i>Lycaon pictus</i>	African Wild Dog	EN	C2a1
<b>ORDER PERISSODACTYLA</b>			
* <i>Ceratotherium simum</i>	White Rhinoceros	NT	
* <i>Diceros bicornis</i>	Black Rhinoceros	CR	A2abc

SARDB (South African Red Data Book): CR = Critically Endangered, En = Endangered, Vu = Vulnerable, LR/nt = Lower Risk near threatened, DD = Data Deficient.

\* re-introduced species

No sensitive or endangered mammals were recorded within the study area. The majority of larger mammal species are likely to have been eradicated or have moved away from the area during the previous agricultural and current high-levels of anthropogenic activities. This is mainly a result of increased development pressure and human disturbances such as daily hunting with dogs and poaching (wire snares), as well as habitat alteration and degradation by vegetation clearance and frequent fires. Smaller mammal species are extremely vulnerable to dogs and cats, snares and poaching activities. It is highly unlikely that the proposed Mboza bridge site constitutes significant habitat for any species of threatened mammal species or will have a significant impact on any threatened mammal species.

# 5. SENSITIVE HABITATS

## 5.1 Phongola River and Riverine Forest or Closed Woodland Riparian Zone



Rivers and streams/drainage lines are longitudinal systems with impacts affecting both upstream and downstream habitat. The entire seasonally inundated or non-perennial drainage lines and their associated indigenous dominated riparian vegetation must be considered as sensitive habitats. Any impact on the riverine area within the study area is therefore also likely to impact on upstream and downstream areas. Riparian zones have the capacity to act as biological corridors connecting areas of suitable habitat in birds (Whitaker & Metevecchi, 1997), mammals (Cockle & Richardson 2003) reptiles and amphibians (Maritz & Alexander 2007). Riparian zones may act as potential refugia for certain fauna and could allow for possible re-colonisation of rehabilitated habitats. The riparian vegetation plays a vital role in the re-colonisation of aquatic macro-invertebrates as well as reptiles and amphibians (Maritz & Alexander 2007).

The riparian vegetation provides vital refuge, foraging and migratory passages for species migrating to and away from the rivers. The riparian zone comprises plant communities contiguous to and affected by surface and subsurface hydrological features of perennial or intermittent water bodies (rivers and streams). The riparian vegetation is dependant on the river for a number of functions including growth, temperature control, seed dispersal, germination and nutrient enrichment. Riparian vegetation comprises a distinct composition of species, often different from that of the surrounding terrestrial vegetation. Tree species are positioned according to their dependence or affinity for water, with the more mesic species (water-loving) being located closest to the river channel, often with their roots in the water, and the less water-loving terrestrial species further away from the river.

**The riparian zone, of which vegetation is a major component, has a number of important functions including:**

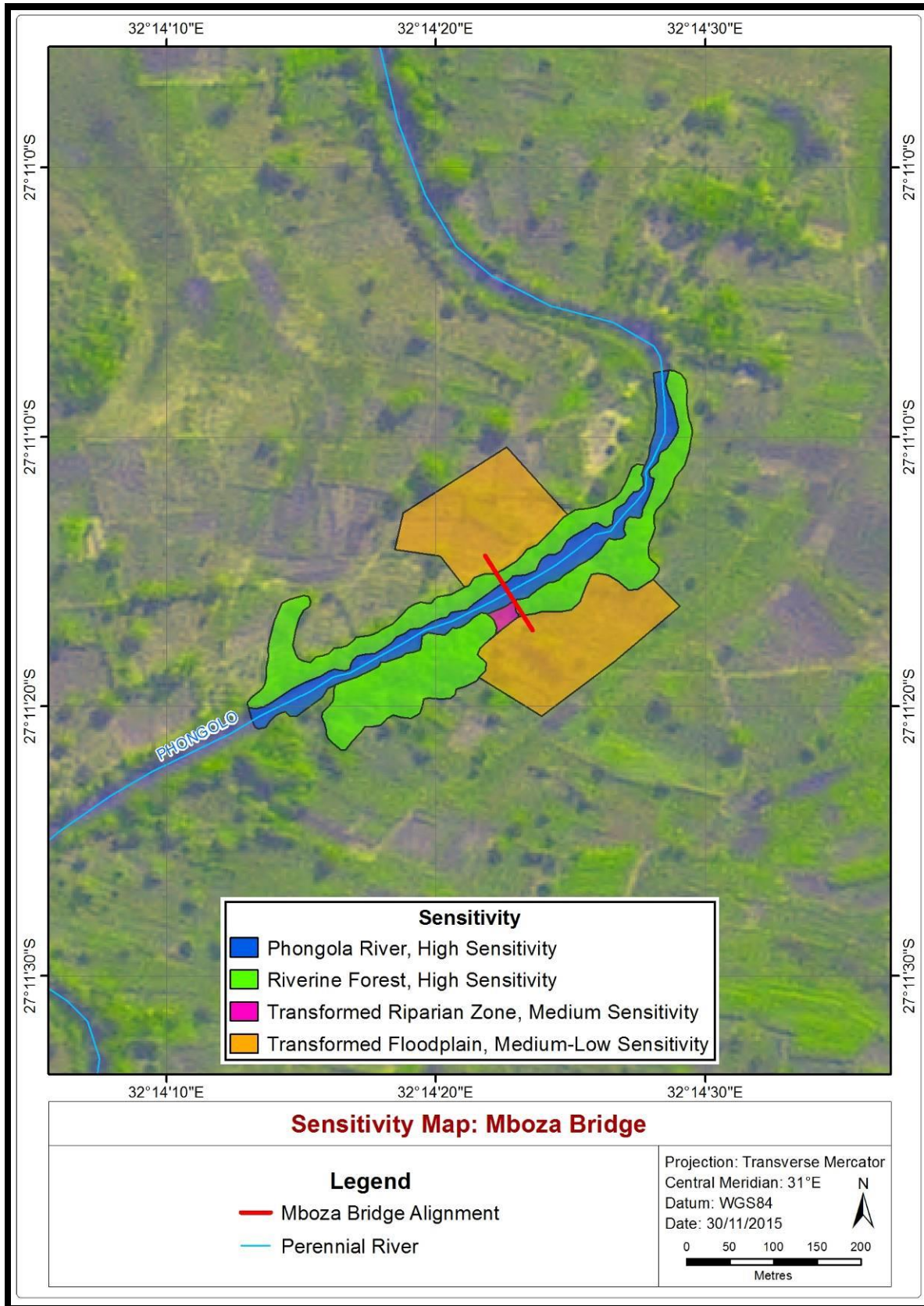
- enhancing water quality in the river by the interception and breakdown of pollutants;
- interception and deposition of nutrients and sediments;
- stabilisation of riverbanks and macro-channel floor;
- flood attenuation;
- provision of habitat and migration routes for fauna and flora;
- provision of fuels, building materials and medicines for communities (if done on a sustainable basis); and
- recreational areas (fishing - rod and line not shade or gill nets; bird watching; picnic areas etc.).

All rivers including the Phongola River as well as adjacent floodplain ( to a lesser extent) must be considered as **Highly sensitive habitats** due to ecological functioning as well as providing suitable habitat as well as biological or dispersal corridors for remaining faunal species. The Phongola River and Lowveld Riverine Forest (FOa 1) azonal vegetation type comprises an 'Endangered' vegetation type (Mucina & Rutherford 2006). Activities within the adjacent remnant patches of closed woodland riparian zone must be severely restricted and managed. Vegetation clearance must be restricted to the already transformed section on the southern embankments and removal of two indigenous riparian trees and shrubs on the northern embankment.

From the initial site visitations as well as desktop study using inter alia aerial photographs and Google Earth™ imagery the following four sensitivity categories of areas were identified:

- High:** Areas with high species richness and habitat diversity comprising natural indigenous plant species. These areas are ecologically valuable and important for ecosystem functioning. These areas should be avoided wherever possible.
- Medium:** An area with a relatively natural species composition; not a threatened or unique ecosystem; moderate species and habitat diversity. Development could be considered with limited impact on the vegetation / ecosystem.
- Low-medium:** Areas with relatively natural vegetation, though a common vegetation type. Could be developed with mitigation and expected low impact on ecosystem
- Low:** A totally degraded and transformed area with a low habitat diversity and ecosystem functioning; no viable populations of natural plants. Development could be supported with little to no impact on the natural vegetation / ecosystem.





**Figure11.** Ecological sensitivity map for the proposed Mboza Bridge site.  
**Mboza Bridge: Preliminary Ecological Survey**

## 6. Impact rating of the proposed Mboza Bridge site

**Table8.** The impact rating criteria used for determining potential impacts of the Mboza Bridge.

Descriptive criteria	
Nature	Include a descriptive sentence
Probability	Categories 1 – 5
	1    Improbable (less than 24% chance of occurring)
	2    Probable (25 – 49%)
	3    Likely (50 – 69%)
	4    Very likely (70 – 89%)
	5    Definite (90 – 100%)
Frequency	Categories 1 – 5
	1    Very rare to remote (once or twice a decade)
	2    Unusual to occasional (once or twice every 5 years)
	3    Frequent (a few times a month)
	4    Very frequent (a few times a week, to daily)
	5    Continuous (daily to a significant percentage of every day)
Extent	Categories 1 – 5
	1    Footprint / site
	2    Local
	3    Regional
	4    National
	5    International (trans-boundary)
Duration	Categories 1 – 5
	1    Short (few days to a few months, less than a phase)
	2    Short (few months, or less than a phase in total)
	3    Medium (a few years, significant part of a phase)
	4    Long (lifespan of development (i.e. all of operation)
	5    Permanent
Intensity	Categories 1 – 5
	1    Very low – natural processes not affected
	2    Low – natural processes slightly affected
	3    Medium – natural processes continue but in a modified manner
	4    Medium-high – natural processes are modified significantly
	5    High – natural processes disturbed significantly so that they cease to occur (temporarily / permanently)
Significance	<b>Significance = P + F + E + D + I</b> Minimum value of 5, maximum of 25 Status determines if positive / negative
	<b>Any positive value</b> No impact High to low consequence, probability not an issue as positive, <b>no mitigation required</b>
	– 5    Low-Low consequence, probably, <b>minimal mitigation may be required</b>
	– 6 to 10    Medium-Medium consequence, probably, <b>mitigation is advised / preferred</b>
	– 11 to 15    Medium-High consequence, probably to very probable, <b>mitigation is necessary</b>
	– 16 to 20    High-High consequence, probably / definite, <b>mitigation is essential</b>
	– 21 to 25    Extreme-Very high consequence, definite, <b>Fatal flaw!</b>



**Table9.** Summary table of the potential impacts and ratings for the Mboza bridge project.

Nature of Impact	Probability	Frequency	Extent	Duration	Intensity	Significance
Habitat destruction with transformation of natural vegetation and habitats within the proposed Mboza bridge Site.	Definite (90-100%)	During Construction Phase	Local Footprint / site	Permanent	Medium – natural processes continue but in a modified manner	High-High consequence, probably / definite, <b>mitigation is essential</b>
Destruction of suitable habitat for red listed or threatened plants and animals.	Improbable (less than 24% chance of occurring)	During Construction Phase	Local Footprint / site	Permanent	Very low – natural processes not affected	Low-Low consequence, probably, <b>minimal mitigation may be required</b>
Destruction of protected tree species	Very likely (70 – 89%)	During Construction Phase	Local Footprint / site	Permanent	Very low – natural processes not affected	Medium-High consequence, probably to very probable, <b>mitigation is necessary</b>
Increased levels of road fatalities of dispersing animals.	Probable (25 – 49%)	Frequent (a few times a month)	Local Footprint / site	Long (lifespan of development (i.e. all of operation)	Low – natural processes slightly affected	Medium-High consequence, probably to very probable, <b>mitigation is necessary</b>
Erosion and sediment control from the cleared site.	Improbable (less than 24% chance of occurring)	Very rare to remote (once or twice a decade)	Local Footprint / site, but eroded soil could be washed onto other ecosystems	Long (lifespan of development (i.e. all of operation)	Low – natural processes slightly affected	Medium-Medium consequence, probably, <b>mitigation is advised / preferred</b>

## 7. DISCUSSION

Any development will have a negative effect on the natural ecosystem in particular the vegetation thereof. The vegetation of areas where the Mboza bridge development and building of structures will take place will destroy all vegetation present on the specific area where the bridge structures are planned to be erected. Due to the effect of soil tillage and the complete removal of indigenous vegetation these areas will be totally transformed or destroyed. The effect on the ecosystem and surrounding areas will depend on the planned development activity.

The purpose of any ecological assessment is to determine areas of high sensitivity and to provide guidelines to ensure that the proposed Mboza bridge development is ecologically sensitive and to prevent unnecessary destruction of natural ecosystems. It is mostly unavoidable to prevent all development especially the linear development such as power lines, roads and bridges to bisect sensitive areas. It is therefore important that all possibilities for such linear infrastructures are investigated in order to provide ecologically sound recommendations on routes to be followed.

The proposed Mboza bridge site is situated within a completely transformed section of the riparian zone on the southern banks and will result in the destruction of two indigenous riparian trees on the southern embankment. The riparian vegetation within and adjacent to the proposed Mboza bridge site has been extensively degraded due to adjacent anthropogenic activities including wood harvesting, clearance of riparian zone as well as extensive alien invasive thickets. It is imperative that construction activities of the Mboza bridge is restricted to the transformed section on the southern banks and the bridge servitude within the riparian zone on the northern embankment. One protected tree species namely a single, small (<2m) Marula (*Sclerocarya birrea* subsp. *caffra*) was recorded adjacent to the existing access road and will most likely need to be removed or relocated. If this tree needs to be removed, a permit from the Department of Agriculture, Fisheries and Forestry (Forestry Branch) will have to be obtained for this purpose. It is recommended that once the final Mboza bridge alignment has been decided on and pegged that a walk down by a qualified plant ecologist is done to determine if any threatened plant species have emerged and how many protected tree species must be removed.

The proposed Mboza Bridge and approach road and associated increased vehicular traffic may impact on the terrestrial fauna in various ways. The major impacts occurring during the construction phase involve the loss and fragmentation of habitats, with a consequent loss of biodiversity, some ecosystem functioning and possibly loss of remnant faunal species or of plant species of conservation concern. This may result from direct land clearance, or occur indirectly via loss or changes in habitats due to consequent changes in drainage patterns, increased fire risk, or secondary impacts associated with socio-economic factors resulting from changes in surrounding land use. During the operational life of the bridge access road, small accumulative impacts would also occur, including ongoing road mortalities, increased disturbance (noise and light), dust generation, air pollution, chemical contamination from petroleum and rubber products, increased litter, changes in the incidence of fire (more frequent), and the introduction of a corridor for alien vegetation.

All of these factors may impact the surrounding fauna and ecological processes in different ways.

The Mboza bridge site is dominated by completely transformed vegetation within the southern embankments. The floodplain and patches of bushveld provides limited suitable habitat for certain rodent species such as the Bushveld Gerbil, House Rats (villages) as well as Multimammate Mouse. Rodents construct burrows in the sandy soils and attract other predators such as the Slender Mongoose. Bird species around the agricultural fields are restricted to granivorous or seed eating birds such as Laughing Dove, Cape Turtle Dove. The majority of bird species recorded during the site visit were observed in the remnant pockets of riverine forest or closed woodland riparian zones. Reptile species are extremely sensitive to habitat destruction and transformation. Low reptile diversity is expected within the transformed Mboza bridge site and adjacent degraded road reserves, old lands and current agricultural lands. Species recorded during the brief field assessment included Flap-necked Chameleon, Southern Tree Agama, Olive Grass Snake and a White-throated Monitor. Medium-High amphibian diversity is expected within the seasonally inundated depressions or pans within the Phongola Rivers' floodplain.

The proposed Mboza bridge will most likely have an impact of low; short-term significance on the remaining vegetation and fauna if construction activities are restricted to the transformed and degraded habitats on the southern banks and to the actual bridge site; especially when the bridge bisects the northern embankments riparian zone of the Phongola River.

## 8. CONCLUSION AND RECOMMENDATIONS

During the construction phase of the proposed Mboza Bridge, habitat destruction and alteration inevitably takes place. This happens with the construction of approach roads, and the clearing of the vegetation on the bridge site. These activities will have an impact on the associated vegetation and fauna; especially ground living and fossorial species occurring within and in close proximity of the Mboza bridge site, both through modification of habitat and disturbance caused by human activity. The proposed impact will be of a **definite low; short-long term negative impact** on remaining natural vegetation and associated faunal species within the Mboza bridge site and immediate adjacent areas.

### 8.1. GENERAL MITIGATORY MEASURES AND RECOMMENDATIONS

**The following recommendations are made to minimize the impacts of proposed Mboza bridge on the immediate environment and remaining fauna:**

- Close site supervision must be maintained during construction. A suitably qualified (minimum BSC. Hons.) Environmental Control Officer (ECO) must be appointed for the project.
- During the **CONSTRUCTION** phase workers must be limited to areas under construction within the Mboza bridge site and access to the undeveloped areas, especially the closed woodland riparian zone of the Phongola River must be strictly regulated (“no-go” areas during construction as well as operational activities).
- Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) water in the area. Mobile toilets must be provided in order to minimize un-authorised traffic of construction workers outside of the designated areas.
- All alien invasive plant should be removed from the proposed Mboza bridge and road servitude to prevent further invasion.
- Firearms or any other hunting weapons must be prohibited on site.
- Contract employees must be educated about the value of wild animals and plants and the importance of their conservation.
- Severe contractual fines must be imposed and immediate dismissal on any contract employee who is found attempting to snare or otherwise harm remaining faunal species.
- No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site.

## 8.2 VEGETATION

All indigenous trees and plants occurring outside the proposed Mboza bridge and approach road, shall be left undisturbed and permits will be required for the removal of the protected tree species namely a single small Marula (*Sclerocarya birrea* subsp. *caffra*). In terms of the National Forests Act 1998 (Act No 84 of 1998) certain tree species can be identified and declared as protected. The Department of Water Affairs and Forestry (now Department of Forestry and Fisheries) developed a list of protected tree species. In terms of Section 15 (1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization. The Department of Agriculture, Forestry and Fisheries (DAFF) will have to be approached to obtain the required permits for the removal of any protected tree species.

### Management objective

- Minimal disturbance to vegetation where such vegetation does not interfere with the CSP plant and the linear infrastructure servitudes (road, pipeline and powerline)
- No unnecessary destruction to surrounding vegetation especially in the adjacent natural areas situated in close proximity to the CSP site and linear infrastructure servitudes.

### Measurable targets

- Adequate protection of adjacent indigenous plant or tree species, especially the three large Marula (*Sclerocarya birrea* subsp. *caffra*) approximately 15m from the current access road.
- Permits are obtained from DAFF prior to the removal of any protected tree or plant species.
- No litigation due to removal of vegetation (protected plant and tree species) without the necessary permits

## MITIGATION AND RECOMMENDATIONS

- As a precautionary measure as suitably qualified botanist should undertake a walk-through of the Mboza bridge site as well as linear developments servitudes and undertake a rescue and recovery programme. All remaining geophytes and Aloes should be removed and relocated away from the development.
- Where herbicides are used to clear vegetation, selective and biodegradable herbicides registered for the specific species should be applied to individual plants only. General spraying and the use of non-selective herbicides (e.g. Roundup, Mamba etc.) should be prohibited at all times.

- All alien vegetation should be eradicated within the linear infrastructure servitudes over a five-year period. Invasive species (*Chromoalena odorata*, *Lantana camara*, *Caesalpinia decapetala*) should be given the highest priority. No dumping of any materials in adjacent Phongola River and riparian zone. Activities in the surrounding open undeveloped areas must be strictly regulated and managed. It is imperative that the construction and operational activities are restricted to the Mboza bridge and associated infrastructure. This impact is anticipated to be **localised, of a short-long-term nature and of low significance**, provided that appropriate mitigation measures are implemented (e.g. the limitation of vegetation or tree clearance adjacent to the Mboza bridge).

## 6.3 VEGETATION CLEARANCE

### Management objective

- Minimise damage to surrounding vegetation
- Minimise damage to topsoil
- Successful rehabilitation of barren areas

### Measurable targets

- No damage to indigenous vegetation outside the road servitude
- No loss of topsoil
- No visible erosion three months after completion of the contract
- All disturbed areas successfully rehabilitated three months after completion of the contract

## MITIGATION AND RECOMMENDATIONS

- Vegetation clearing of the Mboza bridge must be kept to the proposed construction servitude. Vegetation clearance. Four protected tree species occur within and adjacent to the proposed alignment. Any trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root systems are removed. Stumps shall be treated with herbicide. Smaller vegetation can be flattened with a machine, but the blade should be kept above ground level to prevent scalping. Any vegetation cleared shall be removed or flattened and not be pushed to form an embankment.
- Disturbed areas of natural vegetation must be rehabilitated immediately to prevent soil erosion. The use of herbicides shall only be allowed after a proper investigation into the necessity, the type to be used, the long-term effects and the effectiveness of the agent. Application shall be under the direct supervision of a qualified technician. All surplus herbicide shall be disposed of in accordance with the supplier's specifications.
- All alien vegetation in the linear infrastructure servitudes and densifiers creating a fire hazard shall be cleared and treated with herbicides. Exotic and invasive plant species were categorised according to the framework laid out by The Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983). CARA defines weeds as alien plants, with no



known useful economic purpose that should be eradicated. Invader plants, also considered by the Act, can also be of alien origin but may serve useful purposes as ornamentals, as sources of timber, or may have other benefits (Henderson, 2001). These plants need to be managed and prevented from spreading.

**Alien and invasive plant species can be grouped three categories:**

- Category 1 plants are weeds that serve no useful economic purpose and possess characteristics that are harmful to humans, animals or the environment. These plants need to be eradicated using the control methods stipulated in Regulation 15.D of the CARA.
- Category 2 plants are plants that are useful for commercial plant production purposes but are proven plant invaders under uncontrolled conditions outside demarcated areas.
- Category 3 plants are mainly used for ornamental purposes in demarcated areas but are proven plant invaders under uncontrolled conditions outside demarcated areas.

The dominant alien invasive vegetation observed mainly within the transformed areas adjacent to the Mboza bridge included the Category 1b *Lantana camara*, *Chromolaena odorata* and *Caselpinia decapetala*.

## **6.4 INCREASED ROAD FATALITIES**

The proposed access roads to the CSP plant will most-likely result in a **medium-low, short-long duration negative impact** due to increase in numbers of road fatalities of dispersing faunal species.

### **MITIGATION AND RECOMMENDATIONS**

- Speed limits should be imposed on the proposed approach road as well as Mboza bridge.

## **6.5 EROSION AND SEDIMENT CONTROL**

The clay sands within the proposed Mboza bridge site have a low erodibility and low risk of erosion. The southern embankments have become eroded due to un-controlled livestock drinking activities. No additional mitigatory measures for controlling erosion and sedimentation are expected from the Mboza bridge site as well as approach roads due to the flat topography and well-structured, deep clay-loam soils.

## 6.6 FIRE FREQUENCY

The possibility occurs for fires and burning of the vegetation will have a high impact on remaining vegetation and associated faunal species. Fires during the winter months will severely impact on the hibernating species, which are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as refuge areas increasing predation risks.

### Management objective

- Minimise risk of veld fires
- Minimise damage to grazing
- Prevent runaway fires

### Measurable targets

- No veld fires started by the Contractor's work force
- No claims from Landowners for damages due to veld fires
- No litigation

## MITIGATION AND RECOMMENDATIONS

- **No open fires shall be allowed on site** under any circumstance. The Contractor shall have fire-fighting equipment available on all vehicles working on site, especially during the winter months.
- Precautionary signs should be erected indicating no open fires.

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