BASIC ASSESSMENT REPORT – DRAFT 1

For the White Umfolozi River Causeway Crossing (Babanango Valley), Zululand, KwaZulu-Natal

Prepared for	Prepared by
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EDTEA EIA Reference Number: DC26/0009/2019 and KZN/EIA/0001215/2019

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DETAILS OF THE INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) FOR THE BASIC ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PLAN

Compiled by:

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I, **Justin Pietro Ellero** confirm:

- The correctness of all information within the BAR and EMP;
- All I&APs comment and inputs have been included in this Report;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the NEMA Regulations.

An undertaking of oath can be found at the end of this application.

Project Team for the proposed White Umfolozi Causeway Crossing Application:

Name	Role	Company	Qualifications
IDM Environmental Project Team			
Mr. Justin Ellero	Environmental Assessment Practitioner	IDM Environmental – EAP	MSc Geography (UKZN)
Mr. Karl Wiggishoff	Internal Reviewer of all Reports	Managing Director of IDM Environmental	Masters in Environmental, Planning and Development Law (Stel)
Public Participation Consultant			
Ms. Rose Owen	Public Participation Officer	Phelamanga	Masters in Social Science
Environmental Specialists			
Ms. Louise Zdnaw	Botanical and Freshwater Specialist	Managing Director of EnviroSwift KZN (Pty) Ltd.	BSC Honours Botany (UCT) SACNASP Registered (114072)
Dr. Bruce Scott-Shaw	Floodline Assessment Specialist	Naturestamp (Pty) Ltd	PHD Hydrology SACNASP Registered
Mr. Alex Whitehead	Ichthyofaunal (fish) Specialist	Sustainable Development Projects cc	BSc Honours SACNASP Registered
Mr. M. Hadlow	Geotechnical Specialist	Drennan Maud (Pty) Ltd	B.Sc (Honours) MSAIEG SACNASP Registered
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Dr. Shian Saroop	Engineering Report and Designs	UNDASA Project Partners	Pr Tech Eng: Civil

TABLE OF CONTENTS

LIST OF ANNEXURES:

LIST OF APPENDICES:

Appendix 4: Floodline Assessment

Appendix 5: Ichthyofaunal (fish) Survey

Appendix 6: Geotechnical Report

Appendix 7: Engineering Designs

Appendix 8: EAP CV and Specialist Declarations (*Specialist Declarations to be provided in Final Report*)

LIST OF TABLES

LIST OF FIGURES

LIST OF IMAGES

ABBREVIATIONS

BA	Basic Assessment
BAR	Basic Assessment Report
C	Construction
CA	Competent Authority
CBA	Critical Biodiversity Area
CO	Conservation Outcome
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECT	Emcakweni Community Trust
EDTEA	Department of Economic Development, Tourism and Environmental Affairs (KZN)
EIA	Environmental Impact Assessment
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EMP	Environmental Management Plan
ESA	Ecological Support Area
ETo	Potential Evaporation

FEPA	Freshwater Ecosystem Priority Area
IDM	Integrated Development Management Consultants
IDME	Integrated Development Management Consultants Environmental
LM	Local Municipality
KZN	KwaZulu-Natal
NBA	National Biodiversity Assessment
NDP	National Development Plan
NEMPAA	National Environmental Management: Protected Areas Act (57 of 2003)
NFEPA	National Freshwater Ecosystem Priority Area
O	Operational
PGDP	KZN Provincial Growth and Development Plan
PP	Public Participation
PPP	Public Participation Process
PSDF	KZN Provincial Spatial Development Framework
SCC	Species of Conservation Concern
SANBI	South African National Biodiversity Institute
WM	With Mitigation
WMA	Water Management Area
WOM	Without Mitigation
WUL	Water Use License
WULA	Water Use License Application

1 BACKGROUND INFORMATION

1.1 INTRODUCTION

An application (**DC26/0009/2019 and KZN/EIA/0001215/2019**) has been submitted to the KwaZulu-Natal Provincial Department of Economic Development, Tourism and Environmental Affairs on behalf of Emcakweni Community Trust (The Applicant), for the proposed White Umfolozi River causeway crossing situated in the Babanango Valley in Zululand. IDM Environmental (IDME) has been appointed as the independent Environmental Consultant by the Emcakweni Community Trust (ECT) to conduct a Basic Assessment (BA) process for the proposed Umfolozi River causeway crossing as part of the Environmental Impact Assessment Regulations of 2014 (as amended).

The proposed development is for the construction of a 200m long and 4m wide causeway crossing over the White Umfolozi River in the Babanango Valley. The proposed causeway will provide a quick, easy and safe access between the northern and southern sections of the White Umfolozi River. The causeway will replace an existing derelict and unsafe causeway (as determined by Engineering Consultants) further downstream that poses a significant hazard when crossing, as well as being a far more onerous crossing alternative. On both the northern and southern sections of the proposed causeway there are existing dirt tracks which will be lengthened to connect to the proposed causeway itself.

1.2 BACKGROUND TO THE BABANANGO GAME RESERVE FORMATION

The development of the Umfolozi River causeway forms part a broader plan to create linked accessibility between the northern and southern sections of the proposed new Babanango Game Reserve (**Figure 1.1**). The majority of the land making up the proposed Babanango Game Reserve is currently owned by the Emcakweni Community Trust (ECT), which expressed interest in entering into a Biodiversity Stewardship Programme in 2012. The Trust required an investment partner to assist it and its constituent beneficiaries/community in achieving this goal. African Habitat Conservancy (Pty) Ltd has agreed to invest with the Trust and support it for these and associated conservation and community upliftment purposes, while Conservation Outcomes has further lent its support and expertise to the Trust. The long term goal (in keeping with the principles of the Biodiversity Stewardship Programme) is to develop and manage a financially viable private game reserve (Big Five) and the restoration of the biodiversity, the cultural history and scenic splendour of the region. The proposed causeway crossing forms one small component of the broader programme and conservation goals for the area which includes:

- The leasing of land from the ECT and the Kwanqono Community Trust (KCT). The ECT land already contains the Babanango Valley Educational Centre;

- The purchase of property adjacent to the ECT and KCT land to form part of the Babanango Game Reserve (**Figure 1.2**). This includes Zulu Rock Game Reserve, Fairview Cattle Farm, Doornkroon Farm, Lulu Cattle Farm and the Matatane River Lodge.
- The rehabilitation of the sensitive environment forming part of the proposed Reserve;
- Re-instate (or if this is not possible) simulate, through the implementation of sustainable management principles, those ecological processes and regulatory mechanisms endemic to the region;
- The removal of invasive alien species;
- The reintroduction of biodiversity into the Reserve. This includes large game and the 'Big Five';
- The installing of game fences around the Reserve (which will form part of a separate environmental impact assessment);
- The creation of significant community employment opportunities and socio-economic upliftment;
- The establishing and refurbishment of various eco-lodges within the proposed Reserve (also to form part of separate environmental impact assessment). There are two existing lodges in the proposed Reserve which will be upgraded and two new lodges are proposed at this time; and
- The establishing of various community upliftment projects, in order to create sustainable opportunities for the local community and the beneficiaries of the Trusts, and assist in alleviating poverty and unemployment in the area.

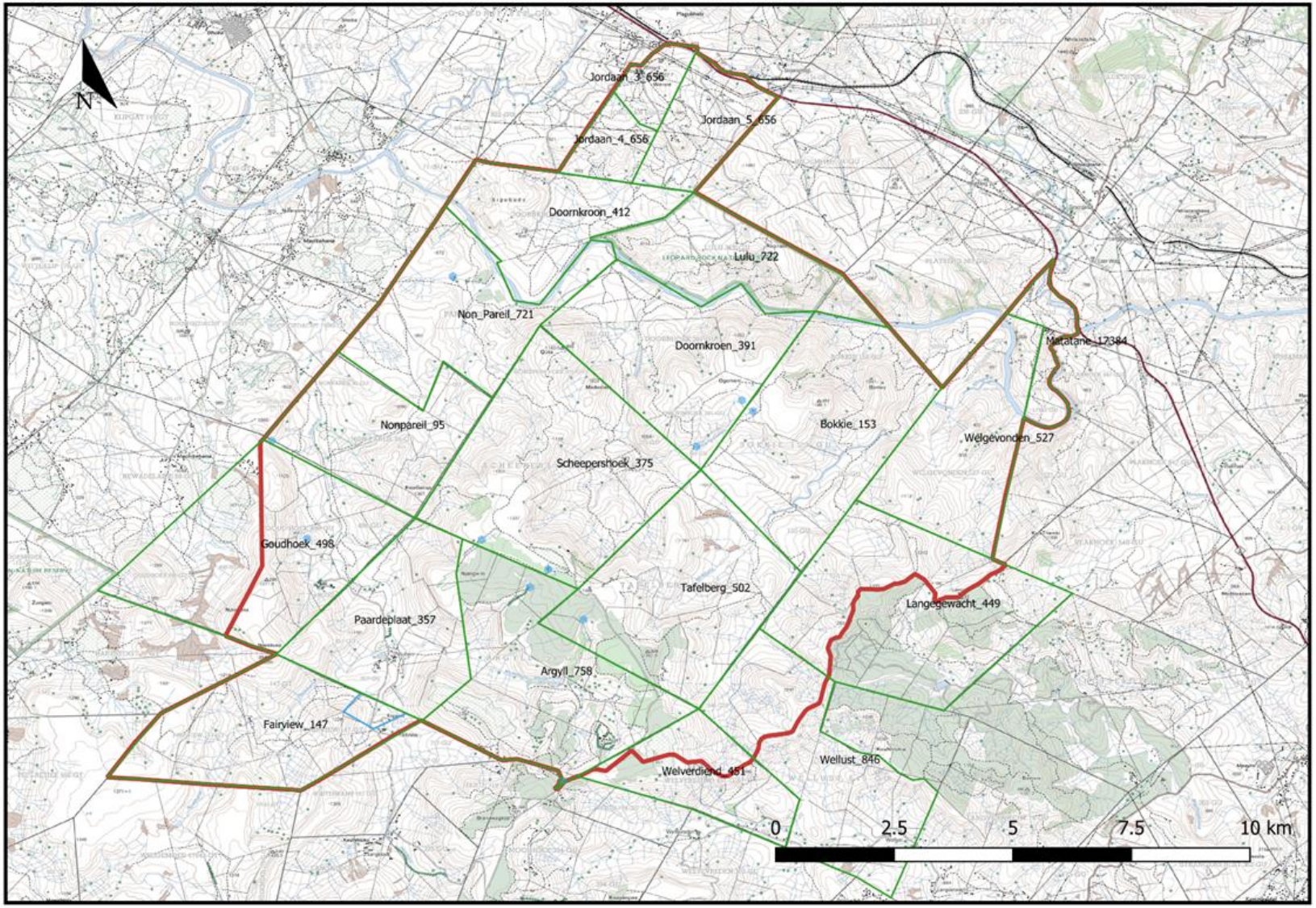

Figure 1.1: The proposed Babanango Game Reserve

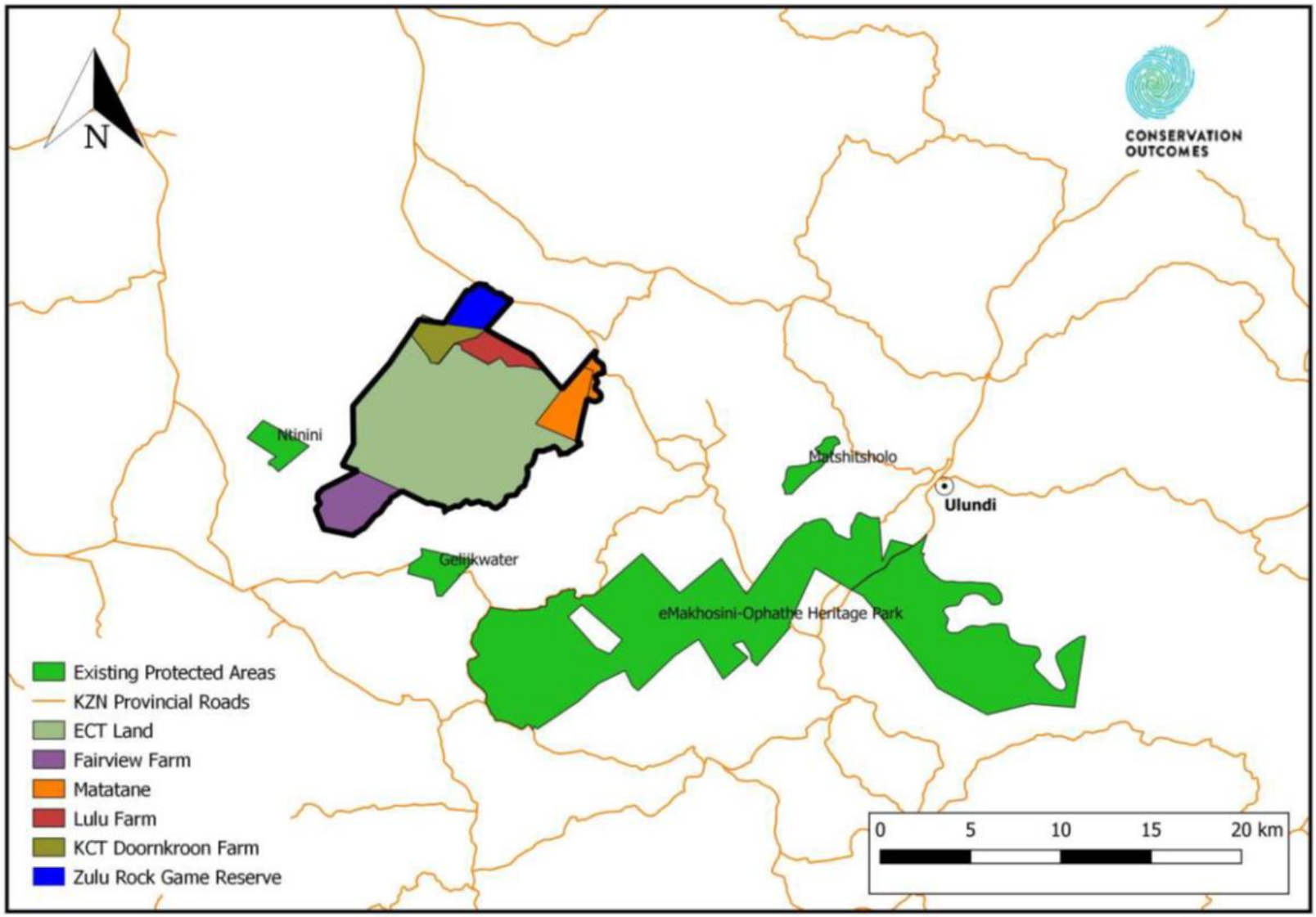

Figure 1.2: Properties making up the proposed Babanango Game Reserve and the Reserve in relation to surrounding protected areas

1.3 LOCATION OF THE PROJECT

The site of the proposed causeway development is located on the properties of Non Pareil, 721/GU (to the North/East) and Portion 4 of Doornkroon, 412/GU (to the South/West). The causeway crossing is approximately 51km south east from Vryheid, approximately 28km west from Ulundi and approximately 7km to the north east of the small town of Babanango in the Zululand District of Northern KwaZulu-Natal (**Figure 1.3 and 1.4)**. A more in-depth locality map is located in **Annexure A**, while **Annexure B** contains a detailed layout plan of the proposed White Umfolozi causeway crossing. **Table 1.1** below contains a summary of the location description.

Table 1.1: Summary of the proposed property details for the White Umfolozi causeway crossing

Farm Names	Non Pareil, 721/GU and Portion 4 of Doornkroon, 412/GU
Property Owners	ECT (Non Pareil) and KCT (Doornkroon)
Magisterial District	Zululand District Municipality; and Ulundi Local Municipality
Distance and Direction to nearest town	51km south east from Vryheid, approximately 28km west from Ulundi and approximately 7km to the north east of the small town of Babanango
Coordinates	28° 13' 45.06"S 31° 03' 20.95"E
Property Zoning	To be zoned from Agriculture to a Nationally Protected Area

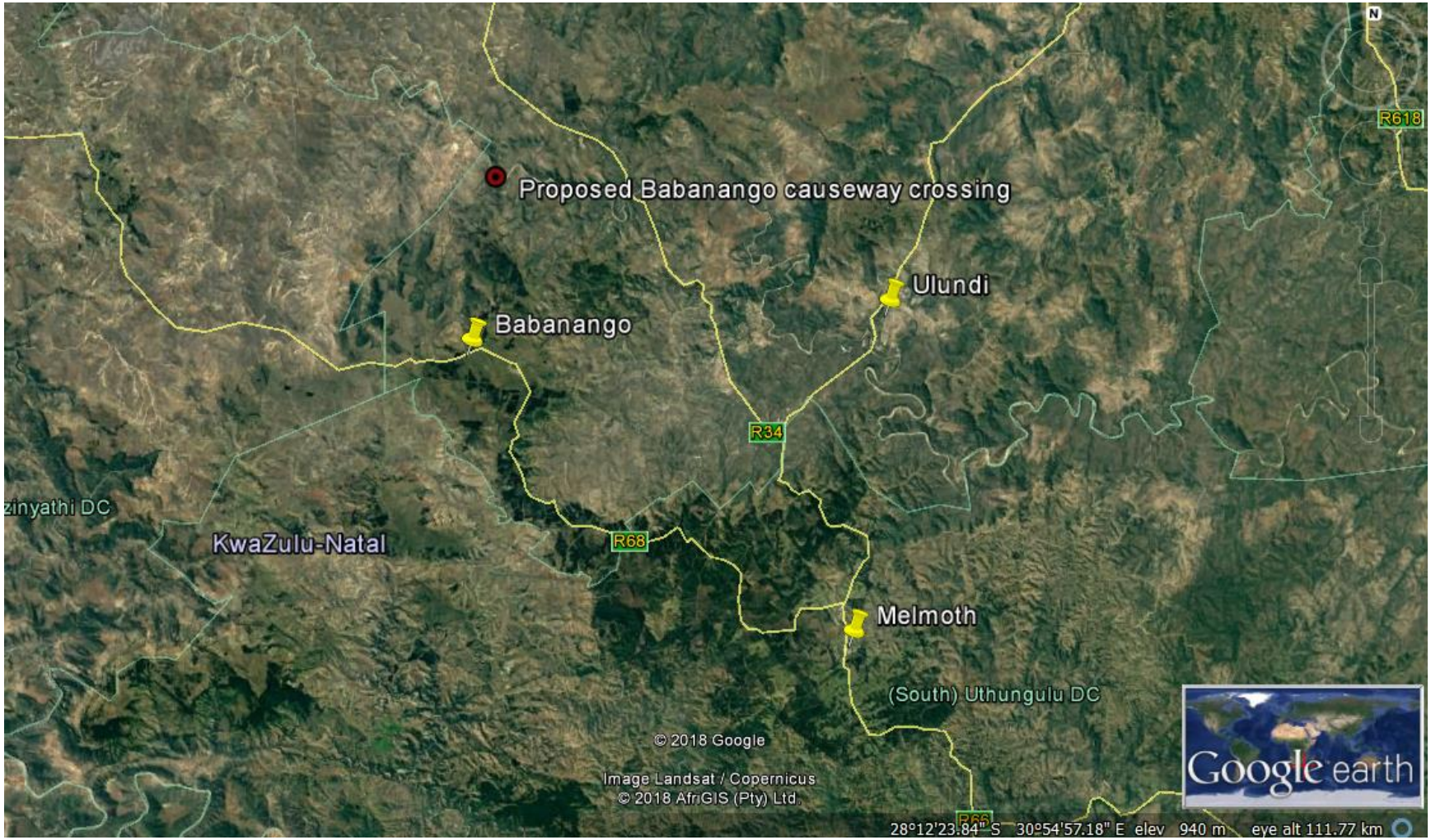

Figure 1.3: Regional location of proposed White Umfolozi River causeway crossing

Figure 1.4: Locality map of the proposed White Umfolozi River causeway crossing

1.4 EIA Regulations of 2014 (as amended) Triggered activities

The EIA Regulations of 2014 (as amended), requires Environmental Authorization from the Competent Authority (The Provincial Department of Economic Development, Tourism and Environmental Affairs) before the development of the proposed White Umfolozi River causeway crossing in the Babanango Valley can commence. Activities in Listing Notice 1 (GNR 327) and 3 (GNR 324) of the EIA Regulations of 2014 (as amended) will be triggered by the application. These Activities triggered thus requires a Basic Assessment (BA) procedure to be undertaken. **Table 1.2** below identifies the activities that have been triggered by the proposed White Umfolozi River causeway crossing.

Table 1.2: Triggered Activities for the proposed causeway crossing

Activity Number	Description	Impact on the proposed project
GNR 327/Listing Notice 1 – **Activity 12**	The development of — (i) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs — (a) within a watercourse	The proposed causeway crossing will be greater than 100 square metres and will cross the White Umfolozi River which is an identified watercourse.
GNR 327/Listing Notice 1 – **Activity 19**	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse	During the construction process of the causeway; soil, sand and rock of more than 10 cubic metres from the River bed will be moved in the process to accommodate the causeway itself.
GNR 324/Listing Notice 3 – **Activity 12**	The clearance of an area of 300 square metres or more of indigenous vegetation. d. In KwaZulu-Natal iii. Biodiversity Stewardship Programme (BSP) Biodiversity Agreement areas;	The clearance of approximately 340m^2 of indigenous vegetation to accommodate the access tracks on either side of the proposed causeway. This within an area that will be declared a BSP before the construction phase commences and authorisation is received.

GNR 324/Listing Notice 3 – **Activity 14**	The development of — ii. Infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— a) within a watercourse; d. KwaZulu-Natal vii. Critical biodiversity areas or ecological support areas (ESA) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	The causeway has a footprint greater than 10 square metres and crosses the White Umfolozi River (a watercourse). Furthermore, the proposed causeway occurs in an ESA.

The triggered activities for the proposed Umfolozi River causeway crossing are Activities 12 and 19 of GN 327 (Listing Notice 1) and Activities 12 and 14 of GN 324 (Listing Notice 3). Both listing Notice 1 and 3 require a BA process to be conducted as per the EIA Regulations of 2014 (as amended).

1.5 TERMS OF REFERENCE

Regulation 19 of the EIA Regulations 2014 (as amended), determines that a BA procedure must be followed for all activities listed in Government Notice R327 and R324. IDM Environmental has been appointed as the independent Environmental Consultant by the Applicant and will therefore be responsible for the BA procedures concerned with the proposed development. This includes formulating of the BAR, Environmental Management Plan (EMP), appointing experts in their respective fields to undertake specialist and engineering studies and the undertaking of a detailed stakeholder engagement process as per the EIA Regulations of 2014 (as amended) requirements.

1.6 APPROACH AND METHODOLOGY

The overall approach to this assessment include the following activities:

- Apply for Environmental Authorisation from EDTEA for the proposed Umfolozi River causeway crossing.
- Provide a detailed analysis of the proposed development, site and region sensitivity and the identification of potential impacts and associated mitigation measures.
- Conduct a detailed Public Participation Process.
- Comply with all legislative requirements in terms of the EIA Regulations and to provide the EDTEA with sufficient information to make an informed decision regarding the development.

1.7 OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

The objective of the basic assessment process is to, through a detailed consultative process:

a) Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
b) Identify the alternatives considered, including the activity, location, and technology alternatives;
c) Describe the need and desirability of the proposed alternatives,
d) Through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:
    i. The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    ii. The degree to which these impacts-
        (aa) can be reversed;
        (bb) may cause irreplaceable loss of resources; and
        (cc) can be avoided, managed or mitigated;
e) Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to-
    i. Identify and motivate a preferred site, activity and technology alternative;
    ii. Identify suitable measures to avoid, manage or mitigate identified impacts; and
    iii. Identify residual risks that need to be managed and monitored.

1.8 REPORT STRUCTURE

Appendix 1 and 4 of GN326 of the EIA Regulations of 2014 (as amended) were used in the formulating of the content and structure of the BA and EMP Reports.

The BAR is structured as follows:

- **Section 2** consists of a summary of **the proposed Umfolozi River causeway crossing, designs, the different project phases, services supplied during construction, the need and desirability of the proposed development, as well as all alternatives considered as part of the application process.**
- **Section 3 describes the Public Participation Process followed as well as the inclusion of all comments received and responses provided by the Project Team.**
- **Section 4 provides a description of the receiving environment (baseline environment) that may be impacted by the activities to be authorised.**

- **Section 5** consists of a detailed assessment of all the **potential impacts of the proposed Umfolozi River causeway crossing and all alternatives taken into consideration**. **Mitigation measures for possible** impacts are further provided.
- **Section 6** provides a **Summary of the recommendations and conclusion.**

Supporting documents, reports, correspondence and other relevant information are contained in various annexures and appendices attached to this Report.

1.9 APPLICABLE LEGISLATION, POLICIES AND GUIDELINES

In addition to the EIA Regulations of 2014 (as amended), **Table 1.3** below indicates all other applicable legislation and guideline documents that have been considered in the preparation of this Draft BAR.

Table 1.3: Other Applicable Legislation to the proposed causeway crossing

Legislation	Relevance to the development
The Constitution of the Republic of South Africa **Section 24**	The Constitution stipulates that everyone has the right to an environment that is not harmful to their health or well-being; and the right to have the environment protected, for the benefit of the present and future generations, through reasonable legislative and other measures. The Constitution has thus paved the way for environmental legislation and NEMA in South Africa post-1994 and the need to find a new approach to protecting the environment in an integrated and sustainable manner. This BAR embodies the principals of the Constitution in its formulation.
National Water Act (No. 36 of 1998)	A Full Water Use License Application (WULA) is in the process of being applied for from the Department of Water and Sanitation (DWS) due to the risk posed by the causeway on the surrounding aquatic environment. Section 21 C and I Water Uses will be applied for authorisation from DWS. The Public Participation Process (PPP) of both the BA and WULA will run in parallel to each other, with the only difference being that the WULA PPP will be conducted over a 60 day period.
National Environmental Management: Biodiversity Act (No. 10 of 2004)	The objectives of this Act are (within the framework of NEMA) to provide for: • The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity; • The use of indigenous biological resources in a sustainable manner; and

	• The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources. Furthermore, NEMBA specifies that a person may not carry out a restricted activity involving either: a) A specimen of a listed threatened or protected species; b) A specimen of an alien species; or c) A specimen of a listed invasive species without a permit. Accordingly, no nationally protected species were located on site. Alien plant species will be required to be removed from the site as per the alien management plan contained in this EMP (**Appendix 1**). The removal of alien species will take place prior to construction, during the construction phase and during operation. The ECO (during construction) and Project Manager (operation) must ensure compliance with this.
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. The site where the proposed causeway is to be situated will in the future be declared as a nationally protected area and will fall under the ambient of this Act.
National Environmental Management: Waste Act, 2008 (Act no. 59 of 2008)	All waste generated on site will need to be dealt with according to the EMP (**Appendix 1**) and relevant legislation. Limited waste volumes will be generated during the site preparation and construction phases, which will be disposed of at a registered landfill site. Relevant sections in this Act include: Section 17 - All attempts must be made by the Applicant/Developer during the different phases to reduce, recycle or re-use waste before it is disposed. Section 25 - All waste (this includes general and hazardous) generated may only be disposed of at a licenced waste disposal sites.
Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004)	Mitigation measures to control air and dust pollution will be implemented to ensure compliance with this Act. Important Sections in this Act relevant to the causeway include: Section 32 – The control of dust; Section 34 – The control of noise; and Section 35 – The control of offensive odours.

National Forests Act (Act No. 84 of 1998)	The purpose of this Act is to promote the sustainable management and development of forests for the benefit of all and provide special regulatory measures for the protection of certain forests and trees. In terms of section 15(1) of the National Forests Act (NFA), 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 product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated.
National Veld and Forest Act 101 of 1998	The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic. The Act provides for a variety of institutions, methods and practices for achieving this purpose. Firefighting equipment will be available on site during the construction process.
Regulations for the Proper Administration of Special Nature Reserves, National Parks and World Heritage Sites No. R. 1061 of 2005	These Regulations make provision for the registration, conservation and management of protected areas and define rules relative to various aspects of use of such protected areas such as use of biological resources, various authorized, restricted or prohibited activities, "community-eased" natural resources utilization, the use of water resources, access to nature reserves and prevention of pollution. This Regulation will come into play once the Babanango Reserve is proclaimed.
KZN Nature Conservation Ordinance (Ordinance No. 15 of 1974)	In terms of this Ordinance, a permit must be obtained from Ezemvelo KwaZulu-Natal Wildlife to remove or destroy any provincially protected plants listed in this Ordinance. Two provincially protected species of Aloe were found on site. If these are to be removed or destroyed, a permit must be applied from Ezemvelo.
Conservation of Agricultural Resources Act 43 of 1983	To provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, water sources and the vegetation. The Act further requires the combating of weeds and invader plants.
Occupational Health and Safety Act (No. 85 of 1993)	The employer needs to manage his/her staff and crew in strict accordance with the Occupational Health and Safety Act in order to prevent injuries to the staff. Extra care must be taken as specified in this EMP (**Appendix 1**), due to workers operating in a remote area.
KZN Provincial Spatial Development Framework	Alignment of the proposed causeway crossing to the KZN Provincial Spatial Development Framework (PSDF) has been made. The PSDF is a long term (i.e. > 5 year) spatial framework from which various plans will be

	implemented. It is informed by the NDP and related spatial policies, and takes its strategic direction from the KZN's development strategy and related policy frameworks. It conveys the KZN's spatial agenda to National and Provincial departments, as well as state owned enterprises (SOEs) so that their sector plans and programmes are grounded in a sound and common spatial logic. Part of this plan is development and growth and the promotion of sustainable job creation and local economic development in rural underdeveloped areas.
KZN Provincial Growth and Development Plan	The proposed development is aligned with the PGDP, as it addresses the first goal of the PGDP which is that of job creation and local economic development (through tourism initiatives).
The National Development Plan 2030 (NDP)	The NDP aims to eliminate poverty and reduce inequality by 2030. According to the plan, South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society. Key to this according to the NDP is "the transition to an environmentally sustainable low-carbon economy, moving from policy, to process, to action".
National Heritage Resources Act (Act 25 of 1999)	This Act has been put into place to protect and conserve heritage resources. If anything of heritage importance is found on the proposed site, the construction process will be halted and a suitably qualified specialist will be contacted. In consultation with the Applicant no heritage resources were located on site. Thus no Heritage assessment was undertaken.
KwaZulu-Natal Heritage Act (No. 4 of 1998)	This Act has been put into place to conserve, protect and conserve heritage resources in the KZN province. If anything of archaeological significance is uncovered, a specialist will be contacted. In consultation with the Applicant no heritage resources were located on site.
Public Participation Guideline in terms of National Environmental Management Act, 1998 - (Department of Environmental Affairs 2017)	Guideline document for Public Participation Process for all EIAs. This document was used to guide the Public Participation Process for the proposed application.
DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa.	This Guideline was utilised in the formulation of the needs and desirability of the proposed application.

2 DESCRIPTION OF PROPOSED ACTIVITY

2.1 ACTIVITY DESCRIPTION

2.1.1 BACKGROUND TO CAUSEWAY CROSSING

The proposed development is for a 200m long and 4m wide causeway crossing the White Umfolozi River in Northern KwaZulu-Natal (**Figure 2.1**). The causeway forms part a broader plan to create linked accessibility to the proposed Babanango Game Reserve, which will be declared a nationally protected nature reserve consisting of various eco-lodges and camps, and the reintroduction of wildlife to the area, including the 'big five'. The proposed causeway will provide quick, easy and safe access between the northern and southern sections of the proposed Babanango Game Reserve once in operation. The causeway will replace an existing, derelict and unsafe causeway (as determined by Engineers) further downstream that poses a significant hazard when crossing.

2.1.2 DESIGN OF THE CAUSEWAY CROSSING

The proposed causeway has been designed to be 200m long and 4m wide and will be constructed in a rocky portion of the White Umfolozi River (**Figure 2.1**). The drift is level at the base, but follows the rock profile closely and will be concrete lined up to the 1:100 year flood level. The causeway has been designed to allow the flow of water during the normal dry weather conditions through concrete culverts below the road. Occasional larger floods will pass through the culverts and over the road surface.

The causeway will contain bollards which are spaced 900mm apart. These bollards will be utilised to guide the crossing of the causeway and indicate water levels. If the bollards are not visible, no vehicle may cross, as river flows would be high. Signs will be placed on either side of the causeway indicating this.

The culverts will be located in the low spots of the rock profile to allow for low flow conditions. Either side of the drift is sloped, so that it is more forgiving to the River flow and does not have vertical barriers, inhibiting flow. It also has concrete keys, in the rock and the portals are doweled into the rock.

A Floodline Assessment is included in **Appendix 4**. The Assessment assessed the flooding extent and risk posed to both the preferred and current causeway. The results provided indicate that given the gentle channel shape of the White Umfolozi in this area, the extent of the flood is not excessive. This indicates that the channel can accommodate large flood volumes. The study however found that the low level causeway would be exceeded by a 100 year flood and would likely be damaged, partly due to debris moving through the channel and blocking the low level structure. Based on these findings the Engineer has designed

the drift to follow the rock profile closely, and is keyed into the rock, so that it does not wash away or face excessive damage. Either side of the drift is sloped, so that it is more forgiving to the river flow and does not have a vertical faces, inhibiting flow. Management measures to deal with debris have been included in **Section 2.4.5** of this Report. The Engineer further confirms that the water will be able to freely flow during both high and low flow conditions (during winter and drought periods) (**Appendix 7**).

Image 2.1: Example of how the new White Umfolozi Causeway crossing will developed

Figure 2.1: The proposed White Umfolozi River Crossing design

2.2 SERVICE PROVISION

2.2.1 SOLID WASTE DISPOSAL

During the construction phase, solid waste will be created in the process. A recycling system will be set up at the construction camp and will sort different types of waste that can be recycled. Construction waste will be disposed of at a registered landfill site. It is not envisioned that the construction phase will generate large quantities of waste.

2.2.2 WATER BORNE WASTE

Temporary toilets will be set up during the construction phase of the proposed causeway. These toilets will be located outside the 1:100 year floodline at the construction camp site. Once in operation these toilets will be removed and facilities at the nearby Lodges will be utilised by employees and guests.

2.2.3 WATER PROVISION

Water for personal consumption for workers and contractors will be obtained from a nearby Lodge.

2.2.4 ELECTRICITY PROVISION

A temporary generator will be set up at the construction camp during the construction phase (when required). No electricity is required once the causeway is in operation.

2.2.5 STORMWATER MANAGEMENT AND EROSION CONTROL

Temporary and permeant stormwater and erosion measures will be installed to control runoff and erosion. The Geotechnical Assessment (**Appendix 6**) concluded that due to the sandy nature of the alluvial soils flanking the River, these soils must be considered highly erodible. Therefore erosion protection (i.e. gabions/reno-mattresses) is recommended for the portal culvert approaches and the up and downstream side of the crossing slab with supporting bollards.

Stormwater will not be discharged directly into the River or its buffer, but will rather be discharged as diffuse flow at multiple discharge points into well vegetated areas outside of the buffer. Energy dissipaters (such as areas of rock riprap grassed with indigenous vegetation or similar structures) must be constructed where stormwater is released in order to reduce the runoff velocity and therefore erosion.

Stormwater and erosion measures must further be installed along the dirt tracks leading to the causeway site. This should include the installation of small, shallow mitre type drains, cut off drains or berms at regular intervals along the access tracks. Drains should be protected from erosion with the use of riprap grassed with indigenous vegetation or similar structures. These drains/berms will direct surface water off the access tracks and will prevent the concentration of flows, the erosion of the track surface and the River during both the construction phase and the operational phase.

2.3 ACCESS ROADS TO THE UMFOLOZI RIVER CAUSEWAY CROSSING

Currently there exists established sand and gravel tracks on either side of the proposed White Umfolozi River causeway crossing. On both the northern and southern sections of the proposed causeway these existing tracks will be extended/lengthened to the proposed causeway itself. Routing of these tracks to the causeway will take the route that will result in the least riparian vegetation being cleared and will not impact on any protected flora species. The dimensions for the lengthening of the existing tracks to the proposed causeway are shown in **Table 2.1**, while the layout is provided in **Figure 2.1**.

Table 2.1: Dimensions of the lengthening of tracks to either side of the causeway

Dirt Track	Width of dirt track	Lengthening of dirt track by
Northern Track to Causeway	3.5m	304m
Southern Track to Causeway	3.5m	92m

2.4 DEVELOPMENT PHASES OF THE PROPOSED CAUSEWAY CROSSING

2.4.1 SITE PLANNING

Before the causeway site establishment and construction can commence, careful planning must take place which will lay the foundations for the abovementioned phases. This will ensure that impacts can be identified at the earliest possible stage and appropriate mitigation measures employed. This in order to prevent/ minimise impacts to acceptable/low levels. The BAR and associated Appendices, forms one part of this planning process. Before site establishment and operation can occur, it is of the upmost importance that the Applicant and Project Manager must ensure plans are in place to implement mitigation measures in the EMP (**Appendix 1**) and that rehabilitation is an on-going process, which is not solely defined to the Closure phase.

2.4.2 SITE PREPARATION AND ESTABLISHMENT

Before construction can commence a number of activities must occur. This includes, but not limited to:

- Environmental Training of workers and subcontractors;
- The clear demarcation of the construction site;
- The clearing of vegetation (340m^2)';
- Demarcating strict no go areas around sensitive environments (watercourses and protected plants/trees). As according to the Botanical and Freshwater specialist, a buffer must be implemented between construction related activities and these sensitive environments. Protected plant and tree species must be clearly marked and avoided;
- Rescuing and relocation of plant species;
- Determining the location of the construction offices/camp, screening and other structures (outside the 1:100 year floodline and Freshwater buffer);
- Determining and preparing site access (including entry and exit points) and access to different areas of the project, taking into consideration the sensitive areas and existing tracks;
- Determining the need and location for temporary services such as electrical and water;
- The placing of portable toilets away from any watercourses (outside the Freshwater buffer or 1:100 year Floodline – whichever is greatest);
- Installation of solid waste collection facilities, including the setting up of a recycling system;
- Implementing of security and safety measures (including repairing existing fencing, signage, lighting and the location of first aid kits, spill kits etc);
- Location of vehicle parking; and
- Implementing erosion control and stormwater management on site.

2.4.3 CONSTRUCTION

The construction sequence of the proposed causeway is as follows:

- The drift alignment will be set out from the drawings and levels provided by the engineer;
- Sandbags will be placed to create clear and dry working area;
- Final levels will be set out from drawings issued by engineer;
- Rock will be drilled into and dowels will be installed;
- A blinding slab will be cast, if specified;
- Grouted gabions and stone pitching will be installed;
- Steel reinforcement will be installed according to the engineer's drawing and bending schedule. The steel reinforcement must be checked by the engineer for correct fixing and placing before any concrete is cast;
- Shuttering will be erected – including shuttering for edge blocks;
- Pipes/culverts will be laid; and
- Concrete will be mixed, placed, compacted and cured.

According to the Geotechnical Report (**Appendix 6**) the preliminary siting of the proposed causeway crossing is likely to be satisfactory based on the underlying geological/geotechnical conditions. The area of the proposed crossing is underlain by granite bedrock at a shallow depth, with alluvial sediments overlying both the northern and southern abutment positions. It is evident from the engineering drawings that the approach abutments to the crossing comprise a reinforced concrete slab over fill or mass concrete, overlying portals on either side of the crossing, founded into the granitic bedrock. The portals should be founded on shallow base slabs taken through all alluvial sediments into hard pickable granitic bedrock. Dowels or equivalent anchoring might be required at the discretion of the Engineer. The maximum allowable bearing pressure should be restricted to 500kPa. All trenches excavated beyond a depth of 1.2m must be shored at the discretion of the Engineer due to the possibility of side wall failure within the loose sediments. From the preliminary Geotechnical Assessment it is evident that the suitable weathered bedrock is expected to occur from surface adjacent to the River to a depth of in the order of 3m below existing ground level on either side of the River.

2.4.4 OPERATION

Once completed, the causeway will function as a quick and safe crossing between the northern and southern sections of the Babanango Nature Reserve.

2.4.5 Maintenance and Decommissioning

It is not anticipated that the proposed causeway will require decommissioning. The causeway will be constructed to have an indefinite lifespan. Regular maintenance of the causeway will be required to ensure its longevity.

Particular cognisance needs to be taken of potential blockages of the culvert pipes during the operational phase which may impact on water flow and fish movement. Therefore measures must be implemented to ensure blockages do not occur or are dealt with in a timely manner. These include:

- If sediment accumulation occurs near the culvert pipe's entry and exit points, a shovel will be utilised to clear debris way. This process must be carefully carried out to ensure no damage to the slope of the culvert pipe.
- If sediments are located deeper inside the culvert pipes, the maintenance team must make an extended shovel by welding culvert pipes to the head of the shovel and inserting it to clear away the debris. Once again, this process must be undertaken carefully to ensure that there is no damage to the slope of the culvert pipe.
- An additional solution for debris located deeper inside the culvert pipe would be by pulling out the blockage using a chain and a piece of piping. First, feed a strong chain through the culvert. This can be accomplished by punching a small hole through the blockage with a long pole that is attached to the chain. This allows you to pull the chain through the other side. Attach the end of the chain sticking out of the upstream culvert exit to a section of steel pipe with a diameter similar to but slightly smaller than the culvert pipe. Then, pull it through the pipe from the downstream end. The steel pipe will push against the blockage, forcing it out of the culvert as it is dragged through.

2.4.6 Rehabilitation

Rehabilitation must be viewed as an on-going process and must not be confined to one specific phase of the development life cycle. Rehabilitation will include the re-vegetation of any disturbed area and the creation of a stable land surface that is not subject to erosion or inundation of water. Re-vegetation should aim to accelerate the natural succession processes so that a healthy plant/riparian community develops and includes the control of invasive alien plants and bush encroachment. Rehabilitation measures have been proposed in the EMP (**Appendix 1**) and must be strictly adhered to. Measures and Plans have been included in the Draft EMP that deals with rehabilitation during and after such events like chemical spills.

2.5 Need and Desirability of the proposed causeway

With the formulation of the proposed Babanango Game Reserve, a quick, easy and safe crossing of the White Umfolozi River is required. The White Umfolozi River divides the proposed Reserve into northern

and southern sections. Therefore, the development of the crossing is crucial to the success of the proposed Reserve and to the access to the different sections of the proposed Reserve. The proposed Reserve will result in the reintroduction of fauna and game into the area and help contribute to conservation of the provinces rich and diverse biodiversity. The Reserve is a community initiative, which will further create jobs and result in local economic development in an area characterised with systematic levels of poverty and unemployment. There is an existing causeway further downstream and this has been considered as an alternative option. However, this option is not practical due to the following reasons:

- Major repair work will have to be undertaken on the existing causeway. Much of the pipes and structures have deteriorated and are rusted. The crossing is thus unsafe to utilise and poses a risk for people when currently crossing (even during the dry spells).

- The existing causeway is low and frequently flooded (even after small rainfall events). After heavy rain one cannot utilise the current causeway at all. The proposed causeway will be available for crossing more times of the year than the existing causeway.

- **The proposed new causeway crossing is a more direct route between the different sections of the proposed Reserve. <u>This will result in</u>:**

→ A more economical option in the long term (in terms of fuel consumption).

→ Vehicles will travel less when traveling to different sections of the Reserve and will release less carbon emissions.

→ The causeway will be designed and constructed in a manner which is ecologically more sound and friendly to the ageing causeway currently in use, and will ensure the free and the unobstructed movement of aquatic fauna species, upstream and downstream of the causeway.

→ It will also provide a safe and easy access to wildlife intending to cross the river for grazing and predation in times of high water circumstances.

→ In the event of an emergency situation, the proposed causeway crossing will be approximately 25 minutes faster than the use of the current causeway. This is especially important to note in terms of security and the presence of heavily poached animals such as rhino and elephant that will be re-introduced into the proposed reserve or in any other emergency situation (hospitalisation of a guest).

- The <u>existing causeway</u> crossing access track routes on the steep side of a major cliff. This access route cannot be avoided. This poses major challenges such as:

→ The access route is subject to frequent rock falls which poses a major safety hazard to vehicles.

→ The vegetation located on the side cliffs are usually highly sensitive and unique. Thus one does not want to disturb this vegetation.

→ The access route is subject to erosion. Due to the slope aspects and minimum area to work with, the access route can easily be eroded away.

→ There is little room to move in the event of encountering of animals such as elephant. The access route is narrow and nearly impossible to reverse on.

Therefore due to the reasons stated above, there is a need for the new causeway.

The site of **the proposed causeway is desirable due to the following reasons**:

- The proposed site will provide the quickest and safest way to cross the White Umfolozi River.
- The development of the causeway will not result in the loss of protected species (it is intended that the access track route will avoid the protected aloe species. Only as a last option will they be removed) or major loss in vegetation.
- The southern section has been heavily grazed and is already disturbed. This area will be rehabilitated post development.
- The site is away from communities or proposed lodges.
- It provides a safe crossing for wildlife.
- The site contains numerous granite rock on which the proposed causeway will be developed upon.
- The site geology supports the development of the proposed causeway.

2.6 CONSIDERATION OF ALTERNATIVES

Alternatives are seen as different means of meeting the general purpose and need of a proposed activity. Alternatives could include, amongst others, the following:

- Activity Alternatives: This requires a change in the nature of the proposed activity. This alternative is most appropriate at a strategic decision-making level.
- Location Alternatives: Alternative locations for the entire project proposal, or for components of the project proposal.
- Layout Alternatives: This alternative allows different spatial configurations of an activity on a specific site.
- Scheduling Alternatives: Also referred to alternative phasing options for the development. This alternative considers different phasing options during the implementation of the development.

- Infrastructure/ Input Alternatives: Also referred to as technological or equipment alternatives. This option considers various alternatives that will result in the same end result.

2.6.1 ACTIVITY ALTERNATIVES

Activity alternatives refer to the consideration of alternatives requiring a change in the nature of the proposed activity to be undertaken. No alterative activity options have been considered in this application. The Developer of the Reserve (different to the Applicant) has already spent a considerable amount of capital purchasing properties for the proposed Babanango Reserve and on consulting costs. Agreements have been arranged with local communities ensuring that the Reserve is community oriented. With the formulation of the Reserve there is thus a need for a safe and easy crossing of the White Umfolozi River as portions of the Reserve are located on either side of the River.

2.6.2 LOCATION ALTERNATIVES

Two options were considered for crossing the White Umfolozi River. The preferred option is the construction of a new causeway which will be safer and a more direct route (**Image 2.2**). The second option (alternative locational option 1) is the utilising of the existing causeway crossing further downstream.

The alterative option 1 (utilising the existing causeway) was not considered the preferred option due to the following reasons:

The existing causeway is downstream of the proposed preferred new causeway option and is already in use by the Babanango Reserve Team. The pipes of this causeway have however collapsed (due to rust) as the causeway was not built to engineering standards as indicated by the Consulting Engineer on the development (**Image 2.3 and 2.4**). Parts of the causeway are constantly under water (even after low rainfall) and from an engineering point, this crossing is dangerous. The Engineer has recommended the use of this causeway should be halted. In order for the existing causeway to be utilised major repair work would need to be undertaken on it.

As specified in the Need and Desirability section of the BAR, the existing causeway is the far longer option between the different sections of the Reserve. A quick and safe option to crossing the White Umfolozi River is required in an emergency situation. This includes when there is a security incident such as poaching, when there is a veld fire or where there is an emergency such as an animal attack or medical emergency. Therefore, the extra 25 minute commute between the different sections of the Reserve becomes a major safety issue.

Furthermore, the access route leading to the existing causeway is not considered safe. This as the route is positioned along the slopes of a steep cliff (**Image 2.5**). The access track is narrow, subject to erosion, rock falls and drivers will have difficulty reversing or escaping the path of wild animals in the event of being charged (**Image 2.6**). Cliff faces in the region are further characterised as containing sensitive flora that will be impacted upon by the constant use of the access track.

Table 2.2 details out the advantages and disadvantages of both the preferred locational option vs the alterative

Image 2.2: Site of the proposed new causeway preferred option

Image 2.3: First half of the existing causeway crossing - from the North - (currently under water after rainfall)

Image 2.4: Second half of the existing causeway crossing - from the North - (constantly under water)

Image 2.5: Access track to the existing causeway along steep cliff face with sensitive vegetation

Image 2.6: Access track to the existing causeway is subject to rock falls due to cliff sides containing numerous rocks and boulders

Table 2.2: Advantages and disadvantages of the preferred vs existing causeway

Type of installation	Advantages	Disadvantages
Preferred option: Construction of a new causeway upstream	• Will be the more direct (quicker) route between the different sections of the Reserve. • Will be more accessible during the wet season. • Will be the safer route for visitors to the Reserve as well as Wildlife. • Will save on petrol costs and vehicles will release less greenhouse gases in the long term.	• Will result in the disturbance of a new area of the proposed Reserve and watercourse. • The White Umfolozi River is a sensitive system and important fish habitat. • Some riparian vegetation will be cleared. • The existing access route will need to be extended to reach the causeway (less than 1km).
Alternative option: Use of the existing causeway downstream	• Existing causeway. Far less disturbance to the surrounding environment. • Will limit the need to disturb a new portion of the White Umfolozi River. • Exiting access route to the causeway exists.	• Unsafe to cross. Major repair work will need to be undertaken on causeway. • The less direct route. Will take far longer to reach the different sections of the Reserve. This is a big issue during emergency situations. • Unsafe to cross during certain times of the year. The one section of the causeway is virtually always under water. • Access route transverses along the sides of a steep cliff. This poses dangers such as erosion and rock falls.

2.6.3 Layout Alternatives

No layout alternates were considered in the application. The design of the causeway is simply and to be developed on a series of rocks in the River itself.

2.6.4 SCHEDULING ALTERNATIVES

The construction of the causeway will take place over the dry months. The causeway will then be operational all year round. As far as possible maintenance must take place in winter.

2.6.5 INFRASTRUCTURE ALTERNATIVES

Two infrastructure options were considered in the application. The preferred option is the construction of a low impacting causeway. The second option (alternative option) is the construction of a larger bridge**. Table 2.3** below details out the advantages and disadvantages of both options.

Table 2.5: Advantages and disadvantages of infrastructure alternates

Type of installation	Advantages	Disadvantages
Preferred option: Construction of a causeway	• More cost-effective option. • Environmentally friendly option (in terms of anticipated impacts on the watercourse, surrounding terrestrial habitat and aesthetics). • Easier to construct.	• We be inaccessible during heavy floods.
Alternative option: Construction of a bridge	• Access to the different sections of the Reserve all year round.	• More expensive option. • Anticipated to have more environmental impacts (on the watercourse, surrounding terrestrial habitat and aesthetics). • Longer construction time.

2.6.6 "NO-GO" ALTERNATIVE

The "no-go" alternative should in all instances be considered as part of the EIA process. It assumes that the activity does not proceed, implying a continuation of the current situation of status quo. Should a positive Environmental Authorisation (EA) not be granted, the Reserve Team will have to continue to utilise the existing unsafe causeway. Major repair work will have to be conducted on the causeway (if possible), however the access route to the crossing poses a major safety hazard as it is situated on the edge of a cliff and subject to erosion and rock falls. Thus this road to may become inaccessible. This will mean the Reserve team do not have access to different sections of the Reserve. This poses a major hazard in the event of an

emergency such as a poaching incident or visitor health related issues (heart attacks, strokes, snake bites, wildlife encounters and the like).

3 PUBLIC PARTICPATION

3.1 REQUIREMENTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS OF 2014 (AS AMENDED)

The proposed Public Participation Process (PPP) to be followed for the White Umfolozi River causeway crossing Basic Assessment includes:

- Identifying and compiling a comprehensive list of potential Interested and Affected Parties including:
  - → The Competent Authority;
  - → Relevant National and Provincial government authorities;
  - → Local Municipal authorities (both district and local);
  - → The local councillors;
  - → Quasi-government institutions
  - → Traditional leadership;
  - → Relevant government state entities/parastatals;
  - → Neighbouring property owners;
  - → Neighbouring communities;
  - → Conservation organisations; and
  - → 3rd party stakeholders
- Potential Interested and Affected Parties will be notified of the proposed causeway development PPP through:
  - → Notification emails will be forwarded to all I&APs;
  - → Registered mail will be posted to certain I&APs;
  - → Site notices will be placed on the proposed site, alterative site, at the entrance to the Zulu Rock Game Lodge and the Babanango Public building; and
  - → An advert will be published in one regional newspaper (the Bayede).
- A copy of the BAR: Draft 1 and all appendices will be made available on the Public Participation Consultants website for download and review. A link to the website will be provided via email notification.
- A hard copy of the BAR: Draft 1 and all appendices will be available at the local Ulundi library for review.
- A hard copy of the BAR: Draft 1 and all appendices will be forwarded to the Competent Authority for review.

- CD copies of the BAR: Draft 1 and all appendices will be couriered to relevant stakeholders where requested.
- All comments and responses will be included in the Final Public Participation Report for review. Evidence of the PPP being conducted will further be provided as annexures to the Report.
- An extensive consultation process has commenced with the surrounding communities regarding the formulation of the proposed Babanango Game Reserve. This as the proposed Reserve is located on land leased from the community. The aim of the Reserve is to be a community oriented development that not only conserves the areas rich biodiversity, but also results in the upliftment of the communities. Due to this extensive community consultation process already having taken place (and set to continue), no Public Open Day will be undertaken. This as the consultation and discussion process is ongoing. However, community members will be provided the opportunity to provide specific comments for the proposed causeway during this ongoing consultation process. A Community Liaison Officer has been appointed to aid in this process and dissemination of information.

As per the NEMA requirements, a PPP of at least 30 days will be conducted after the Departmental Reference number has been provided. Furthermore, the DEA Public Participation Guideline will be used to guide the PPP.

3.2 COMMENTS AND RESPONSE REPORT

Please see below example of comments and response report to be populated after the PPP has been conducted.

Public Participation Comments and EAP Responses

Interested and Affected Party	Represented individual/official	Date comment/s were received	Comments received	Response and action provided by the EAP	Inclusion in BAR or EMP or Additional EAP comments

4 BASELINE ENVIRONMENT OF THE PROPOSED SITE

4.1 CLIMATE

The climate of the region is warm and temperate with a mean annual precipitation average of 861mm, falling mainly in the warmer months of October to March. Rainfall events are often intermittent and include dramatic thunderstorm events in the spring and summer months. The site is further largely frost free. The average evapotranspiration rate is between 1601 to 1800 mm per annum. The average daily mean temperature in February (the hottest average month) is 23.1 C and 16 C in June (the coldest average month). Summer maximums can reach in the upper 30 C.

4.2 LANDSCAPE CHARACTERISTICS/EXISTING SITUATION

The proposed causeway crossing occurs over the White Umfolozi River located within a valley floor surrounded by adjacent hilltops. The southern bank of the River has been impacted as a result of historical cultivation and cattle grazing (**Image 4.1** and **4.2**). Disturbance of soils during cultivation and cattle grazing has led to an increase in runoff and in the formation of small shallow erosion gullies within the riparian area of the proposed site. The grazing of cattle has further led to the trampling of the riparian vegetation that is found on site.

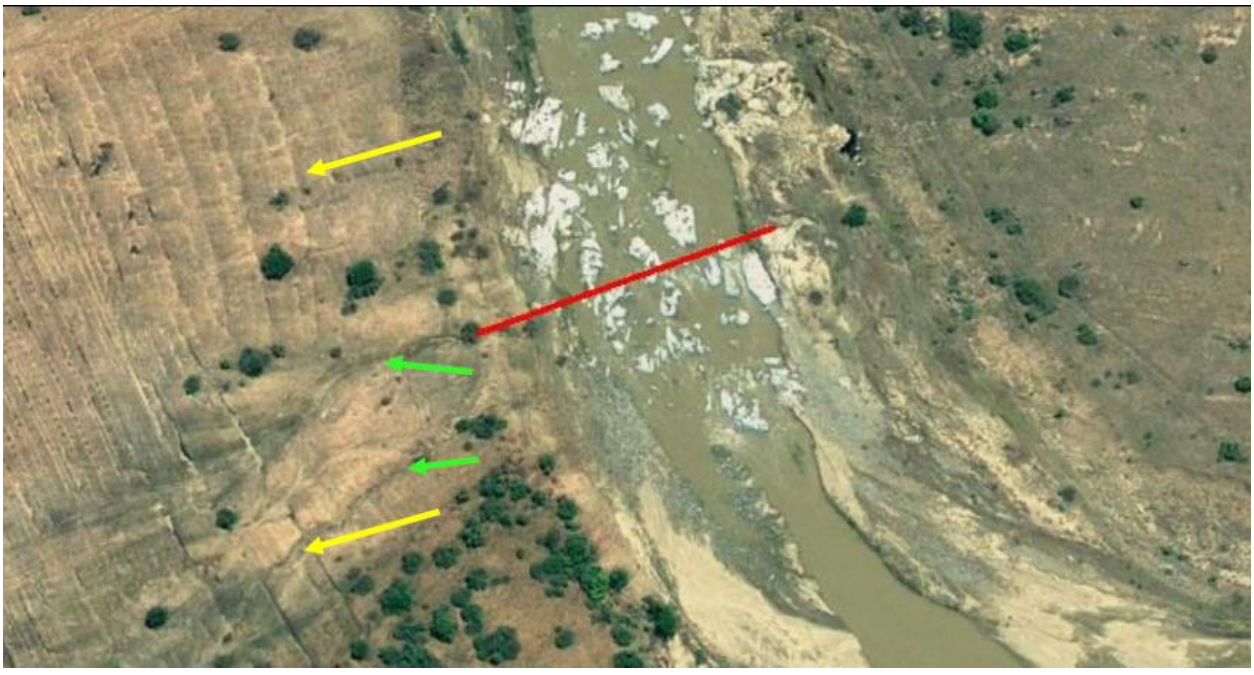

Image 4.1: Digital satellite imagery in which historical cultivation (indicated by yellow arrows) and erosion gullies (indicated by green arrows) can be identified

Image 4.2: Erosion gullies located on the southern bank

No existing dwelling or settlements are located on or adjacent to the proposed site. Existing sand and gravel tracks route close to the proposed causeway crossing, but will require lengthening to reach the causeway during operation. The nearest community is situated on the hilltop some 10km away. The communities that surround the proposed site are largely dispersed rural dwellings.

The proposed causeway is situated between the existing Zulu Rock Private Game Farm and the Babanango Game Reserve. The formulation of the new game reserve also referred to as the Babanango Game Reserve will incorporate both existing developments into plans.

4.3 GEOLOGY AND SOILS

The regional geology of the immediate area as identified in the Geotechnical Assessment (**Appendix 6**) is dominated by Swazian intrusive granite and the colluvial and residual soils derived therefrom. In addition, the granite in the area has been intruded into by both Randium diabase dykes and Jurassic dolerite dykes. Furthermore, both the northern and southern banks of the proposed causeway crossing are overlain by alluvial sediments comprising boulders, gravels and sandy soils.

The geology of the two banks are as follow:

- Northern Bank

The immediate riverbank contains very hard rock granite bedrock outcropping as large boulders/massive granite slabs between joints and shears in the granite which have been eroded by the White Umfolozi River. The granitic bedrock is overlain by boulders and cobbles and relatively thick alluvial sands.

- Southern Bank

The immediate riverbank contains very hard rock granite bedrock outcropping as large boulders/massive granite slabs between joints and shears in the granite which have been eroded by the White Umfolozi River. The granitic bedrock is overlain by thick alluvial sands.

- River Channel

The main river channel is underlain by granitic bedrock and alluvial sands and boulders.

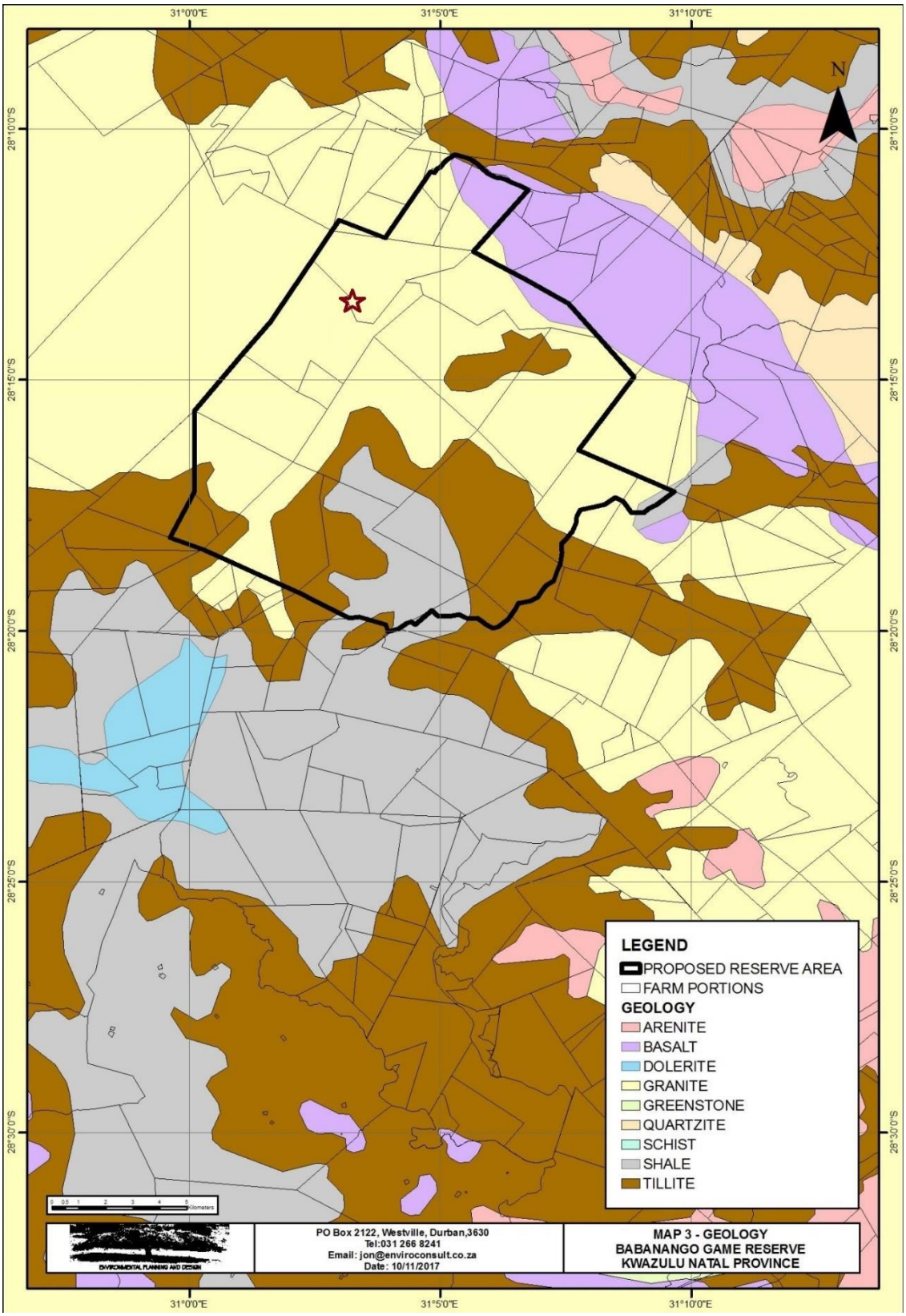

Figure: 4.1: The geology making up the proposed Reserve (Causeway site represented by red star)

4.4 FLORA

According to a Desktop analysis, the project footprint is located within the Savanna Biome, the Lowveld Bioregion (Mucina and Rutherford, 2006, updated in 2012) and within the Zululand Lowveld vegetation type (Scott-Shaw and Escott, 2011) (**Figure 4.2**). This vegetation type extends from around Big Bend south to Mkuze, Hluhluwe, Ulundi and to just north of the Ongoye Forest. It is characterised by extensive flat or only slightly undulating landscapes supporting a complex of various bushveld units.

A site inspection was undertaken by a Botanical specialist (**Appendix 3**). The site was characterised by riparian vegetation. Alluvial deposits associated with the active channel bank and flood bench of the River are dominated by graminoid sedge and herb species which are adapted to disturbance such as *Imperata cylindrica* (Cotton Wool Grass), *Cymbopogon pospischilii* (Narrow-leaved Turpentine Grass), *Eragrostis curvula* (Weeping Love Grass) *Melinis nerviglumis* (Brittle-leaved Red-top), *Phragmites mauritianus* (Reed Grass), *Juncus* sp., *Verbena aristigera* (Fine-leaved verbane), *Helichrysum* sp., *Lippia javanica* (Feve Tea), *Felicia muricata* (Bloublommetjie) and *Berkheya* sp. Small tree and shrub species such as *Salix* cf *mucronata* subsp. *woodii* (Flute Willow), *Gomphocarpus fruticosus* (Milkweed), *Phoenix reclinata* (Date Palm) and *Diospyros dicrophylla* (Poison Star Apple) were also encountered growing along the active channel banks (**Image 4.3**).

The macro-channel banks were dominated by a similar graminoid community, however, an increase in the occurrence of common indigenous tree species such as *Vachellia nilotica* subsp. *kraussiana* (Scented-pod Acacia), *Vachellia sieberiana* var *woodii* (Paperbark Thorn), *Vachellia robusta* (Broad-pod Robust Thorn), *Euclea divinorum* (Magic guarri), *Ziziphus mucronata* (Spike Thorn) and *Searsia pentheri* (Crow Berry) were noted.

Vegetation associated with the southern bank of the River has been subject to disturbance as a result of historical agricultural activities and current livestock grazing (**Image 4.4**). The riparian habitat on the southern bank is therefore considered to be in a more degraded condition when compared to the northern bank.

No SCC were encountered within the project footprint at the time of the assessment and, due to the natural high levels of disturbance associated with the flood prone riparian area, the probability of occurrence of SCC is considered to be low. However, the two provincially protected species, *Aloe marlothii* and *Aloe* cf. *pedunculata* were encountered within the riparian area. Should individuals of these species be removed, a permit will be required from EKZN Wildlife.

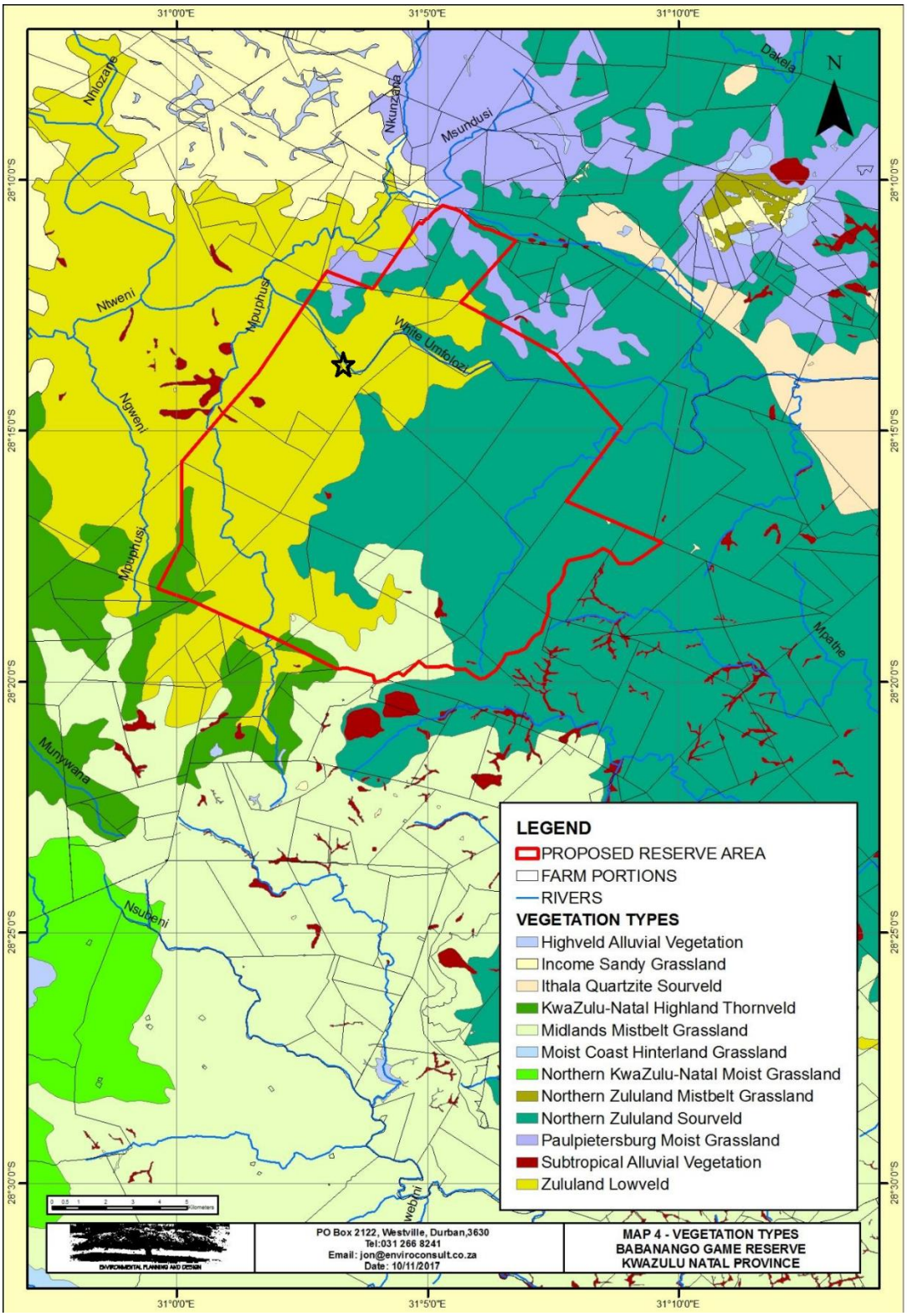

Figure: 4.2: The Vegetation types making up the proposed Reserve (Causeway site represented by red star)

Image 4.3: Phoenix reclinata found on site

Image 4.4: Degraded riparian habitat associated with the southern bank of the White Umfolozi River

4.5 FAUNA

According to Birdlife South Africa the region is an important area for birds, especially raptor species. Birdlife South Africa noted that a total of 428 bird species have been recorded in the region, with 15 species being regarded as globally threatened.

Raptors found within the area include the Secretarybird, Brown Snake-Eagle, Tawny, African Hawk, African Crowned, Verreaux's, Wahlberg's, African Fish and Martial Eagles. African White-backed Vultures are often seen "surfing" thermals, and are sometimes joined by Lappet-faced and Cape Vultures.

Grassland species recorded include Southern Bald Ibis, Southern Ground Hornbill, Blue Crane, Small Buttonquail, Black-bellied Korhaan, Spotted Thick-knee, Yellow-throated Longclaw and Wing-snapping Cisticola.

The thornveld and bushveld birds recorded include Orange-breasted and Grey-headed Bush-Shrikes, Scarlet-chested Sunbird, Violet-backed Starling, Green-winged Pytilia, White-fronted Bee-eater, African Firefinch and Yellow-breasted Apalis. Other noteworthy species include Arrow-marked Babbler, Grey Go-away-bird and Pale Flycatcher.

Forest birds recorded at Zulu Rock include Purple-crested Turaco, Grey Tit-Flycatcher, Green Pigeon, Pygmy Kingfisher, Red-fronted Tinkerbird, Red-capped and White-throated Robin-Chats, Trumpeter and Crowned Hornbills and the elusive Narina Trogon. Birds typical of rocky areas include Striped Pipit, Cinnamon-breasted Bunting, Buff-streaked Chat, Mocking Cliff-Chat, Bokmakierie and Malachite Sunbird.

The region the above birds were noted according to Birdlife Africa is located in **Figure 4.3.** The entire proposed Reserve occurs within this region.

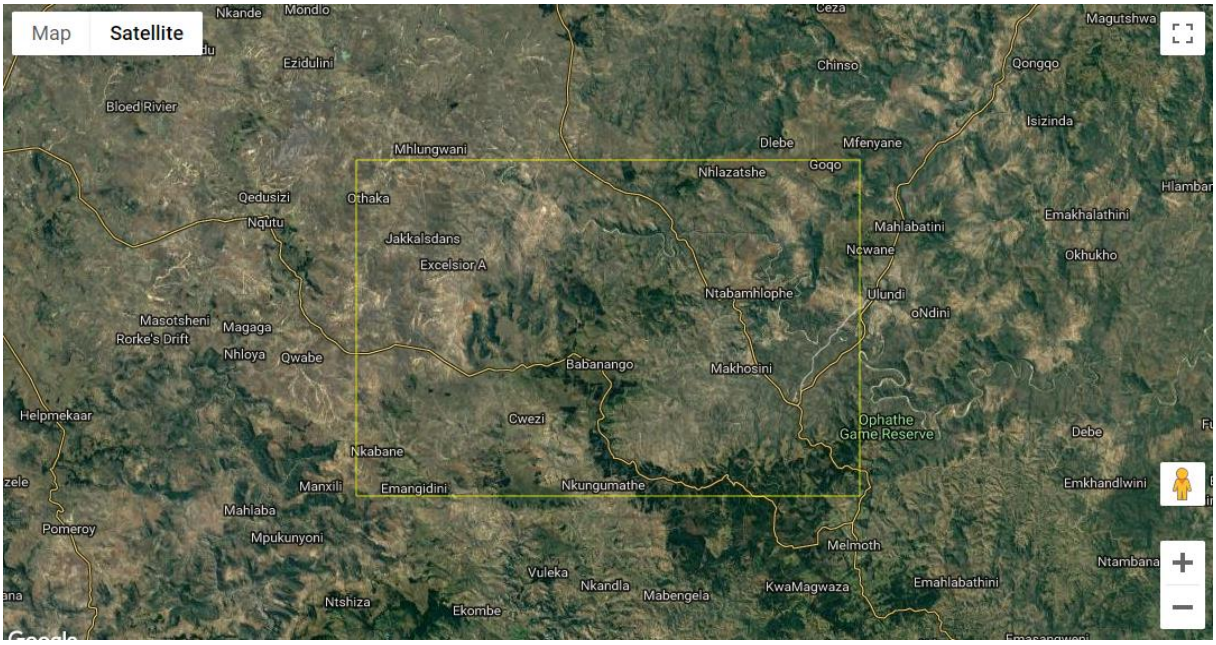

Figure 4.3: Birdlife Africa region were bird species were noted

Furthermore, some mammals already occur within the proposed Babanango Game Reserve. This includes: Bushpig, warthog, impala, duiker, waterbuck, bushbuck, nyala, kudu, giraffe, zebra, caracal and leopard. With the formulation of the Babanango Game Reserve, fauna will be reintroduced into the Reserve on a large scale. This includes predators, game and other animals historically occurring in the region. A major attraction of the proposed Reserve will be the introduction of the 'big five'.

4.6 FRESHWATER CHARACTERISTICS

The project footprint falls within the Lowveld Ecoregion and within the Usutu to Mhlathuze Water Management Area (WMA) and the Mfolozi sub-Water Management Area (sub-WMA) as defined by NFEPA (2011). The quaternary catchment indicated for the project footprint is W21G.

According to the Freshwater Study (**Appendix 3**) only one watercourse was found within the vicinity of the proposed crossing and that was the White Umfolozi River. The White Umfolozi River is a perennial lower foothills river which is characterized by a low gradient and a mixed bedrock alluvial channel. The section of River to be traversed comprises of a wide active channel (approximately 100m wide), with a relatively shallow alluvial bed (approximately 0.5m to 1m deep at the time of the assessment) interspersed with granite rock outcrops (**Image 4.5**).

The White Umfolozi River is a flood prone system and the active channel banks and flood bench are characterised by alluvial deposits which have collected between exposed areas of bedrock. The alluvial deposits are dominated by graminoid, sedge and herb species which are adapted to ongoing disturbance

such as Imperata cylindrica (Cotton Wool Grass) and Juncus sp. Small tree and shrub species such as Salix cf mucronata subsp. woodii (Flute Willow) and Gomphocarpus fruticosus (Milkweed) were also encountered growing along the active channel banks. The macro-channel banks were dominated by a similar graminoid community (**Image 4.6**), however, an increase in the occurrence of common indigenous tree species such as Vachellia nilotica subsp. kraussiana (Scented-pod Acacia) and Vachellia sieberiana var woodii (Paperbark Thorn) were noted.

A significant change in structure between the terrestrial habitat and the riparian habitat of the River is lacking, however, a change in floral species composition was noted. Terrestrial areas were characterised by a decrease in the occurrence of graminoid species indicative of disturbance and an increase in the occurrence of climax grass species such as Hyparrhenia sp. (Thatching Grass) as well as common indigenous tree species such as Cussonia spicata (Cabbage Tree), Pavetta edentula (Gland-leaf Brides Bush), Aloe marlothii (Mountain Aloe) and Gymnosporia sp.

Although wetland habitat is indicated on the banks of the White Umfolozi River by the NFEPA project (2011), no wetland characteristics were observed during the site assessment. The active channel bank of the River was dominated by *Imperata cylindrica* which is a graminoid species indicative of damp conditions. However, this species is also an indicator of disturbance and was found to dominate alluvial material which was deposited on the banks of the River during recent flood events. Hand augering was also undertaken at multiple points along the banks of the portion of the River to be traversed and no signs of gleying or mottling were encountered.

Image 4.5: White Umfolozi River with granite outcrops

Image 4.6: Graminoid and sedge species encountered on the active channel bank

4.6.1 The Present Ecological State and Ecological Importance and Sensitivity scores

The Present Ecological State (PES) scores calculated for the portion of the White Umfolozi River associated with the project footprint fall within IHIA Category B (Largely natural with few modifications - a small change in natural habitats and biota may have taken place, but the ecosystem functions are essentially unchanged). Impacts to the River and riparian area are limited to historical and current impacts as a result of small-scale subsistence farming.

The White Umfolozi River calculated a high overall Ecological Importance and Sensitivity (EIS) score - Quaternaries that are considered to be unique on a national scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but may have a substantial capacity for use.

The River is also considered to be of a moderate fish representivity rating, a high invertebrate representivity rating, a high fish rarity rating and a moderate invertebrate rarity rating. Due to this finding by the Freshwater Specialist, an Ichthyological Specialist was contacted to undertake a fish study (**Appendix 5**). The results of this are contained in **Section 4.7** below.

4.7 ichthyological of the White Umfolozi River

A survey of a section of the White Umfolozi River within the Babanango Game Reserve resulted in the capture of 4 fish species out of a potential 10 species that are expected to occur within the section of the White Umfolozi River between Ulundi and the Klipfontein Dam near Vryheid (**Appendix 5**). The fish survey confirmed the presence of one larger migratory cyprinid, *Labeobarbus natalensis* and three other fish species that are known to undertake less significant migrations/movements (*Clarias gariepinus*, *Enteromius trimaculatus* and *Orechromis mossambicus*) (**Image 4.7** and **4.8**). In addition to these, a further larger cyprinid, *Labeo molybdinus* and 2 eel (Anguillidae) species are expected to occur within the affected River section. The Anguillidae are known to undertake catchment scale migrations, while *L. molybdinus* undertakes migrations similar in nature to the upstream spawning movements undertaken by *L. natalenisis*.

It was however noted that conditions during the sampling exercise were not ideal as the water was high and very turbid. The limited number of fish caught was attributed to the conditions at the time of sampling rather than the overall ecological condition of the River, which is considered to be "largely natural". Despite the conditions, the species captured and observations of the state and flow of the River provided sufficient data for a confident assessment of potential impacts.

Image 4.7: Clarias gariepinus captured

Image 5.8: Labeobarbus natalensis captured

4.8 SITES WITH ARCHAEOLOGICAL INTEREST

The proposed Babanango Game Reserve contains various heritage sites that are protected under the relevant national and provincial legislation. These include:

- An old copper mine with its workings and associated ruins which was mined between 1900 to 1910.
- The ruins of the mine manager's house (over 100 years old and thus protected as per National and Provincial legislation).
- Wagon tracks cut into a sandstone ridge between the mine house and Monkey Kop. The route was used for the removal of ore from the mine.
- An isiVivane, a cairn of stones developed as a result of superstition by Zulu travelers. Any traveller passing by would spit on a small round stone and throw it onto the pile to avert the wrath of the spirits or misfortune and so secure safe passage.
- The area is the ancestral home of the Buthelezi Clan and contains burial sites.
- A cave in the cliffs which was probably inhabited circa 1800-1860. Some pottery shards and bone fragments were found in them. The person who first entered (a visitor) initially removed three pieces of pottery but the pieces have been kept in the display cabinet in the lounge.
- Stone Age sites (dated 150 000 to 50 000 BC) have been discovered. Some artefacts from these are also in the display cabinet.
- Rock art discovered in 1998.

However, it must be noted that due to the small footprint of the causeway and access tracks in relation to the proposed Reserve, it has been determined by the EAP that there is nothing of heritage importance on site or adjacent to the site. It is thus the EAP's professional opinion in consultation with the applicant and project team, as well as the undertaking of a site inspection that no heritage resources will be impacted upon by the causeway development. This includes

- Archaeological material (remains older than 100 years or rock art);
- Palaeontology and Meterories (including fossils);
- Built Environment (Historical buildings, buildings over 60 years); and/or
- Burial Grounds and Graves.

In the highly unlikely event that anything of archaeological significance be uncovered, a suitably qualified professional will be contacted to conduct an assessment. The Development will further be halted and only continue at the discretion of the Environmental and Heritage authorities. This has been explained to the Applicant.

4.9 SOCIAL-ECONOMIC ENVIRONMENT

4.9.1 THE SURROUNDING LOCAL SOCIAL ENVIRONMENT

The proposed causeway is situated on Emcakwini Community land awarded to the community as part of a successful land claim lodged in 1998. The ECT was then formed to represent the interests of the community which is made up of around 192 households. Currently, there are no dwellings located on the proposed site or immediately adjacent. However, there is a mixture of formal and informal dwellings located on the hilltops overlooking the valley bottom. These communities utilise the proposed causeway crossing area for occasional livestock farming.

The proposed creation of the Babanango Game Reserve will have positive economic and social impacts for the local community and will result in local economic growth and the growth of supporting industries. The Reserve will create an estimated 272 direct job opportunities. These employment opportunities will be created through the operation of the lodges and conservation management (**Table 4.1**).

Table 4.1: Employment opportunities created with the formulation of the Babanango Game Reserve

	Skilled Opportunities	Semi-skilled opportunities	Unskilled opportunities
Conservation Management	4	52	17
Operation of tourism lodges	78	112	24
Total direct employment opportunities created			**272**

Additional employment/work opportunities will be created for the community through the supplying of services to the Reserve. This includes: transport, provision of charcoal and wood, sale of small crafts, sale of fresh produce.

The community will further benefit from training opportunities, profit sharing from the creation of the game reserve, and community projects such as community gardens and infrastructure development

The construction of the causeway itself will also create temporary employment opportunities. Employment will further be created through the maintenance of the causeway and removal of debris, as part of the reserve management plan to be formulated.

It must be further noted that the Buthelezi clan further contain family burial sites within the Reserve as indicated under the Heritage section of this Report. Family members do occasionally visit these sites and preform rituals as per traditional customs. The proposed causeway site is not located adjacent to any burial sites. Once the Reserve is proclaimed, Rangers will escort the community members to these burial sites and protect the community from wildlife. The community further utilises the Reserves plants for cultural practises and traditional medicine. However, the proposed causeway will not likely impact on this due to the sites relatively small size. Furthermore, rehabilitation will occur which will help preserve these culturally significant plants in the long term.

4.9.2 ULUNDI LOCAL MUNICIPALITY

The Ulundi Local Municipality is a rural municipality located on the southern boundary of the Zululand District Municipality in the north eastern section of the KwaZulu-Natal province. The Ulundi municipal area is approximately 3,250 km^2 in extent and according to the 2018 Integrated Development Plan includes the includes the towns and settlements of Ulundi, Nqulwane, Mahlabathini, Babanango, Mpungamhlophe and Ceza as well as the Traditional Authorities of Buthelezi, Buthelezi Mbatha, Mpungose, Ndebele, Ntombela, Ximba, Zungu and Zulu.

The Municipality has a population of approximately 205 762 (2016 census) with over 50% of the population being under 21 years old. This indicating that a high percentage of the population is economically dependent. The Municipality experienced a positive population growth rate from the previous census undertaken in 2011. The population size increased by approximately 17 177 people. The gender profile within Ulundi LM is dominated by females that constitute 54,83% with males constituting 45,17% of the population. This high female proportion is attributed young males moving to urban areas for further employment opportunities.

The economy is largely rural and underdeveloped. The economy is based on:

- Agriculture (Large commercial to subsistence);
- Tourism (focusing on game reserves and heritage resources);
- Mining (coal);
- Retail (concentrated in Ulundi); and
- Informal economy.

The Municipality experiences numerous social challenges persistent of rural municipalities throughout the province. This includes a high poverty rate of 43%, a high rate of child headed households, large unemployment at 49%, a high rate of HIV/AIDS and a lack of basic services to the remote areas of the Municipality. Low annual income and low education levels are further social problems.

4.9.3 Zululand District Municipality

The Zululand District Municipality is one of eleven district municipalities making up the province of KwaZulu-Natal. It is a Category C municipality situated in the north-eastern part of KwaZulu-Natal and is the biggest district in the province, making up 16% of its geographical area. It comprises of five local municipalities namely: Ulundi, Nongoma, uPhongolo, eDumbe and AbaQulusi. The town of Vryheid is a commercial and business hub, while the Ulundi Town is mainly an administrative centre. It is primarily a rural district with about half the area falls under the jurisdiction of traditional authorities.

4.10 Local and Regional site sensitivity

The project footprint is not located within a formally protected area, within an informally protected area, or within a focus area for protection (NBA, 2011 and the NPAES, 2010). However, the Applicant has already applied for formal protection status. This will result in the formulation of the Babanango Game Reserve (as a proclaimed 'Nature Reserve') consisting of the reintroduction of game including large herbivores and the 'big 5'.

The project footprint is located within an Ecological Support Area (ESA) (**Figure 4.4**). ESAs are characterised by functional but not necessarily entirely natural terrestrial land that is largely required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within Critical Biodiversity Areas (CBAs). The land use management objective of these areas is to maintain ecosystem functionality and connectivity allowing for some loss of biodiversity.

Please note that the developer is in the advanced stages of declaring the area as a Biodiversity Stewardship Programme - Biodiversity Agreement area. Thus Activity 12 of Listing Notice 1 for the clearance of indigenous vegetation will be triggered.

It can be concluded from the GIS databases and site assessments that the proposed Babananago Game Reserve and indeed the site itself is of significant biodiversity value with unique characteristics and landscape features, and a number of rare and threatened species. The overall formulation of the Reserve will aid the province in achieving several key protected area targets.

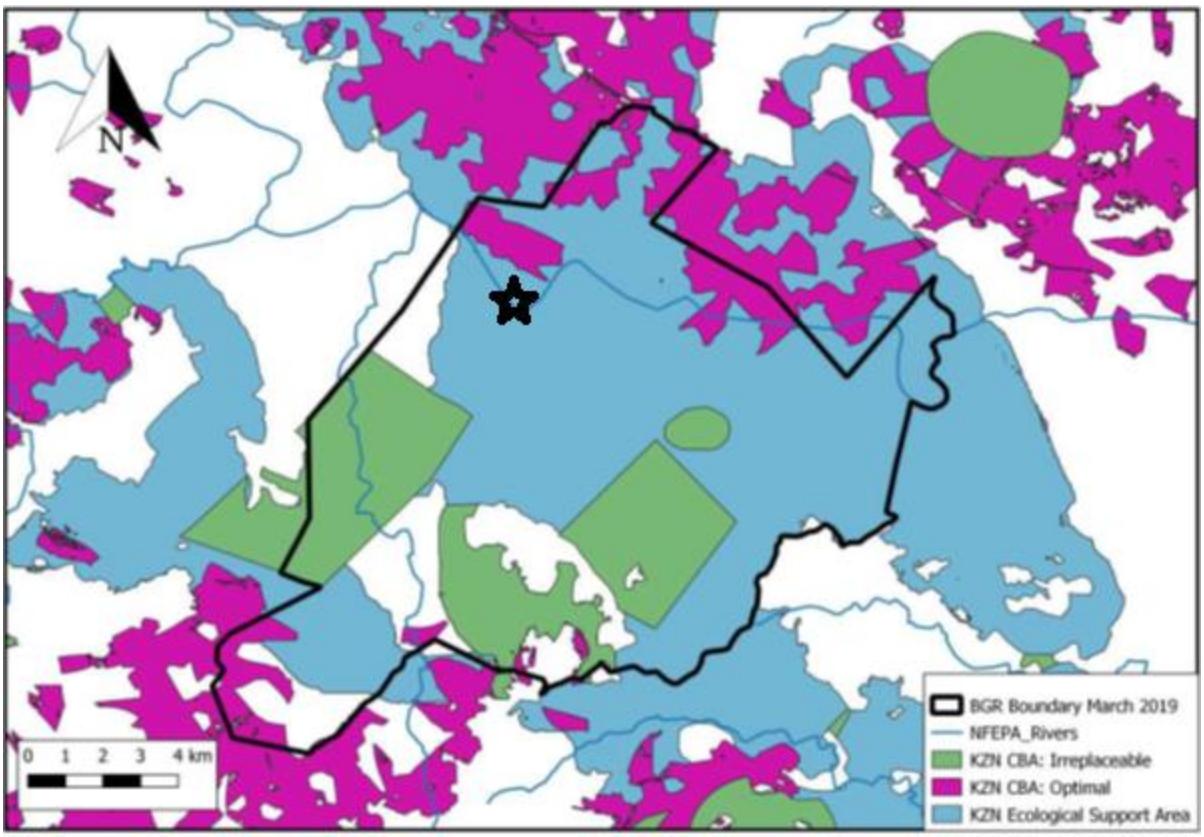

Figure 4.4: The proposed causeway site is located within an Ecological Support Area

5 IMPACT ASSESSMENT

5.1 INTRODUCTION

The impact assessment aims at identifying potential environmental impacts (both positive and negative impacts) and evaluating these impacts in terms of its significance. This assessment is provided in the form of a systematic analysis framework to evaluate the nature, extent, duration, intensity, probability and significance of the various impacts considered both without and with mitigation and management measures. The impact assessment assesses both the impacts of the preferred alternative, as well as the other alternative options considered in the development proposal and unforeseen cumulative impacts. The mitigation hierarchy was applied during the BA process and contains steps to mitigate potential impacts of the proposed causeway. The aim of the mitigation hierarchy is to avoid/minimize impacts over rehabilitation and offsetting.

5.2 IMPACT ASSESSMENT CRITERIA

The assessment of the potential impacts of the envisaged development is undertaken in accordance with the broad criteria required by the integrated environmental management procedure and includes the following:

5.2.1 NATURE OF IMPACT

A brief description of the type of impact the proposed development will have on the affected environment.

5.2.2 EXTENT/SCALE

The physical extent of the impact.

i. Footprint
   The impacted area extends only as far as the actual footprint of the activity.
ii. Site
   The impact will affect the entire or substantial portion of the site/property.
iii. Local
   The impact could affect the area including neighbouring properties and transport routes.
iv. Regional
   Impact could be widespread with regional implication.
v. National
   Impact could have a widespread national level implication.

5.2.3 DURATION

The duration of the impact.

i. Short term
   The impact is quickly reversible within a period of one year, or limited to the construction phase, or immediate upon the commencement of floods.
ii. Medium term

The impact will have a short-term lifespan (project lifespan 1 – 10 years).

iii. Long term

The impact will have a long-term lifespan (project lifespan > 10 years).

iv. Permanent

The impact will be permanent beyond the lifespan of the development.

5.2.4 INTENSITY

This criteria evaluates intensity of the impact and are rated as follows:

i. Minor

The activity will only have a minor impact on the affected environment in such a way that the natural processes or functions are not affected.

ii. Low

The activity will have a low impact on the affected environment.

iii. Medium

The activity will have a medium impact on the affected environment, but function and process continue, albeit in a modified way.

iv. High

The activity will have a high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

v. Very high

The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

5.2.5 PROBABILITY

This describes the likelihood of the impacts actually occurring.

i. Improbable

The possibility of the impact occurring is highly improbable (less than 5% of impact occurring).

ii. Low

The possibility of the impact occurring is very low, due either to the circumstances, design or experience (between 5% to 20% of impact occurring).

iii. Medium

There is a possibility that the impact will occur to the extent that provision must be made therefore (between 20% to 80% of impact occurring).

iv. High

There is a high possibility that the impact will occur to the extent that provision must be made therefore (between 80% to 95% of impact occurring).

v. Definite

The impact will definitely take place regardless of any prevention plans, and there can only be relied on migratory actions or contingency plans to contain the effect (between 95% to 100% of impact occurring).

5.2.5.1 DETERMINATION OF SIGNIFICANCE

Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the extent, duration, intensity and probability of the impacts.

i. No significance
   The impact is not substantial and does not require any mitigatory action.
ii. Low
   The impact is of little importance, but may require limited mitigation.
iii. Medium
   The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
iv. High
   The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation and management is essential.

The following assessment scale is used to determine the significance of the identified potential impacts on the environment.

Significance = (probability + duration + scale) x intensity

Probability: 1 – 5
Extent: 1 – 5
Duration: 1 – 4
Intensity: 1 – 10

Significance rating criteria

>75	High environmental significance
50 – 75	Medium environmental significance
<50	Low environmental significance

5.3 IMPACT HIERARCHY

The mitigation hierarchy tool was used to guide the process in dealing with potential impacts of the proposed causeway crossing and the formulating of the various mitigating measures specified in the section below and the Final EMP (**Appendix 1**). The mitigation hierarchy is typically used when planning and

implementing development projects in order to provide a systematic, logical and sustainable approach in dealing with possible impacts associated with the development. This to ensure the positive impacts are amplified and negative impacts have the lowest possible effect on the receiving environment.

The following steps/hierarchy was utilised as the core in dealing with possible impacts. When mitigation measures were being formulated to deal with potential impacts, the below measures in the table were used. The favoured mitigation option was the avoidance of impacts and the least preferred option is offsetting

Avoidance	The first step of the mitigation hierarchy comprises of measures taken to avoid creating impacts from the outset. This is the most environmentally sustainable and cost effective option.
Minimization	The second preferred option involves measures taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided.
Restoration	The third preferred option is restoration measures which aim to rehabilitate degraded or removed ecosystems following exposure to impacts that cannot be completely avoided or minimised.
Offsetting	The least preferred option is offsetting. This involves implementing measures taken to compensate for any residual, adverse impacts after full implementation of the previous three steps of the mitigation hierarchy.

5.4 IMPACTS FROM SIMILAR TYPES OF DEVELOPMENT

As part of the impact assessment process, impacts from similar types of developments were analysed and used to help guide the assessment process for the current Basic Assessment. In particular, causeway construction in sensitive environments/protected areas were examined. While the EAP notes that all projects are unique depending upon local environmental conditions and engineering designs; examining previously undertaken Basic Assessments of similar types of projects can assist the EAP in the Impact Assessment process. This to strengthen the quality of the EIA.

5.5 ENVIRONMENTAL IMPACTS OF THE PROPOSED PREFERRED ALTERNATIVE

Below contains a description of the anticipated impacts of the **proposed preferred alternative** as discussed in **Section 2.6** of this Report.

NB: For each Impact identified corresponding mitigation measures have been proposed that are legally binding on the Applicant. Mitigation measures are provided in the 9th block of the impact tables below

Kindly note, that these blocks do not contain all the mitigation measures to be implemented by the Applicant during the construction and operational phases of the causeway. Rather the important mitigation measures are stipulated. A full list of all the mitigation measures as well as timeframes and responsible persons can be found in the EMP (**Appendix 1**).

5.5.1 Soil Erosion, loss of topsoil and contamination

Soil erosion, contamination, compaction and loss of top soil are serious impacts that could occur during the construction and operational phases of the proposed causeway development if mitigation measures are not employed. This as once soil is disturbed by construction related activities, it becomes far more susceptible to erosion and a decrease in quality. Erosion of the soil surface greatly increases the risk of losing topsoil to erosion and impairing the soils ability to support vegetation growth. Nutrients and seed banks are lost to sun baking and humus content will often be reduced (oxidised). This makes future rehabilitation/re-vegetation difficult and favours colonising species like invasive aliens or in the worst case, desertification. Already erosion is occurring on the southern bank of the proposed causeway crossing from former farming practises and current livestock grazing. This has resulted in the emergence shallow erosion gullies within the riparian vegetation. With the further disturbance of this area as a result of the development of the causeway, this can worsen the erosion on site if action is not taken to remedy the situation. Furthermore, earth moving activities such as excavation within the river bed and banks for the construction of the causeway abutments/cutoff walls and for the laying of binding concrete will result in the disturbance of soils and in an increase in the runoff of sediment into the River. Excavation may also result in the destabilisation of the River banks and in bank slump which will add to the impact as a result of sedimentation. Soil contamination due to chemical spills (Waste, sewage, paints, herbicides etc) or leaks (Hydrocarbons) is a further issue which can result in a health hazard to both humans and local flora and fauna. Soil contamination can also compromise future rehabilitation of the site. Lastly, compaction of soil due to unrestricted vehicle movement on site can potentially occur resulting in impacts on soil structure which determines the ability of soil to hold water, nutrients, and air.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. <u>Soil pollution and contamination</u>	C	Negative	Local	Short	High	High	Medium	1. Repairs done to construction vehicles must be conducted on hardened surfaces.	Low

	O	Negative	Local	Short	Medium	Low	Low	2. Under no circumstances must oil, diesel or any other chemical be disposed of at the site. 3. Minimise petrol, diesel, and oil leaks by allocating a loading zone, which is protected against such leaks. Drip trays must be secured and emptied regularly. 4. Chemical toilets must be provided by the contractor in accordance with DWS requirements 5. A Spill Contingency Plan must be adopted. A spill chemical kit must be available on site in the event of an emergency	Low
2. <u>Compaction of soils</u>	C	Negative	Site	Short	Medium	High	Low	1. Where roads or soil have become compacted, they will be ploughed, ripped and re-vegetated.	Low
	O	Negative	Site	Short	Medium	Medium	Low		Low
3. <u>Soil Erosion</u>	C	Negative	Local	Long	Medium	High	Medium	1. On any areas where the risk of erosion is evident, appropriate temporary or permanent works and water energy dispersion structures must be installed. 2. There needs to be minimal vegetation clearance and exposure of soils. 3. The removal of vegetation and exposing of soils must be phased. 4. The excavation of soils must only be undertaken during agreed times and under suitable weather conditions. Should heavy rains be forecast, clearing activities must be put on hold. 5. Wind screening and barriers should be installed where necessary.	Low
	O	Negative	Local	Long	Medium	High	Medium		Low

								6. In areas where erosion control measures have been implemented, protection measures must be implemented to prevent animals from utilising these areas. 7. The Stormwater measures stipulated in this Report must be implemented. 8. Install many small, shallow mitre type drains, cut off drains or berms at regular intervals along access tracks. Drains should be protected from erosion with the use of riprap grassed with indigenous vegetation or similar structures.	
4. <u>Loss of Topsoil</u>	C	Negative	Site	Short	Medium	High	Low	1. Topsoil stripped from the footprint must not be spoiled but stockpiled and preserved for later use in rehabilitation. 2. Stockpiled topsoil should be used as the final cover for all disturbed areas where re-vegetation is required. 3. All stockpiles must be protected from windy conditions or heavy rain. This includes cloth or vegetation. 4. All stockpiles must be kept neat and tidy and free of weeds. 5. Stockpiles must be located away from any watercourse.	Low

5.5.2 WATER QUALITY AND QUANTITY

There is likely to be impact on water quality to both the surface water and to a lesser extent groundwater during the different phases of the causeway development. However, the majority of these impacts are confined to the construction phase of the development. These impacts are most likely to be short term/temporary impacts (some impacts such as pollution can be prevented all together) that can be mitigated

to acceptable/low levels with the measures proposed in this Report and EMP. Without these measures being implemented, the causeway will likely have a high impact on the White Umfolozi River as determined by the Freshwater Specialist.

During the construction phase: Water quality modification is aggravated by a decrease in the volume of water during low or no flow conditions such as drought conditions frequently experienced by the region. The movement of construction vehicles through the River and surroundings increases the possibility of the contamination of the River by hydrocarbons which may leak from poorly maintained vehicles. In addition, there is a possibility that the River will be contaminated as a result of the runoff of cement and other construction related materials which will be utilised during the development of the causeway structure. Furthermore, there is a possibility of contamination of the River by sewage from leaking and poorly maintained chemical toilets.

An increase in stormwater runoff from bare, disturbed and compacted areas may result in an increase in stormwater flows and flow velocities into the White Umfolozi River. This may cause erosion and the transport of soil, rock and chemicals into the River if appropriate measures are not employed or if stromwater structures which are in place are not properly maintained during construction.

The development of the causeway is also likely to impact negatively on the instream habitat of the River (ie: during construction and should blockages occur). Where the binding slabs of the proposed causeway are cast directly onto the rock surface below the River water level, dredging of the River bed will be required and a small section of aquatic habitat will be lost from the direct causeway footprint in the River. However, bedrock surfaces and sandy river beds are usually inhospitable environments when compared to other biotypes such as gravel, stones and vegetation, and are usually associated with a few hardy and adaptable species (Dickens and Graham, 2002). In addition, any aquatic invertebrates present will be able to relocate to areas up or downstream of the causeway during this disturbance and return once construction is completed. It must further be considered that with the formulation of Babanango Game Reserve, a large section of the White Umfolozi will be formally protected from potentially harmful anthropogenic activities such as large scale mining. Thus a large section of instream habitat will be protected.

The proposed construction of a causeway traversing the White Umfolozi River will result in a temporary impact on the flow patterns through the River due to the diversion of flow during construction activities and any potential blockages by debris. Temporary sandbag coffer dams / berms will be utilised during the construction of the causeway in order to ensure a dry work surface within the River. Coffer dams / berms

are likely to result in the back flooding of areas upstream of the impounded area and in the reduction of flow into areas downstream of the impounded area. Coffer dams/berms are also likely to result in the concentration of flows through the narrowed River channel and in the scouring of downstream areas. The excavation of sandbag coffer dams / berms within the River could have long term implications should effective rehabilitation not be undertaken. Rehabilitation is thus important as the White Umfolozi River contains a high Ecological Importance and Sensitivity (EIS) score with a high aquatic biodiversity (site contains 4 confirmed fish species and another 10 species are expected to occur in the region). Some of these species are migratory and need to be able to move freely up and downstream. Therefore the causeway has been designed to allow the free movement of water (through a series of culverts). Thus aquatic life will be able to freely move both upstream and downstream of the proposed causeway as impacting on flow patterns will only be short term during construction.

During the operational phase: With regular maintenance and repair and the fact that the design of the causeway will allow for the constant flow of water during all conditions, the impact of the causeway on the White Umfolozi River during operation will be limited. Without the regular maintenance, repair, removal of blockages; the causeway will impact on the instream habitat and the flow of the River.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. **Water Quality Impairment**	C	Negative	Local	Short	High	High	Medium	1. Chemical toilets must be provided by the contractor and be 17m away from the watercourse or outside the 1:100 year floodline, whichever is greatest. 2. Machine maintenance of the equipment must as far as possible be undertaken off site. 3. Hazardous substances must be stored away from the buffer areas surrounding any water bodies on site to avoid pollution. 4. Inspect all storage facilities, machinery and vehicles daily for the early detection of deterioration or leaks 5. Limit construction activities within the	Low
	O	Negative	Local	Short	High	Medium	Medium		Low

								River to the dry winter months in order to prevent the runoff of contaminants into the River with stormwater. 6. Avoid the use of infill material or construction material with pollution / leaching potential when constructing the causeway. 7. Train employees and contractors in spillage management and provide them with absorbent spill kits and disposal containers to handle spillages	
2. <u>Loss of instream habitat</u>	C	Negative	Local	Permeant	Medium	Definite	Medium	N/A	N/A
3. <u>Disturbance of riparian and instream habitat</u>	C	Negative	Local	Long	Medium	Definite	Medium	1. Limit construction activities within the River to the dry winter months (June to September). 2. Limit the extent of the construction footprint, including the causeway footprint, access tracks to either side of the causeway and any sandbag coffer dams / berms, to that which is absolutely essential. 3. A maximum construction working servitude of 3m should be allowed to either side of proposed causeway footprint. 4. Limit the movement of construction personnel and construction vehicles through the River during the construction phase. 5. Prevent excessive disturbance of the bed and banks during	Low
	O	Negative	Local	Long	Medium	Medium	Medium		Low

								culvert and abutment development. 6. Immediately rehabilitate any accidental disturbance to freshwater habitat falling outside of the demarcated construction footprint area.	
4. <u>Impact on fish migration</u>	C	Negative	Local	Long	High	Definite	High	1. Sufficient water volume must be able to pass beneath the crossing. The widest possible gaps between supports must be provided. The use of numerous small diameter pipes must be avoided. If pipes or culverts are to be used, these must be the maximum allowable diameter. 2. Blockages must be regularly removed.	Low
	O	Negative	Local	Long	High	Definite	High		Low
5. <u>Altering of flow patterns</u>	C	Negative	Local	Long	High	Definite	High	1. The natural flow of the River must not be permanently diverted or blocked. 2. Strictly prohibit the excavation of a new channel or drainage canals for the diversion of water away from the construction area. 3. Throughflow to downstream freshwater habitats must be maintained during construction. This can be achieved by the development of flume pipes through dry work areas, which divert water away from the direct construction works area. 4. Sandbags utilised for the diversion of the River must be in good condition so as to avoid the bursting of the bags and sedimentation of downstream areas.	Low
	O	Negative	Local	Permeant	High	High	High		Low

								5. Any debris which collects above the sandbag coffer dams / berms during the construction phase must be removed and disposed of at a registered waste disposal facility. 6. The causeway must be stable and must be appropriately protected so as to withstand major flood events	
6.	**Stormwater and runoff on site**	C	Negative	Local	Long	Medium	High	Medium	1. Implement storm water management measures as stipulated in this Report. 2. Regular maintenance of the system must be carried out to ensure that blockages of the pipes do not occur. 3. Divert stormwater away from the construction footprint area. Stormwater must not be discharged directly into any watercourse.	Low
		O	Negative	Local	Long	Medium	High	Medium		Low
7.	**Water Quantity**	C	Negative	Local	Short	Minor	Low	Low	1. Place water saving measures in place. 2. Limit the wastage of water. 3. Plant indigenous plant species during rehabilitation.	Low

5.5.3 FLORA AND FAUNA

The proposed causeway construction and operation will have some potential impacts on both flora and fauna of the area. The most significant impact will be the permanent loss of small areas of riparian vegetation for the access track. The proposed causeway and gravel access routes are located within the Zululand Lowveld vegetation type which is listed as a Vulnerable vegetation type in the province (Jewitt, 2011), and is located within an ESA (KZN BSP, 2016). However, the flood/disturbance prone riparian habitat is dominated by common indigenous species with no SCC encountered. Only individuals of provincially protected species such as Aloe marlothii and Aloe cf parvebracteata were encountered within the area. The vegetation which will be lost is therefore only considered to be of a moderate sensitivity. In addition, the area of vegetation to be lost is relatively small (approximately 380m^2 riparian habitat) and its loss is therefore not likely to significantly impact on the conservation targets of the vegetation type. It must

be further noted that the southern bank of the causeway crossing is already disturbed due to livestock grazing. Further disturbance will worsen the impact on the riparian habitat. However, rehabilitation of these disturbed areas are proposed. Thus the rehabilitation process will result in a greater gain for the local environment.

Factors which will result in the potential degradation of limited vegetation areas, include the proliferation of alien and invasive species within disturbed areas, road maintenance activities, and the erosion of areas which have not been adequately rehabilitated. Alien vegetation is likely to proliferate in areas disturbed during the construction phase of development, unless appropriately monitored and managed. With the implementation of rehabilitation measures post construction will reduce the intensity of the impact; however, without follow up alien vegetation control, encroachment is still highly likely to occur. Maintenance activities (e.g. repairs, alien vegetation control, road grading etc.) and the movement of maintenance vehicles and personnel during the operation of the causeway may also result in the disturbance of natural vegetation on either side of the causeway and associated access routes. This is likely to result in the further proliferation of alien and invasive species in disturbed areas. An increase in stormwater runoff from the hardened surface of the access routes and the concentration of runoff at stormwater outlet points could potentially result in erosion damage to adjacent areas and in the associated disturbance of vegetation.

While the introduction of fauna has not yet commenced, there still exists numerous fauna species in the proposed Reserve and the region is an important bird biodiversity hotspot (with numerous water bird species). Construction related activities may result in the temporary migration of fauna species away from the proposed causeway. This especially during noisy activities. This impact will however be temporary in nature. Due to the proposed Reserve being an exclusive tourism venture, vehicle traffic crossing the causeway will be limited to a few cars a day. This will unlikely have major impact on fauna on the causeway site. Fauna will further utilise the causeway to reach the different sides of the Reserve. The movement of vehicles and equipment on site may result in collisions or trampling of fauna. The further degradation of the site may result in the fragmentation of habitat and the loss of species diversity. However, it must be noted the site is relatively small and with rehabilitation, this will improve the quality of the site and adjacent areas.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. **Impact on faunal activity**	C	Negative	Local	Medium	Medium	Definite	Medium	1. No trapping, snaring, hunting, fishing or killing of any animal may occur on the site. 2. Any malicious damage to any fauna species present on site will be considered a punishable offence, and the appropriate measures will be followed. 3. Limit the clearing of vegetation, removal of logs, rocks etc. 4. Demarcate the site and phase construction to limit disturbing a large area at one time.	Low
	O	Negative	Local	Permeant	Low	High	Low		Low
2. **Loss of Riparian vegetation and protected species**	C	Negative	Local	Permeant	Medium	Definite	Medium	1. Limit the construction footprint area to what is essential in order to minimise environmental damage. 2. A maximum construction working servitude of 3m should be allowed to either side of the proposed causeway. 3. Demarcate the construction footprint, including the working servitudes clearly. 4. A suitably qualified specialist must undertake a 'walk through' of the final causeway alignment prior to construction in order to identify and mark individuals of protected species which will be removed. A floral permit application will have to be made to EKZN Wildlife for the removal of individuals of Aloe	Low

								marlothii and Aloe cf parvebracteata;	
3. <u>Impact on vegetation</u>	C	Negative	Local	Permeant	Medium	Definite	Medium	1. During the construction phase workers must be limited to areas under construction and avoid buffer areas. 2. Limit the removal of vegetation. 3. Incorporate vegetation into the design of structures. 4. Prevent illegal removal of protected vegetation. 5. Minimise disturbance and loss of topsoil. 6. Rescue smaller trees, shrubs or forbs encountered within the construction footprint and relocate to areas that have historically been disturbed. 7. Remove invasive alien species on site. 8. Permits must be applied for if protected species are to be removed.	Low
	O	Negative	Local	Long	Medium	High	Medium		Low

5.5.4 NOISE IMPACTS

During construction and to a lesser extent during operation (Traffic), elevated noise levels will be generated. Noise levels must be monitored as high volumes could cause stress to the different species of animals and cause migration away from the site and impact on surrounding communities.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. <u>Noise impacts</u>	C	Negative	Local	Medium	Medium	Definite	Medium	1. Noise levels must be kept within acceptable limits. 2. Noise suppression measures must be applied to all construction equipment. 3. Manuel digging must be favoured where possible over the use of machinery.	Low
	O	Negative	Local	Permeant	Low	Definite	Low		Low

5.5.5 AIR QUALITY

Dust may be produced during construction, but will be limited to the construction site. Dust can be a nuisance but can, to a large extend, be controlled (especially due to the project footprint being small). Construction will take place during the dry winter months and thus extra care must be taken during construction to ensure that dust levels do not exceed acceptable limits. Traffic and smoke from fires and vehicles can further contribute to a deterioration in air quality. This however will be temporary.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. **Air pollution**	C	Negative	Local	Short	Low	High	Low	1. During windy or dry periods, dust suppression techniques must be implemented. 2. Vehicles and equipment must be properly maintained to limit the release of harmful gases. 3. Exhaust emission control devices are to be installed on vehicles and/or machinery where practical.	Low
	O	Negative	Site	Short	Low	Medium	Low		Low

5.5.6 LIGHT

Light pollution may be created during the construction period. The construction camp will be lit up with lights to ensure safety.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. **Light pollution**	C	Negative	Site	Short	Minor	Definite	Low	1. Operational hours during construction will be restricted from Monday to Saturday 07h00 to 17h00. 2. Implement light suppression techniques during construction (eg: tilt lights instead of shining on a large area).	Low

5.5.7 VISUAL

Visual impact due to construction and the operation of the causeway may have limited aesthetic impacts in terms of impacting on the sense of place of the area, which is largely devoid of human structures and natural in state. The construction process and utilisation of the causeway crossing may impact on this natural sense of place and isolation from human activities feel during the construction period only. It must be noted that one of the reasons a causeway was preferred to a bridge was the fact that the causeway will be less intrusive and more aesthetically appealing than a bridge. The causeway will be developed across the rocky outcrops of the River and has been designed to amalgamate into the surrounding environment.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. **Visual Impact**	C	Negative	Local	Short	Minor	High	Low	1. The site must be kept neat and tidy at all times. 2. Sustainable practises must be used to guide the design of the causeway. 3. After construction rehabilitation of the site must occur.	Low
	O	Negative	Local	Permeant	Minor	High	Low		Low

5.5.8 SOLID WASTE DISPOSAL

Inappropriate location of solid waste storage and disposal services may lead to litter, pollution and general nuisances and health hazards. This solid waste may enter into the River and be transported further downstream. The site is currently free of litter and construction waste and this must be continued.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. **Waste disposal**	C	Negative	Local	Medium	Medium	Definite	Medium	1. Ensure sustainable waste management practises are in place. 2. Implement recycling. 3. Bins must be provided on site and coded. 4. Littering by the construction workers must not be allowed. 5. Construction waste must be disposed of at a registered landfill site.	Low

5.5.9 TRAFFIC

The construction and operation of the proposed causeway will result in increased vehicle use of the area, in the form of accessibility by Reserve tourists and game viewing vehicles. It must be noted that the proposed Babanango Game Reserve will not have large volumes of tourism and thus large volumes of traffic crossing the proposed causeway will not occur.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Increase in Traffic	C	Negative	Local	Short	Low	Low	Low	1. Vehicle access must be strictly contained onsite. Vehicles may only use designated routes and access points as determined by the ECO and Project Manager before operations commence. 2. Access road and loading area will be properly maintained, and this includes appropriate stormwater management and dust control.	Low
	O	Negative	Local	Permeant	Low	Low	Low		Low

5.5.10 SOCIAL

The causeway will have positive impacts on the local economy, which will in turn have numerous social benefits. The construction phase and development of the Reserve (including the construction of the causeway) will result in employment opportunities being created for the surrounding communities, and the beneficiaries of the Applicant. There will be an increase in tourism and the promotion of secondary industries supporting the proposed Reserve. The land comprising the proposed Reserve is predominantly owned by the applicant Trust and the constituent beneficiaries of the Trust. The Reserve is therefore a community owned (in part) and community oriented project, and already development, wildlife management, and lease agreements have been signed with the Applicant and proposed investors, including the participation of local community leaders, to ensure benefits to these communities. Community upliftment projects are proposed such as the development of schools, creches, gardens (which must include a section for culturally significant and traditional medicine plants) and clinics.

The community will however be unable to graze livestock on the southern bank which occurs on an occasional basis. This has been agreed with the Trust. The community however will be allowed to graze on other areas of ECT land.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. <u>Social impacts</u>	C	Positive	Regional	Medium	Medium	High	None	None	None
	O	Positive	Regional	Medium	Medium	High			

5.6 CUMULATIVE IMPACTS

Cumulative impacts are impacts that result from the incremental impact of the proposed activity on freshwater systems within a greater catchment, ecoregion and wetland vegetation group when added to the impacts of other past, present or reasonably foreseeable future activities. Freshwater habitat within the region has already been impacted as a result of anthropogenic activities and alien vegetation encroachment. Furthermore, existing degraded bridge structures currently have an impact on flow patterns through the White Umfolozi River. The White Umfolozi further flows into both the Hluhluwe–iMfolozi Park and the iSimangaliso Wetland Park which are two of the most important nationally protected areas in South Africa. Therefore impact on the River by unregulated development can have severe impacts further downstream.

However, should the designs, mitigation and management measures as listed within this Report be strictly adhered to, disturbance to freshwater habitat will be minimal/low as assessed by the Freshwater Specialist and EAP. In addition, existing degraded causeway structures located within the Reserve will be removed thereby improving flow through the River. Lastly, with the formulation of the Reserve, a large portion of the White Umfolozi will be protected from negative impacts including mining. The cumulative impact is therefore considered to be of a negligible significance.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Impact on the White Umfolozi watercourse system	C and O	Negative	Regional	Permeant	High	Medium	High	Implement strict mitigation measures as specified in **Sections 5.5.1, 5.5.2 and 5.5.3.**	Low

Please see below summary of the preferred alternative impact assessment.

Nature	Type	Extent	Duration	Intensity	Probability	Without Mitigation	With Mitigation
Impacts linked to the Site Preparation and Construction Phases							
Soil Erosion, loss of topsoil and contamination impacts							
1) Soil Pollution	Negative	Local	Short	High	High	Medium	Low
2) Compaction of soils	Negative	Site	Short	Medium	High	Low	Low
3) Soil Erosion	Negative	Local	Long	Medium	High	Medium	Low
4) Loss of top soil	Negative	Site	Short	Medium	High	Low	Low
Water Quality and Quantity Impacts							
5) Water Quality Impairment	Negative	Local	Short	High	High	Medium	Low
6) Loss of instream habitat	Negative	Local	Permeant	Medium	Definite	Medium	N/A
7) Disturbance of Riparian and instream habitat	Negative	Local	Long	Medium	Definite	Medium	Low
8) Impact on Fish and migration patterns	Negative	Local	Long	High	Definite	High	Low
9) Altering of flow patterns of the White Umfolozi River	Negative	Local	Long	High	Definite	High	Low
10) Stormwater and runoff	Negative	Local	Long	Medium	High	Medium	Low
11) Water Quantity	Negative	Local	Short	Minor	Low	Low	Low
Flora and Fauna Impacts							
12) Impact on fauna activity	Negative	Local	Medium	Medium	Definite	Medium	Low
13) Loss of Riparian vegetation and protected species	Negative	Local	Permeant	Medium	Definite	Medium	Low
14) Impact on vegetation	Negative	Local	Permeant	Medium	Definite	Medium	Low
Other environmental Impacts associated with the development of the proposed causeway							
15) Noise Impacts	Negative	Local	Medium	Medium	Definite	Medium	Low
16) Air Pollution	Negative	Local	Short	Low	High	Low	Low
17) Light Pollution	Negative	Site	Short	Minor	Definite	Low	Low
18) Visual and Aesthetic	Negative	Local	Short	Minor	High	Low	Low
19) Solid Waste disposal	Negative	Local	Medium	Medium	Definite	Medium	Low
20) Increase in traffic	Negative	Local	Short	Low	Low	Low	Low
21) Social Impacts	Positive	Regional	Medium	Medium	High	-	-

Nature	Type	Extent	Duration	Intensity	Probability	Without Mitigation	With Mitigation
Impacts linked to the Operational Phase							
Soil Erosion, loss of topsoil and contamination impacts							
1) Soil Pollution	Negative	Local	Short	Medium	Low	Low	Low
2) Compaction of soils	Negative	Site	Short	Medium	Medium	Low	Low
3) Soil Erosion	Negative	Local	Long	Medium	High	Medium	Low
Water Quality and Quantity Impacts							
4) Water Quality Impairment	Negative	Local	Short	High	Medium	Medium	Low
5) Disturbance of riparian and instream habitat	Negative	Local	Long	Medium	Medium	Medium	Low
6) Impact on Fish and migration patterns	Negative	Local	Long	High	Definite	High	Low
7) Altering of flow patterns of the White Umfolozi River	Negative	Local	Permeant	High	High	High	Low
8) Stormwater and runoff	Negative	Local	Long	Medium	High	Medium	Low
Flora and Fauna Impacts							
9) Impact on fauna activity	Negative	Local	Permeant	Low	High	Low	Low
10) Impact on vegetation	Negative	Local	Long	Medium	High	Medium	Low
Other environmental Impacts associated with the development of the proposed causeway							
11) Noise Impacts	Negative	Local	Permeant	Low	Definite	Low	Low
12) Air Pollution	Negative	Site	Short	Low	Medium	Low	Low
13) Visual and Aesthetic	Negative	Local	Permeant	Minor	High	Low	Low
14) Increase in traffic	Negative	Local	Permeant	Low	Low	Low	Low
15) Social Impacts	Positive	Regional	Medium	Medium	High	-	-

5.7 Alternatives Impact assessment

The impacts of the proposed alternatives have further been assessed. Please see below impact assessment of the alternatives proposed in **Section 2.6** of this Report.

5.7.1 Alternative 1 – Usage of the existing causeway

The first alternative assessed is the usage of the existing causeway. As specified during the assessment of alternatives, while the usage of the existing causeway will necessitate the need to disturb a new site, it must be noted that the current causeway is unsafe to use and major repair work will be required. Therefore much of the same impacts associated with the development of a new causeway are associated with the major repair work of the existing causeway. However, the usage of existing causeway will result in less indigenous vegetation clearance as access tracks exist to the causeway.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Impact, loss of Riparian vegetation and protected species	C and O	Negative	Local	Permeant	Medium	High	Medium	See mitigation measures proposed in **Section 5.5.3**	Low

5.7.2 ALTERNATIVE 2 – CONSTRUCTION OF A LARGE BRIDGE

The second alternative taken into consideration is the construction of a large bridge. This is not feasible in terms of the cost of development. In terms of impacts, the construction of a large bridge will have impacts on aesthetic value and water quality.

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Aesthetic impact	C and O	Negative	Local	Permeant	Medium	High	Medium	Please see **Section 5.5.7**	Low
2. Altering of flow patterns	C and O	Negative	Local	Permeant	High	Definite	High	Please see **Section 5.5.2**	Medium
3. Loss of instream habitat	O	Negative	Local	Permeant	High	High	High	Please see **Section 5.5.2**	Low

5.8 SUMMARY OF SPECIALIST STUDIES

The following specialist studies was undertaken as part of the Basic Assessment process:

- Freshwater Study;
- Floodline Assessment;
- Fish Survey;
- Botanical Study; and
- Geotechnical assessment.

A full list of specialist recommendations proposed and included in the BAR and EMP are provided in **Annexure C** of this Report.

5.9 Environmental Impact Statement and summary on need and desirability

5.9.1 Environmental Impact Statement

The impact assessment for the proposed Babanango causeway crossing illustrates that there is a potential for both positive and negative impacts on the local environment. The impact assessment noted that due to the sensitivity of the site and surrounding areas, many of the potential impacts from the proposed causeway may be serious and have long lasting impacts unless strict mitigation, monitoring and management measures are implemented. This especially in terms of impacts on the White Umfolozi River which may be impacted in terms of water quality, instream habitat, erosion, sedimentation, impact on fish migration and diversion of flow. Impacts will thus extend past the immediate causeway footprint and impact on the River both up and downstream, should the proposed and recommended mitigation measures not be appropriately imposed, managed and monitored.

It is however the opinion of the EAP that with the strict implementation of mitigation measures as specified in this Report, and set out in the EMP - based on the comprehensive specialist studies conducted and the embracing of the principals of the impact mitigation hierarchy guiding the assessment process which aims to avoid impacts over rehabilitation or offsetting - the positive impacts can be enhanced while the majority of the negative impacts can be mitigated to Low/ Acceptable levels. This includes the impacts on the White Umfolozi River. An extensive list of engineering, freshwater and ichthyological measures have been proposed to protect this system.

Due to the proposed development of the Babanango Game Reserve there is a need to access different sections of the Reserve which is divided by the White Umfolozi River. This option must be quick, safe and environmentally sustainable. The proposed preferred option as well as all alternatives considered have been assessed in the impact assessment. It is the opinion of the EAP that the development of the proposed causeway is the most sustainable option and better suited to the proposed Reserve's needs. While the development of the causeway will have certain impacts on the surrounding environment during construction, the development of the Babanango Game Reserve will result in the reintroduction of game and the rehabilitation of degraded areas within the Reserve, including significant socio-economic upliftment and community benefits. The establishment of the Reserve will ensure that both flora and fauna are protected for future generations to enjoy. The formulation of the Reserve will further lead to increased protection of the White Umfolozi River that transverses the section of the Reserve from undesirable development in that area.

Table 5.1 below considers both the advantages and disadvantages of the proposed development:

Table 5.1: Advantages and Disadvantages of the proposed development

Advantages	Disadvantages
Will link the different sections of the proposed Babanango Game Reserve. The reserve will result in the reintroduction of game and the rehabilitation of degraded portions of the environment.	Will impact on the White Umfolozi River and instream habitat.
Will provide a quicker means to cross the White Umfolozi River than is currently utilised. This will reduce carbon emissions from vehicles taking the longer route, will be more convenient for guests and wildlife traveling to different sections of the Reserve and is vital for security (in terms of a poaching or medical incident).	Will result in a new portion of the White Umfolozi River being disturbed.
Will be a far safer option than the utilising the existing causeway that is neither safe nor sound.	Blockages may result in the impact of water flow and fish migration and movement.
Will be more accessible than the existing causeway. Will be flooded fewer times per year.	Will result in a greater loss of riparian vegetation than utilising the existing causeway.

5.10 Implementation of Buffers

Furthermore, with the assessment of the impacts of the proposed causeway crossing, buffers must be implemented in order to protect the surrounding environment. Two buffers must be implemented as per the specialist study findings. These include:

5.10.1 The Watercourse Buffer

According to the specialist study recommendations, a buffer area of 17m was calculated for the White Umfolozi River (**Figure 5.1**). The complete avoidance of the buffer area will not be possible as the causeway will need to traverse the White Umfolozi River and gravel roads will need to be developed on either side of the causeway in order to provide access to it. However, the Freshwater specialist recommended that the advocated buffer should be designated as a ‘’No Go’’ zone within the project footprint wherein only essential activities should be allowed during construction of the access roads and the causeway crossing. Activities within this 17m buffer must be strictly controlled and monitored. Demarcations and the formulation of entry and exit points into the River must be specified before construction takes place.

5.1: White Umfolozi River and associated riparian areas as well as the 17m buffer zone

5.10.2 The Vegetation buffer

A buffer must also be implemented around the protected plant/trees species that will not be removed during the construction phase. These species must be clearly marked and development must avoid these areas. If protected species cannot be avoided a permit must be applied from the respective authority. Before construction commences a suitably qualified specialist must conduct a site inspection/sweep through to ensure no other protected flora species are on site that may require removal. This is especially important with smaller plants that may be seasonal. Large trees must be clearly marked and may not be removed by the contractor unless authorised.

5.11 Uncertainties/Gaps in Knowledge

As far as possible the Environmental Impact Assessment has attempted to assess all potential environmental impacts and provide suitable mitigation measures to ensure impacts are kept to a minimal. Gaps in Knowledge included the following:

- It must be noted the absence of protected species on the proposed site does not conclude that the species is not present on the site. Therefore, before construction can occur a site visit must take place to ensure there are no protected species on site; and
- The Fish Study noted that conditions at the time of the study were turbid. The limited number of fish caught was attributed to the conditions at the time of sampling rather than the overall ecological condition of the River, which is considered to be "largely natural". Despite the conditions, the

species captured and observations of the state and flow of the river provided sufficient data for a confident assessment of potential impacts.

5.12 PROPOSED CONDITIONS TO INCLUDE IN THE ENVIRONMENTAL AUTHORISATION (IF GRANTED)

- Before site preparation and construction commences, a suitably qualified individual must carry out a plant rescue and relocation plan.

6 SUMMARY RECOMMENDATIONS OF EAP

It is the opinion of the EAP that the project can be supported on condition that the Mitigation and Management measures described in **Section 5** hereof and the EMPr (**Appendix 1 hereto**) should be strictly adhered to by the Applicant.

A variety of mitigation measures have been identified that will serve to mitigate the scale, intensity, duration and significance of the impacts of the proposed White Umfolozi causeway crossing. The proposed mitigatory measures, if implemented, will reduce the significance of the majority of the identified impacts and allow for the proposed causeway to proceed with minimal effect to the environment, local community and surrounding land use practice.

IDM Environmental recommends the following (must be included in the EMP):

- Implement pollution control measures;
- Implement mitigation measures specified in the various specialist reports undertaken;
- Limit the removal of vegetation as far as possible;
- Ensure strict erosion control and stormwater management measures are in place;
- Regularly maintain the causeway during operation to prevent damage and blockages of fish movement and water flow; and
- Rehabilitate and restore the surrounding environment.

Any decision regarding the granting of authorization of this activity should also be subject to the implementation of all the management recommendations as contained in the Environmental Management Plan.

It is the opinion of the EAP that the information contained in the Basic Assessment Report, and the specialist studies, have been compiled to address specific areas of concern, and provide sufficient information to undertake a sound assessment of the proposal and provide an informed recommendation with a sufficient degree of confidence.

Annexure A: Locality Map

Annexure B: Master Layout Plan

Annexure C: Specialist Recommendations inclusion