DRAFT BASIC ASSESSMENT REPORT

DRAFT BASIC ASSESSMENT REPORT

PROPOSED CONSTRUCTION OF EMANGWENI BRIDGE LOCATED AT WARD 29 OF ALFRED DUMA LOCAL MUNICIPALITY UNDER IN UTHUKELA DISTRICT MUNICIPALITY, KWAZULU NATAL PROVINCE

Indaloenhle

Reg No. 2014/043185/07

DRAFT BASIC ASSESSMENT REPORT

PROPOSED CONSTRUCTION OF EMANGWENI BRIDGE LOCATED AT WARD 29 OF ALFRED DUMA LOCAL MUNICIPALITY UNDER IN UTHUKELA DISTRICT MUNICIPALITY, KWAZULU NATAL PROVINCE.

REPORT REFERENCE: IND/EMEIA-1018/01

NEAS:

REF NO:

Prepared for:	**Prepared by:**
Alfred Duma Local Municipality	**Indaloenhle Environmental Consultants (Pty) Ltd**
221 Murchison Street Lister Clarence Building, Ladysmith	62 Old Main Road, Kloof, 3610 031 003 4241 info@indaloenhle.co.za www.indaloenhle.co.za

Client:

Alfred Duma Local Municipality

Reference Document as:

Proposed Construction Of Emangweni Bridge Located At Ward 29 Of Alfred Duma Local Municipality Under In uThukela District Municipality, KwaZulu Natal Province.

Reference Number: **IND/EMEIA-1018/01**

NEAS:

REF:

Report Compiled by:

Mr. Divhani M. Ramovha

Reg. EAP (EAPASA, No: 2019/287)

Mr. Siyanda M. Mhlongo

Report Reviewed by

Mbalenhle Mtshali (Managing Director)

Reg. EAP (EAPASA, No: 2019/660)

Date of Report:

August 2023

Report approved by:

Mbalenhle Mtshali (Managing Director)

Reg. EAP (EAPASA, No: 2019/660)

NOTICE

The Basic Assessment Report [BAR] sets out environmental outcomes, impacts, and residual risks of the proposed activity and is a public document that is made available to the Competent Authority [CA], commenting authorities, stakeholders, Interested and Affected Parties [I&APs] and the general public. The BAR is available for public review and commenting period lasting thirty (30) days from the day of accessibility and it can be obtainable from the Indaloenhle Environmental Consultants company website. The finalised BAR will be submitted to the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs, uThukela district Municipality [KZN EDTEA] for decision-making.

Copies of this BAR are available on the company website (www.indaloenhle.co.za) and upon request from Indaloenhle Environmental Consultants.

OPPORTUNITIES FOR PUBLIC REVIEW

The EAP conducting the Public Participation Process ensured that information containing all relevant facts in respect of the application or proposed application is made available to interested and affected parties and participation by interested and affected parties is facilitated in such a manner that all interested and affected parties are provided with a reasonable opportunity to comment on the application or proposed application through:

- Fixing notice board at a place conspicuous to and accessible by the public
- Giving written notice
- Distribution of Background Information Document (BID) with registration form for Interested and Affected Parties. The BID was circulated on the 16 August 2023 and can be obtainable from Indaloenhle Environmental Consultants website (www.indaloenhle.co.za) or through means of communication stipulated hereunder.

ALL COMMENTS AND QUERIES ARE TO BE SUBMITTED TO:

Mr. Divhani M. Ramovha

62 Old Main Road

Kloof, 3610

Tel: 031 003 4241 | Cell: 081 524 2226

Email: divhani@indaloenhle.co.za

Disclaimer

The opinions expressed in this dBAR are based on the information supplied to Indaloenhle Environmental Consultants. Indaloenhle Environmental Consultants has exercised all due care in reviewing the supplied information. Whilst Indaloenhle Environmental Consultants has compared key supplied data with expected outcomes, and duly interrogated all information supplied to us, the accuracy of the results and conclusions from the review is entirely reliant on the accuracy and completeness of the supplied data. Indaloenhle Environmental Consultants does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of Indaloenhle Environmental Consultants' investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this dBAR, about which Indaloenhle Environmental Consultants had no prior knowledge nor had the opportunity to evaluate.

TABLE OF CONTENTS

TABLE OF TABLES

CONTENTS

TABLE OF FIGURES

APPENDICES

I – SPECIALIST DECLARATIONS [COPIES]

J – OTHER INFORMATION

GLOSSARY

Activity [Development] – an action either planned or existing that may result in environmental impacts through pollution or resource use.

Alternative – a possible course of action, in place of another, of achieving the same desired goal of the proposed project. Alternatives can refer to any of the following but are not limited to site alternatives, site layout alternatives, design or technology alternatives, process alternatives, or a no-go alternative.

Applicant – the project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorization.

Bench Wetland - an area of mostly level or nearly level high ground [relative to the broad surroundings], including hilltops / crests [areas at the top of a mountain or hill flanked by down-slopes in all directions], saddles [relatively high-lying areas flanked by down-slopes on two sides in one direction and up-slopes on two sides in an approximately perpendicular direction], and shelves / terraces / ledges [relatively high-lying, localised flat areas along a slope, representing a break in slope with an up-slope one side and a down-slope on the other side in the same direction].

Biodiversity – the diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.

Construction – means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration, or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

Cumulative Impacts – impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present, or reasonably foreseeable future activities to produce a greater impact or different impacts.

Direct Impacts – impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.

Ecological Reserve – the water that is necessary to protect the water ecosystems of the water resource. It must be safeguarded and not used for other purposes. The Ecological Reserve specifies both the quantity and quality of water that must be left in the national water resource. The Ecological Reserve is

determined for all major water resources in the different water management areas to ensure sustainable development.

Ecosystem – a dynamic system of plant, animal [including humans] and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.

Environment – In terms of the National Environmental Management Act [NEMA] [Act No 107 of 1998] [as amended], "*Environment" means the surroundings within which humans exist and that are made up of:*

a) the land, water, and atmosphere of the earth

b) micro-organisms, plants, and animal life

c) any part or combination of [a] or [b] and the interrelationships among and between them; and

d) the physical, chemical, aesthetic, and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Assessment– the generic term for all forms of environmental assessment for projects, plans, programmes, or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments, and risk assessments.

Environmental Authorisation [EA] – an authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.

Environmental Assessment Practitioner – the individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.

Environmental Impact – a change to the environment [biophysical, social and / or economic], whether adverse or beneficial, wholly, or partially, resulting from an organisation's activities, products, or services.

Environmental Impact Assessment [EIA] – the process of identifying, predicting, evaluating, and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

Environmental Issue – a concern raised by a stakeholder, interested, or affected parties about an existing or perceived environmental impact of an activity.

Environmental Management – ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme – A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. This EMPr focuses on the construction phase, operation [maintenance] phase and decommissioning phase of the proposed project.

Expansion – means the modification, extension, alteration or upgrading of a facility, structure, or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Fatal Flaw – issue or conflict [real or perceived] that could result in developments being rejected or stopped.

General Waste – household water, construction rubble, garden waste and certain dry industrial and commercial waste which does not pose an immediate threat to man or the environment.

Hazardous Waste – waste that may cause ill health or increase mortality in humans, flora, and fauna.

Indirect Impacts – indirect or induced changes that may occur as a result of the activity. These types if impacts include all of the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place as a result of the activity.

Integrated Environmental Management – a philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy [and principles] is interpreted as applying to the planning, assessment, implementation, and management of any proposal [project, plan, programme, or policy] or activity – at local, national, and international level – that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental assessment tools [such as strategic environmental assessment and risk assessment], environmental management tools [such as monitoring, auditing, and reporting] and decision-making tools [such as multi-criteria decision support systems or advisory councils].

Interested and Affected Party – for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24[4] [a] [v], and which includes – *[a] any person, group of*

persons or organisation interested in or affected by such operation or activity; and [b] any organ of state that may have jurisdiction over any aspect of the operation or activity.

Mitigate – the implementation of practical measures designed to avoid, reduce, or remedy adverse impacts or enhance beneficial impacts of an action.

No-Go Option – in this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.

Rehabilitation– a measure aimed at reinstating an ecosystem to its original function and state [or as close as possible to its original function and state] following activities that have disrupted those functions.

Sensitive Environment – any environment identified as being sensitive to the impacts of the development.

Significance – significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change [i.e., magnitude, intensity, duration, and likelihood]. Impact significance is the value placed on the change by different affected parties [i.e., level of significance and acceptability]. It is an anthropocentric concept, which makes use of value judgements and science-based criteria [i.e., biophysical, social, and economic].

Stakeholder Engagement – the process of engagement between stakeholders [the proponent, authorities, and I&APs] during the planning, assessment, implementation and / or management of proposals or activities.

Sustainable Development – development which meets the needs of current generations without hindering future generations from meeting their own needs.

Watercourse – means:

a] *a river or spring*

b] *a natural channel or depression in which water flows regularly or intermittently.*

c] *a wetland, lake, or dam into which, or from which, water flows; and*

d] *any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 [Act No. 36 of 1998] and a reference to a watercourse includes, where relevant, its bed and banks.*

Wetland – means land, which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
BGIS	Biodiversity Geographic Information Systems
BID	Background Information Document
CBA	Critical Biodiversity Area
CDO	Community Development Officer
CLO	Community Liaison Officer
CMA	Catchment Management Agency
CP	Conservation Plan
DAFF	Department of Agriculture, Forestry and Fisheries
DBAR	Draft Basic Assessment Report
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Early Industrial Age [refers to historical era]
EIA	Environmental Impact Assessment [refers to environmental management tool]
EIS	Ecological Importance and Sensitivity
EKZN	Ezemvelo KwaZulu-Natal Wildlife
GA	General Arrangement [refers to drawing / illustration of structures]
GA	General Authorisation [refers to type of water use licence authorisation]
GIS	Geographic Information System
GPS	Geographical Positioning System

IAPs	Interested and Affected Parties
IDP	Integrated Development Plan
KZN	KwaZulu-Natal
KZN DEDTEA	KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs
LLO	Local Liaison Officer
LSA	Later Stone Age
MAB	Modular Ablution Blocks
MSA	Middle Stone Age
NBSAP	National Biodiversity Strategy and Action Plans
NEM: AQA	National Environmental Management Air Quality Act [Act No. 39 of 2004]
NEM: BA	National Environmental Management Biodiversity Act [Act No. 10 of 2004]
NEM: WA	National Environmental Management Waste Act [Act No. 36 of 1998] [as amended]
NEMA	National Environmental Management Act [Act No. 107 of 1998] [as amended]
NFA	National Forests Act [Act No. 84 of 1998]
NFEPA	National Freshwater Ecosystem Priority Area
NGO	Non-Governmental Organisation
NHRA	National Heritage Resources Act
NWA	National Water Act
OHSA	Occupational Health and Safety Act [Act No. 85 of 1993]
PPP	Public Participation Process
PU	Planning Unit
PWS	Present Ecological State
REC	Recommended Ecological Category
RISFSA	Road Infrastructure Strategic Framework for South Africa
SADC	South African Development Community
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Internet System

SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SAPS	South African Police Services
SARTSM	South African Road Traffic Signs Manual
SDF	Standard Design Flood
SMP	Storm water Management Plan
SWL	Static Water Level
VRAI	[Riparian] Vegetation Response Assessment Index
WMA	Water Management Agency
WUL	Water Use Licence

EXECUTIVE SUMMARY

Project Background and Introduction

Abazingeli Civils (Pty) Ltd (acting on behalf of Alfred Duma local Municipality) appointed Indaloenhle Environmental Consultants (Pty) Ltd to undertake the legally required application process for Environmental Authorisation for the proposed construction of the Emangweni bridge located in ward 29 under uThukela District Municipality in the province of KwaZulu Natal. The applications and supporting documentation will be submitted to the Department of Economic Development Tourism and Environmental Affairs (DEDTEA) respectively, for consideration and decision-making.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) a Basic Assessment (BA) Process in required for a development that constitutes activities identified in Section 24 of the act. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed, and reported on to the competent authority that has been charged by NEMA with the responsibility of granting Environmental Authorisations. The nature and extent of the proposed project is explored in more detail in this BA Report. This report has been compiled in accordance with the requirements of the EIA Regulations of December 2014 and includes details of the activity description; the site, area, and property description; the public participation process; the impact assessment; and the recommendations of the Environmental Assessment Practitioner (EAP).

An Environmental Management Programme report (EMPr) has been compiled according to Appendix 4 of the GNR 326 of the EIA Regulations (2017, as amended) for the construction and operational phases of the project. The EMPr has been compiled as a stand-alone document from the BAR and will be submitted to DEDTEA along with the BAR. The EMPr provides the actions for the management of identified environmental impacts emanating from the project and a detailed outline of the implementation programme to minimise and/or eliminate any anticipated negative environmental impacts and to enhance positive impacts. The EMPr provides strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring.

Indaloenhle was assisted by specialists in order to comprehensively identify potentially positive and negative environmental impacts associated with the project, and where possible to provide mitigation to reduce the potentially negative impacts and to enhance the positive impacts. Specialist input ensures the scientific vigour and a robust assessment of impacts. The specialist study

that has been conducted is an Aquatic and terrestrial Impact Assessment Study, Flood line Assessment and Geotechnical Investigation.

Environmental Impact assessment

The proponent is required to undertake a Basic Assessment (BA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended; the Environmental Impact Assessment Regulations (2014) as published in the Government Gazette 38282, Notice No. GNR 982 amended by GNR 326. This Basic Assessment Report (BAR) has been compiled to satisfy these requirements.

Table 1: Listed activities and triggering aspect of the proposal.

Listed activity	Description of a listed item	Triggering aspect of the project
GNR 327, Listing Notice 1: Activity 12 within a watercourse	The development of- (iii) bridges exceeding 100 square metres in size. (xii) infrastructure or structures with a physical footprint of 100 square metres or more. Where such development occurs. (a within a watercourse.	The scope of the proposed Emangweni Bridge will include the excavation to the required depth or rock, construction and installation of precast concrete bases, construction of a series of four 3.0m x 3.0m precast portals, the construction earwigs, and bases, 150mm concrete slab, construction of concrete bollards construction of non-structural gabions, construction of reno mattresses, fill within the structure, and construction of guardrails.

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.	The scope of the proposed Emangweni Bridge will include the excavation to the required depth or rock, construction and installation of precast concrete bases, construction of a series of four 3.0m x 3.0m precast portals, the construction of ear wings and bases, 150mm concrete slab, construction of concrete bollards construction of non-structural gabions, construction of reno mattresses, fill within the structure, and construction of guardrails. The proposed activity will trigger this activity.

Water Use Licencing

The proposed construction of a bridge within a watercourse triggers Section 21 (c) and (i) of the National Water Act, 1998 [Act No. 36 of 1998] [NWA] and will require Water Use Licensing (WUL) from the Department of Water and Sanitation [DWS]. However, in terms of GN509 OF 26 August 2016 published by DWS on 26th August 2016 for Section 21 (c) and (i) water uses; all maintenance of bridges over rivers, streams and wetlands and new construction of bridges done according to

the SANRAL Drainage Manual or similar norms and standards are generally authorizable for municipalities subject only to the conditions of the notice.

Motivation

The proposed development aims to:

The proposed development aims to:

- Improve the road and bridge's service levels by improving the accessibility.
- Provide adequate access of public transport to local residents by improving the bridge accessibility.
- Ensure adequate safety to bridge users by improving the stability of riverbanks.
- Create a temporary employment for the local people living in the surrounding area for the duration of the contract.
- Improve the road leading up to the road on both ends.

The road works will comprise the improvement of the road's geometry thus providing a stable and a safe transport facility and improvement of the surface drainage system to provide an easily accessible road even during wet seasons.

Social benefits associated with the construction of a concrete culvert.

- Short term employment opportunities
- Improved safety for motorists, passengers, and pedestrians
- Reduction in road inconveniences (slowing down due to rutting and slippery conditions during wet weather) and delays.
- Convenient access to facilities (clinics, schools, shopping centres etc.,)

Environmental benefits associated with the construction of a concrete culvert.

- Decreased soil erosion.
- Decreased sedimentation.

Alternatives

"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

(a) the property on which or location where it is proposed to undertake the activity

(b) the type of activity to be undertaken

(c) the design or layout of the activity

(d) the technology to be used in the activity

(e) the operational aspects of the activity; and

(f) the option of not implementing the activity

In this section, Indaloenhle describes alternatives that are considered in this application. Alternatives include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

Site alternatives

The proposed development entails the construction of Emangweni Bridge. Site alternatives were not considered as the development is site specific.

Layout consideration

During the planning stage, the layout options were influenced by the following:

- Methods of crossing watercourses and sensitive areas.
- Prevailing slopes and topography.
- Land use and zoning.
- Suitability of soils and the underlying geology and

Another major design consideration will be the Expanded Public Works Programme (EPWP) and the inclusion of local labour in the construction process of Emangweni Box Culvert. This has influenced the design philosophy in that simpler designs and more labour-intensive construction method were preferred. The design of Emangweni Box culvert also gives opportunity to Emerging Vukuzakhe Contractors in the Ladysmith area, which will be responsible for the construction of

gabion walls and ancillary works. This will also be considered during the design process and will be achieved by the simplicity of the design and unbundling of works to include Grade One Contractors in the construction of Emangweni Box Culvert and road approaches.

Technology alternatives

In terms of technology alternatives, the following considerations influenced the selection of the chosen specifications:

- Health, safety, and environmental considerations.
- The footprint sizes of the proposed infrastructure.
- Financial availability.

No design and structural alternatives were explored; selection of the preferred alternatives was influenced by structures within the municipal jurisdiction which served as a precedent.

Specialist studies

Specialist investigations were carried out as part of the Basic Environmental Impact Assessment, and include:

- Aquatic and terrestrial Impact Assessment
- Geotechnical Investigation
- Flood line Assessment

Section 5.6 of this report highlights the findings of the specialist reports carried out for this project.

Key findings from the specialists' investigations are discussed below:

Aquatic and terrestrial Impact Assessment

The biophysical attributes of the study area are summarized in table below.

Summary of the biophysical attributes of the study area.

Biophysical attributes

Elevation	700-720 a.m.s.l.
Ecoregion (DWA, 2007)	14.06 (Northeastern Uplands) Highly Dissected Low Undulating Mountains
Mean Annual Precipitation (MAP) (Schulze, 1997)	769.3 mm (Mid-Summer)
Mean Annual Temperature (MAT) (DWA, 2007)	19-22 °C
Rainfall intensity	59.3 mm (Zone 3)
Potential Evaporation (PET) (Schulze, 1997)	1833.8 mm
Median Annual Simulated Run-off (Schulze, 1997)	101.1 mm
Geology (Department of Agriculture Land Types Database)	Shale, Coal, and Arenite of the Ecca Group of Paleozoic formation
Soil Erodibility Score (K-factor) (Schulze, 2007)	0.44 (medium erodibility)
Receiving river system	Sundays River

Riparian Habitat Description and Classification

The Riparian Unit (R1) stand to be directly and indirectly impacted by the proposed Emangweni bridge. The Riparian Unit R2 may be indirectly impacted by the development although its distance from the site reduces the likelihood. This Riparian unit was therefore only delineated and described but not included in any PES or impact assessments.

Riparian Unit R1 The tributary falls within a transitional longitudinal zone. Transitional areas are moderately steep streams dominated by bedrock and boulders. The floodplain is often limited and reach types include plain-bed, pool-rapid, or pool-riffles (Ollis *et al*. 2013).

The tributary can be classified as a small seasonal non-perennial system. The active channel varied between 1-4m wide. The riparian zone was not well developed and was largely determined by the edge of the macro channel. The only obligate riparian species recorded were *Spirostachys Africana*, *Gymnosporia sp* and the invasive species *Melia azedarach*. Obligate wetland species were limited. Numerous *Aloe marlothi* were dispersed throughout the study area with *Cynodon dactylon* and *Sporobolus africanus* being the dominant grass species.

Intermediate habitat Integrity Assessment

Riparian Unit R1
The Intermediate Habitat Integrity Assessment (IHIA) scores for the instream and riparian zones of the tributary are shown in Table 3.5. The IHIA indicated that the riparian and instream habitats are in a moderately modified (Class C) state. The primary impacts affecting the instream habitat were flow modification which subsequently affects channel morphology.

Fish Assessment

O.mossambicus assemblages are under pressure due to the threat of habitat invasion by *Oreochromis niloticus*within its natural range as well as hybridisation (Bills, 2019). Freshwater eels are particularly vulnerable as they depend on river connectivity to complete their life cycle. Pressures facing this species include habitat loss, pollution, overexploitation, climate change and barriers to their movements (Hanzen et al., 2021). *Labeo rubromaculatus* is endemic to the Thukela River and associated tributaries. This species is currently threatened by hydrological modifications which prevent the movement of individuals through various reaches of the system (IUCN, 2018).

Summary of the potential fish species present within the study area based on historic sampling (DWAF, 2007; DWS, 2014), as well as the species caught during the field assessment.

Scientific Name	Common Name	Threat Status (IUCN, 2019)	No of Species Caught
Anguilla mossambica	Longfin Eel	Near Threatened	0
Anguilla marmorata	Giant Mottled Eel	Least Concern	0
Amphilius natalensis	Natal Mountain Catfish	Least Concern	0
Labeobarbus natalensis[1]	Scaly	Least Concern	3
Enteromius trimaculatus	Threespot Barb	Least Concern	1
Enteromius anoplus	Chubbyhead Barb	Least Concern	1
Oreochromis mossambicus	Mozambique Tilapia	Vulnerable	0
Labeo molybdinus	Leaden Labeo	Least Concern	0
Clarias gariepinus	Sharptooth Catfish	Least Concern	5
Labeo rubromaculatus[2]	Tugela Labeo	Vulnerable	0
Tilapia sparmanii	Banded Tilapia	Least Concern	0
Micropterus salmoides	Largemouth Bass	Least Concern	0

Water quality assessment

All water quality results were within the Target Water Quality Ranges (TWQR) and DWS Effluent standards. Nitrate concentrations were slightly elevated suggesting that some form of nutrient enrichment is occurring. This is most likely from animal waste and fertilizer runoff. The surrounding area is rural with subsistence farming and cattle grazing being the dominant land uses.

Measured Parameters	Target Water Quality Range (DWAF, 1996)	DWS General Effluent Standard	Units	Downstream
pH	pH must not vary by more than 5% or 0.5 pH. units of background pH for a specific site and time of day	**5.5 – 9.5**	**pH units**	8.26
Electrical Conductivity	Not Available	**70 – 150**	**mS/m**	28
Total dissolved Salts	TDS concentrations should not be changed by > 15 % from the normal cycles of the water body. under unimpacted conditions	**N/A**	**mg/ℓ**	140
Temperature	Must not vary by more than 10% or 2°C of average daily water temperature, whichever is more conservative	**<35°C**	**°C**	17
Suspended Solids at 105°C	Total suspended solids (TSS) must not vary by more than 10% of background TSS for a specific site and time of day. Should be less than 100. mg/ℓ for all aquatic ecosystems	**≤25**	**mg/ℓ**	<18
Free Ammonia	<0.007 mg N/ℓ	**≤6**	**mg N/ℓ**	<1.5

Nitrate	Inorganic nitrogen concentrations must not vary more than 15 % from background concentrations under unimpacted conditions at any time of the year. <0.5 will limit eutrophication	**<15**	**mg N/ℓ**	2.43
Orthophosphate	Inorganic phosphorus concentrations must not vary more than 15 % from background concentrations under unimpacted conditions at any time of the year. <0.005 will limit. eutrophication.	**<10**	**mg P/ ℓ**	<0.1
E. coli	130/100 mℓ for recreational use 10/100mℓ for domestic use	**1000**	**Colonies per 100mℓ**	115

GEO TECHNICAL ASSESSMENT

Excavation

The excavation characterization for the proposed route upgrade is in terms of SANS 1200 will classify as "INTERMEDIATE TO HARD" to depths of 1.0m below existing ground level.

Groundwater conditions

There was no groundwater seepage encountered in any of the trial pits put down during investigation.

However, during periods of prolonged rainfall, particularly the summer season, a marked increase in the occurrence and magnitude of groundwater seepage flow can be anticipated. Perched groundwater flows are likely to become more prolific during rainy months.

Subgrade conditions

The subgrade beneath the road consists of transported materials (in a form of colluvium) in-situ materials such as shales and sandstones of the Volksrust and Vryheid Formations respectively. The colluvium is of poor subgrade quality and needs to be spoiled, while the weathered sandstone is suitable for use as general subgrade.

Collapsible/ compressible soils

Although the test pit sidewalls were stable at the bridge site, these soils are still medium dense and may collapse if excavations are left open for a long time. The rise of water table/stream flow is anticipated during rainy months, and this can induce collapse of the sandy soils. The medium dense consistency can also mean the soils can be compressible if heavily loaded.

BORROW PIT INVESTIGATION

A local borrow pit was identified about 1.7km northeast of the stream crossing. The site coordinates are -28.632307°lat and 30.224587°long. It comprised of mainly of shale of the Volksrust formation, which classifies as G8 in terms of TRH14 thus making it suitable for use as general subgrade.

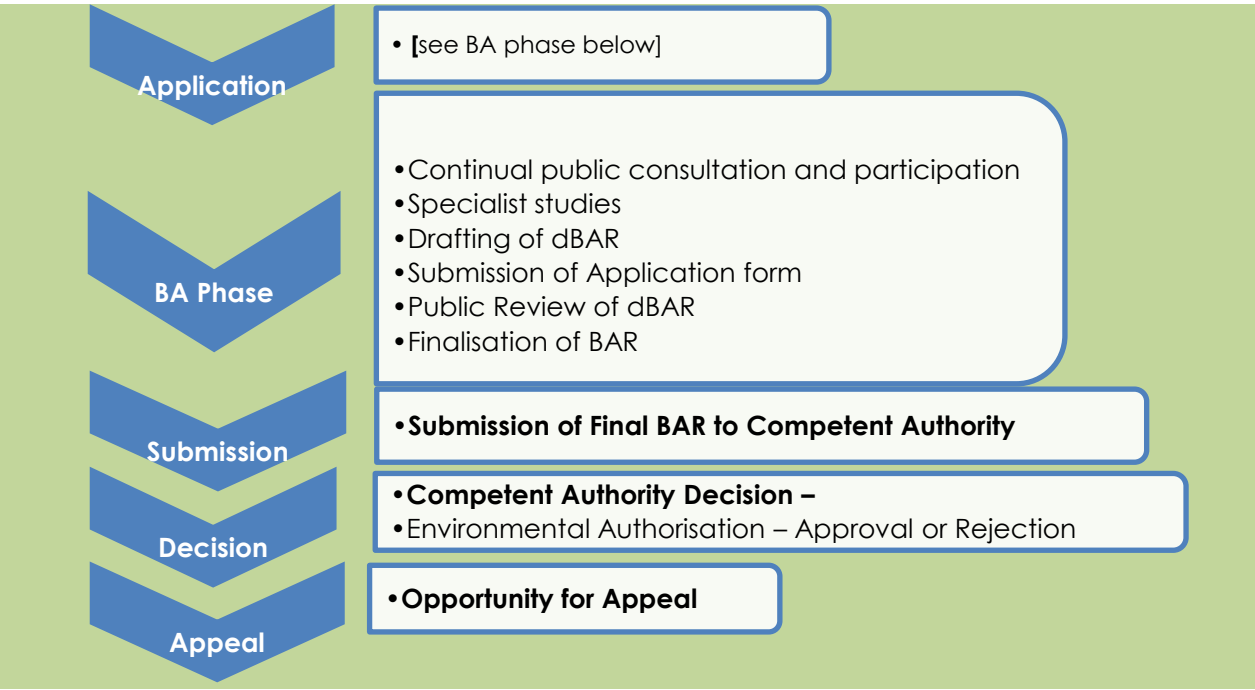
Founding conditions at bridge site

A total of 2 Dynamic Probe Light (DPL) test designated DPL1 through to DPL2 were conducted on either side of the stream crossings. Penetrometer test equipment bounced on the shallow sandstone bedrock; no penetration could be achieved Penetrometer equipment refused due to shallow soft to medium hard sandstone. The proposed bridge/causeway structures should be founded on an underlying bedrock which occur at shallow depths.

It is recommended that the foundation excavations for the bridge structure be inspected to confirm depth of bedrock during excavations.

The Basic Assessment

This Basic Assessment [BA] follows the legislative process prescribed in the EIA Regulations [2014 as amended in 2017], as this application will be lodged under the EIA Regulations [2014, as amended in 2017]. The process is explained in the diagram below.



Principal Objective of Report

This report constitutes the dBAR, which details the environmental outcomes, impacts and residual risks of the proposed activity. The report aims to assess the key environmental issues and impacts associated with the development, and to document I&APs issues and concerns. Furthermore, it

provides background information of the proposed project, motivation, and details of the proposed project, and describes the public participation undertaken to date.

The objective of this report is to provide the project's I&APs, stakeholders, commenting authorities, and the CA, with a thorough project description and BA process description. The outcome being to engender productive comment / input, based on all information generated to date and presented herein. The document concludes by proposing what is believed to be a sound and environmentally risk calculated decision. In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant portions of environmental legislation that were taken into consideration during this study and are elaborated on in this report.

Regulatory Environmental Requirements

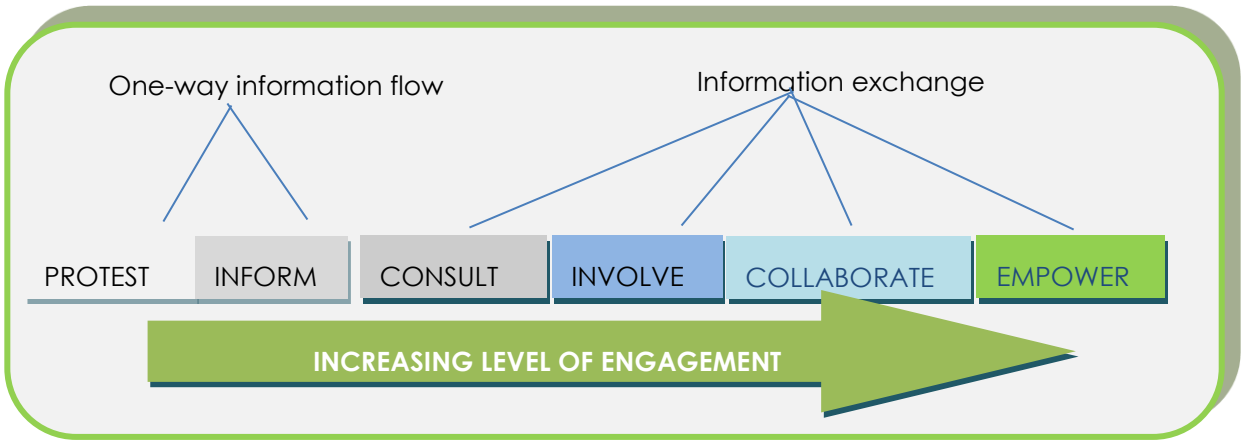
The KZN EDTEA – uThukela region is the lead / competent authority for this BA process and the development needs to be authorised by this Department in accordance with the NEMA. The EIA Regulations under the NEMA consist of three [3] categories of activities1 namely: Listing Notice 1 Activities [GNR 327 of 2017] which require a BA Process, Listing Notice 2 Activities [GNR 325 of 2017] which require S&EIR process, and Listing Notice 3 Activities [GNR 324 of 2017] which requires a BA process for specific activities in identified sensitive geographical areas.

Public Participation Process [PPP]

Indaloenhle Environmental Consultants as the EAP is undertaking the PPP for this project as professional facilitators. It is imperative to note that the study area presents a challenge in that input from the community may be heavily reliant and dependent on the information exchange between the community leaders and a further challenge will be that of jargon barriers. However, the input from the community is essential for a complete assessment of the impacts and benefits associated with the proposed development. As such as an EAP, one is reliant on the indigenous knowledge, which will optimistically be forthcoming by the community.

The figure below depicts the approach taken by Indaloenhle Environmental Consultants, where one-way information flow is avoided and information exchange is promoted, thereby enabling a higher level of engagement.

[1] *Note that a fourth listing notice has been drafted but not yet promulgated and hence not considered in the*



Key Findings and Conclusions

Overall, the results of the BA process emerge as having a "negative low" significance after mitigation.

Assumptions, gaps, and limitations of the study

Basic Assessment Report

The BA process followed the legislated process required and as governed and specified by the EIA Regulations [2014 as amended in 2017]. Inevitably, when undertaking scientific studies, challenges and limitations are encountered. For this specific BA, the following challenges were encountered:

The information and recommendations contained herein are based upon information provided by the client and the assumption that all relevant information has been provided by all relevant sources consulted for requisition of such information. Furthermore, field investigation work has been restricted to a level of detail that satisfies the objectives of the study.

The document has been developed with due reference to the following:

- Site visits and assessments – Indaloenhle Environmental Consultants and Abazingeli Civils.
- Information on biophysical environment - Indaloenhle Environmental Consultants
- Information on the proposed works – Abazingeli Civils
- Recommendations from the Authorities – Department of Economic Development, Tourism and Environmental Affairs – Alfred Duma Local Municipality

Assumptions and limitations of the aquatic impact assessment study:

Aquatic Impact Assessment

The following limitations applied to this study:

• The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge.

EAP Opinion and Recommendation to CA

This BAR provides an assessment of anticipated positive and negative impacts attributed to the proposed construction of Emangweni Bridge project. Having considered the proposal, there is unlikely to be any significant negative environmental impacts, and the socio-economic benefits are evident.

Based on the findings of environmental impact assessment, there is unlikely to be any significant negative environmental impacts and the socio-economic benefits are evident. Mitigation measures contained herein have been informed by the extent, nature, duration, and probability of impacts identified. Implementation of mitigation measures and conditions of the Environmental Management Programme appended to this document which is intended for the management of the impacts of construction of the proposed project and operation thereof, will result to minimal impacts attributed to the proposed project. Assessment findings, therefore, present no fatal flaws; the development will have long term positive impacts than negative impacts, the latter of which are short termed.

It is therefore the recommendation of the EAP that the environmental authorisation is granted for the proposed construction of a Emangweni Bridge.

1. BASIC ASSESSMENT DATA

1.1 APPROACH TO THE STUDY

This Draft Basic Assessment Report [dBAR] has been compiled in accordance with the stipulated requirements in Government Notice Regulation [GNR] 326 Appendix 1 of the EIA Regulations [2014 as amended in 2017], which outlines the legislative Basic Assessment [BA] process and requirements for assessment of outcomes, impacts and residual risks of the proposed development. The dBAR further incorporates the findings and recommendations of the specialist studies conducted for the project.

The proposed project site is located in Ladysmith (Emangweni area) Ward 29 within Alfred Duma Local Municipality of the Province of KwaZulu-Natal, therefore the Competent Authority [CA] is the Department of Economic Development, Tourism and Environmental Affairs [DEDTEA], Alfred Duma Local Municipality: Ladysmith.

1.2 OBJECTIVES OF THE STUDY

The BA aims to achieve the following:

- Conduct a consultative process.
- Determine the policy and legislative context within which the proposed activity is undertaken and how the activity complies with and responds to the policy and legislative context.
- Identify the alternatives considered, including the activity, location, and technology alternatives.
- Describe the need and desirability of the proposed project.
- Undertake an impact and risk assessment process inclusive of cumulative impacts [where applicable]. The focus being to determine 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:
    - the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    - the degree to which these impacts:
        - can be reversed.
        - may cause irreplaceable loss of resources; and
        - can be avoided, managed, or mitigated.
- Through a ranking of the site sensitivities and possible impacts the activity will impose on the site to:
    - identify suitable measures to avoid, manage or mitigate identified impacts; and
    - Identify residual risks that need to be managed and monitored.

Figure below illustrates the approach / methodology employed.

Basic Assessment Process – Formal 197-day process [or 247 days]

	Prior to formal process		Screening of project scope Pre-application meeting Compile application Conduct specialist studies. The following studies were conducted: ▪ Wetland and Aquatic Assessment Conduct PPP [BIDs, Site notices and Advertisement if permitted by CA] Develop consultation BAR to completion Develop EMPr Submit Application form to CA
197 [or 247] days of formal BA process	90 days [or 140 days]	30 days	Place Draft BAR for review
		60 days [or 110]	Incorporate comments Finalise for submission to CA [or request 50-day extension, 30 of which must include a repeat of placement for public review] Submit to CA
	107 days	Decision by CA	
	90 days	Complete appeal process	
	No less than 3 months prior to expiry of EA	Application for amendment of EA	
	30 days	CA must acknowledge amendment application	

BA = Basic Assessment

BAR = Basic Assessment Report

CA = Competent Authority [EDTEA uThukela Municipality]

EA = Environmental Authorisation

EMPr = Environmental Management Programme

PPP = Public Participation Process

Figure 1: Basic Assessment process

1.2.1 DETAILS OF THE PROJECT PROPONENT

The Applicant for the proposed project is the Alfred Duma local Municipality. The details of the Applicant are as follows:

Table 2: Details of the applicant

Applicant	**Alfred Duma Local Municipality**	
Representative	Mr Muziwandile Philasande	
Postal Address	221 Murchison Street Lister Clarence Building Ladysmith	
Telephone	+2736 637 2231	
E-mail	mpmabaso@alfredduma.gov.za	

1.2.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

The environmental team of Indaloenhle Environmental Consultants [hereafter referred to as Indaloenhle Consultants] are appointed as the Environmental Assessment Practitioner [EAP]. Indaloenhle Environmental Consultants is therefore undertaking the appropriate environmental studies for this proposed project.

Indaloenhle Environmental Consultants has been involved in and / or managed several environmental assessments in South Africa to date. A specialist area of focus is on assessment of linear developments [national and provincial roads, pipelines and power lines], bulk infrastructure and supply [e.g. wastewater treatment works, pipelines, landfills], electricity generation and transmission. For the detailed experience of the EAP, refer to Appendix H of this BAR.

Table 3: EAP details[2]

	Detail	Indaloenhle Environmental Consultants
	Contact Persons	Mr. Divhani Ramovha
	Address	62 Old Main Road, Kloof, 3610
	Telephone	031 003 4241
	Facsimile	N/A
	E-mail	divhani@indaloenhle.co.za
	Qualification	BSc Hons. Environmental Science EAPASA (Reg. EAP – *2019/287)* *SACNASP (Pr.Sci.Nat – 118762)*
	Experience	6+ Years

1.3 REPORT STRUCTURE

This report has been structured to comply with the format required by the National Environmental Management Act [NEMA] [Act No. 107 of 1998] [as amended]. The contents are as follows:

Chapter	Content
Chapter 1 Basic Assessment Data	This chapter includes the approach to the study and details of the project proponent and EAP.
Chapter 2 Project Context and Motivation	Contextualises the study area and provides a motivation and need for the proposed development.
Chapter 3 Technical Data	Includes a detailed description of the proposed activities.
Chapter 4 Environmental Legislative Context	Includes an explanation on all applicable legislation and the relevant listed activities applied for.
Chapter 5 The Study	A description of the biophysical and social environment. Consideration of alternatives [design / layout and no-go] for the project. Overview of the public participation process conducted to date. This section also highlights the key findings of the specialist studies conducted and other environmental considerations. Includes the impact assessment methodology. The impacts identified are rated and a significance score obtained.
Chapter 6 Study Findings & Conclusions	Conclusions and recommendations of the Environmental Impact Assessment. Declaration of independence by the EAP.

2 PROJECT CONTEXT AND MOTIVATION

2.1 BACKGROUND

Abazingeli Civils (Pty) Ltd acting on behalf of the Applicant (Alfred Duma Local Municipality) appointed Indaloenhle Environmental Consultants to undertake the legally required application process for Environmental Authorisation for the proposed construction of Emangweni Bridge under Alfred Duma Municipality of the province of KwaZulu-Natal. The applications and supporting documentation will be submitted to the EDTEA respectively, for consideration and decision-making.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) a Basic Assessment (BA) Process is required for a development that constitutes activities identified in Section 24 of the act. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed, and reported on to the competent authority that has been charged by NEMA with the responsibility of granting Environmental Authorisations. The nature and extent of the proposed project is explored in more detail in this BA Report. This report has been compiled in accordance with the requirements of the EIA Regulations of December 2014 and includes details of the activity description; the site, area, and property description; the public participation process; the impact assessment; and the recommendations of the Environmental Assessment Practitioner (EAP).

An Environmental Management Programme report (EMPr) has been compiled according to Appendix 4 of the GNR 982 of the EIA Regulations (2014) for the construction and operational phases of the project. The EMPr has been compiled as a stand-alone document from the BAR and will be submitted to the DEDTEA along with the BAR. The EMPr provides the actions for the management of identified environmental impacts emanating from the project and a detailed outline of the implementation programme to minimise and/or eliminate any anticipated negative environmental impacts and to enhance positive impacts. The EMPr provides strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring.

Indaloenhle was assisted by specialists in order to comprehensively identify potentially positive and negative environmental impacts associated with the project, and where possible to provide mitigation to reduce the potentially negative impacts and to enhance the positive impacts. Specialist input ensures the scientific vigour and a robust assessment of impacts. The specialist studies undertaken include Aquatic and terrestrial Impact Assessment, Flood line assessment and Geotechnical investigation.

Description of the project

The Project Management Unit under the Technical and Infrastructural Services of Alfred Duma Local Municipality proposes to construct 20.37m length and 3.672m wide vehicular bridge within the 2023/2024 financial year. Major aspects of the proposal entail the following:

- Tachometry survey at the structure position and gravel road approaches
- Drainage design of macro drainage
- Structural design of the proposed bridge
- Structural and road earthworks
- Precast concrete slabs
- Placement of precast concrete portal culverts
- Formwork and false work for the earwigs
- Construction of earwigs
- Construction of top slab
- Construction of concrete bollards
- Backfilling using suitable material.
- Construction of gravel road approaches
- installation of non-structural gabion

Details of the proposed bridge are as follows:

The proposed Emangweni bridge is located in uThukela District Municipality under the Alfred Duma Local Municipality in ward 29. Emangweni village is a rural area situated 80km from Ladysmith CBD. The Emangweni bridge will serve as a link for Emangweni residents and other surrounding areas. The current route traverses through a mountainous to rolling terrain with sparsely populated community on either side. It provides access to the community of Emangweni as well as Empolombeni Primary School, Clinics, and other community facilities.

The Project Management Unit under the Technical and Infrastructural Services of Alfred Duma Local Municipality proposes to construct 20.37m length and 3.672m wide vehicular bridge within the 2023/2024 financial year. Emangweni Bridge in Ward 29 forms part of the three (3) year capital plan and Integrated Development Plan (IDP) as it was adopted by council on 31 August 2022.

The scope of the proposed Emangweni Bridge will include the excavation to the required depth or rock, construction and installation of precast concrete bases, construction of a series of four 3.0m x 3.0m precast portals, the construction of earwings and bases, 150mm concrete slab, construction of concrete bollards construction of non-structural gabions, construction of reno mattresses, fill within the structure, and construction of guardrails.

The construction of the bridge will be 3m high and will have capacity to allow runoff to freely pass through without overflowing. As a result, the level of the gravel road will be affected. Therefore, construction of gravel road approaches to the new bridge will be required. The approaches to the bridge will be 3.0m wide with 1m shoulders in accordance with Type 7B local gravel road. The proposed Emangweni bridge will be constructed while traffic is maintained on the detour to be constructed during construction.

Roads

The project lies within the Ingonyama Trust Land. The required road reserve for a Type 7B Local gravel road is minimum 10m. The design will be able to fit within the existing road reserve. construction of gravel road approaches to the new bridge will be required. The approaches to the bridge will be 3.0m wide with 1m shoulders in accordance with Type 7B local gravel road. The proposed Emangweni bridge will be constructed while traffic is maintained on the detour to be constructed during construction.

2.2 SURVEYOR GENERAL NUMBERS / PROPERTY DESCRIPTIONS:

Project location information

District Municipality	**uThukela District Municipality**	
Local Municipality	Alfred Duma Local Municipality	
Wards	29	
Co-ordinates:	**Latitude**	**Longitude**
Bridge	28° 38'7.74''S	30° 12'53.60'' E
Property Description:	Erf 17481 farm Sithole	
21 Digit Surveyor General no.	N 0 G U 0 0 0 0 0	0 0 1 7 4 8 1 0 0 0 0 0

SURROUNDING LAND USES

Table 5: Surrounding land uses in proximity to the proposed project site.

Natural area	Y	~~Light industrial~~	~~N~~
Low density residential	Y	~~Medium industrial~~	~~N~~
~~Medium density residential~~	~~N~~	~~Heavy industrial~~	~~N~~
~~High density residential~~	~~N~~	~~Power station~~	~~N~~
~~Informal residential~~	~~N~~	~~Military or police base/station/compound~~	~~N~~
~~Retail commercial & warehousing~~	~~N~~	~~Spoil heap or slimes dam~~	~~N~~
~~Office/consulting room~~	~~N~~	~~Dam or reservoir~~	~~N~~
Quarry, sand or borrow pit	N	~~Hospital / medical centre~~	N
School	Y	~~Tertiary education facility~~	~~N~~
~~Church~~	~~N~~	~~Old age home~~	~~N~~
~~Sewage treatment plant~~	~~N~~	~~Train station or shunting yard~~	~~N~~
~~Railway line~~	~~N~~	~~Major road [4 lanes or more]~~	~~N~~
~~Harbour~~	~~N~~	~~Plantation~~	~~N~~
~~Sport facilities~~	~~N~~	~~Agriculture~~	~~N~~
~~Golf course~~	~~N~~	River, stream, or wetland	Y
~~Polo fields~~	~~N~~	~~Nature conservation area~~	~~N~~
~~Filling station~~	N	Mountain, koppie or ridge	Y
~~Landfill or waste treatment site~~	~~N~~	~~Museum~~	~~N~~
~~Historical building~~	~~N~~	~~Protected Area~~	~~N~~
Graveyard	P	~~Archaeological site~~	~~N~~
~~Airport~~	~~N~~	~~Other:~~	~~N~~

Key: Y = Yes P = Possibly N = No

2.3 PROJECT MOTIVATION AND NEED AND DESIRABILITY

Table 6: Proposed project need, desirability, and benefits

Project Need			
The project will provide better access to the local communities to a variety of local community facilities as well as quick access to schools and surround areas. Currently, the community of Emangweni settlement has no bridge for crossing on the L3340 stream crossing. The community walks in the stream to go to schools, clinics and to catch buses to their workplaces which is on the other side of it. This is a major challenge to the community especially during summertime because of the higher the stream flows. A training programme for local labour is anticipated to commence during the construction of Emangweni Box culvert. This development will be assisted through the EPWP by equipping learners to progress and increase their skills. The training programme will assist to alleviate poverty in the area through employment and will also address the issue of skills shortage. The proposed development aims to: The recommended structure consists of a single-lane precast portal box culvert which will be constructed in the centreline of L3340. The Emangweni bridge to be constructed is 20.37m length and 3.672m wide. • Drainage design of macro drainage • Structural design of the proposed bridge • Structural and road earthworks • Precast concrete slabs • Placement of precast concrete portal culverts • Formwork and false work for the ear wings • Construction of ear wings • Construction of top slab • Construction of concrete bollards • Backfilling using suitable material. • Construction of gravel road approaches • Installation of non-structural gabions			
1.	**Was the relevant provincial planning department involved in the application?** Alfred Duma local Municipality is responsible for local infrastructure and	YES	

	planning and is also the project Applicant.		
2.	**Does the proposed land use fall within the relevant provincial planning framework?** This is an infrastructure project thus it can be considered to be part of the PSDF, it is constituted for every municipality to provide basic services to the communities	YES	
3.	**If the answer to questions 1 and / or 2 was NO, please provide further motivation / Explanation** – N/A.		
	Desirability		
1.	**Does the proposed land use / development conform to the relevant structure plans, SDF, and planning visions for the area?** The approval of this application will not compromise the IDP or the SDF but will serve as key enabling support to these plans. The proposed development supports Goal Number Five of the IDP: Enhance Infrastructure Development and Maintenance: Improved infrastructure to support LED and effective economic development nodes identified and developed.	YES	
2.	**Will the benefits of the proposed land use / development outweigh the negative impacts of it?** The positive benefits will outweigh negative impacts. Anticipated negative Environmental impacts are limited to the construction phase and to a lesser extent during operational phase. With implementation of mitigation measures, significance level of negative impacts will be low.	YES	
3.	**If the answer to any of the questions 1-3 was NO, please provide further motivation / Explanation** – N/A.		
4.	**Will the proposed land use / development impact on the sense of place?**		NO
5.	**Will the proposed land use / development set a precedent?** The proposed development will set a precedent.	YES	
6.	**Will any person's rights be affected by the proposed land use / development?**		NO

	The proposed project will enhance community rights once constructed. However, during construction continuous engagement with the community is vital to ensure that no agreements are infringed, and discontentment of community members is avoided.		
7.	**Will the proposed land use / development compromise the "urban edge"?**		NO
8.	**If the answer to any of the question 5-8 was YES, please provide further motivation / explanation** – N/A.		
	Benefits		
1.	**Will the land use / development have any benefits for society in general?**	YES	
2.	**Explain:** The proposed developments will benefit the impacted communities directly as the proposed structures/facilities are intended for use by impacted communities.		
3.	**Will the land use / development have any benefits for the local communities where it will be located?**	YES	
4.	**Explain:** The development will directly benefit local communities as it is intended for use by impacted communities.		

2.3.1 SOCIO-ECONOMIC VALUE OF THE ACTIVITY

Table **7**: Socio-economic value of the proposed project

Description	Value	
What is the expected capital value of the activity on completion?	N/A	
What is the expected yearly income that will be generated by or as a result of the activity?	N/A	
Will the activity contribute to service infrastructure?	YES X	NO
Is the activity a public amenity?	YES X	NO

How many new employment opportunities will be created in the development and construction phase of the activity/ies?	30
What is the expected value of the employment opportunities? during the development and construction phase?	
What percentage of this will accrue to previously disadvantaged individuals?	90%
How many permanent new employment opportunities will be created during the operational phase of the activity?	0
What is the expected current value of the employment opportunities during the first 10 years?	N/A
What percentage of this will accrue to previously disadvantaged individuals?	N/A

3 TECHNICAL DATA

3.1 DESIGN CRITERIA

The latest design criteria as prescribed by the "Guidelines for Provision of Engineering Services and Township Development" is utilised in the design report. The design standards are modified where necessary, to account for local materials and to provide a cost-effective solution.

3.1.1. DESIGN CODES AND STANDARDS USED

The services and infrastructure will be designed in accordance with the following design guidelines and standards:

Drainage:

- The SANRAL Drainage Manual (6th Edition) and Drainage Utilities were used for the calculation of all drainage.
- The method used in the calculation of the macro drainage was the rational method.
  of flood calculations. A 1:10 year flood frequency will be used in the calculation. A 1:20 year flood will also be checked to investigation possible overtopping. Arial photograph and visual inspections will be used in the determination of the ground conditions.
- The co-efficient used in the calculation of the drainage have been obtained from

the SANRAL Drainage Manual and the Water Resource Commission (Surface Water Resources of South Africa)

Hydrology:

- Hydrologic analyses were carried out using SANRAL's Drainage Manual (2013), followed by hydraulic assessments using the HEC-RAS River Analysis System (2019) to check the hydraulic capacity of the structure.
- Flood peaks were calculated using the average peak flow values estimated from a combination of methods, namely, the Rational Method and the Standard Design Flood Method.
- Flood Estimation
- The principal catchment parameters used to estimate the Peak Flows (QT) as per return period are as follows:
- Catchment area A = 5.90 km2
- Longest collector L = 3.50 km
- Drainage Basin Number = 26
- Height Elevation = 1041m
- Lowest Elevation = 700m
- Gradient = 0.0974 m/m

Estimated Average Flood Peak Values as per Return Period

Return Period (Years)	2	5	10	20	50	100	200
Peak Flow (m^3/s)	56.79	82.06	109.78	142.67	193.97	248.96	395.47

Table 8 : Flood peak volumes

River Hydraulics:

The Emangweni flows through a wide plain with a steep gradient. Further downstream, the river is incised in a shallow gorge.

The left and right banks of the watercourse have no flow restrictions caused by vegetation and allow for smooth flow of water over the concrete pipes. Channel and overbank roughness estimates will be based on field investigations. Manning's roughness coefficient values for the main channel will be set between

0.03 and 0.04 for stones present in the channel, while the overbanks included roughness values of 0.030-0.05 for high grass.

A steady state hydraulic analysis on the Emangweni was performed using HEC-RAS, a 1-dimensional hydraulic simulation program developed by the Hydrologic Engineering Centre of the U.S. Army Corps of Engineers.

Model cross sections were placed at locations to represent changes in roughness, channel width, depth, and variations in overbank configuration likely to impact hydraulic properties at the Box Culvert. Cross section locations are displayed on the HEC-RAS model shown below.

Hydraulic Computations

Reach	River Station	Profile	Q Total	Min Channe l Elevation	Water Surface Elevation	Velocity Channel	Flow Area	Top Width
			(m3/s)	(m)	(m)	(m/s)	(m2)	(m)
1	11	1:100	248.96	720.45	723.23	0.45	1211.15	706.60
1	11	1:50	193.97	720.45	723.04	0.42	1001.10	705.50
1	**11**	**1:20**	**142.67**	**720.45**	**722.70**	**0.40**	**776.02**	**704.60**
1	**11**	**1:10**	**109.78**	**720.45**	**722.36**	**0.37**	**513.40**	**703.90**
1	11	1:5	82.06	720.45	722.06	0.34	128.77	703.10
1	11	1:2	56.79	720.45	721.53	0.40	98.26	701.10

Table 9: HEC RAS Model

The water surface elevation upstream of the bridge position, at river station 11, for the 1:10-year discharge of 109.78m3/s is 703.90m and for the 1:20-year discharge of

142.67m3/s is 704.60m. This proves that the 4/3.0m x 3.0m precast portal culvert will not be overtopped during the 1:10 year and 1:20 year floods. Possible overtopping will occur during a 1:100-year flood as the water surface elevation is 706.60m

Applicable design standards

The project design will be based on the TRH manuals, TMH7, SANS, Colto, SANRAL Drainage Manual and other relevant specifications. The project is to be based on the Engineering design layout proposed by Abazingeli Civils Pty Ltd, which will be approved and signed off by the Alfred Duma compliance unit.

The proposed Emangweni Bridge will have the following geometry parameters:

- The precast box culvert will be 3.672m (3 x 1.22m portal culverts with 10mm joints). To accommodate a 3m single lane with 0.45m shoulder.
- The width of the box culvert will be 14.430m.
- Horizontal curve = 430m
- Super elevation = 3.8%
- Longitudinal slope = 1%

4. ENVIRONMENTAL LEGISLATIVE CONTEXT

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant pieces of environmental legislation that need to be considered during this study. This section outlines the applicable national legislations which needs to be taken cognisance of.

4.1. THE CONSTITUTION OF SOUTH AFRICA

Section 24 of the Constitution of South Africa [No. 108 of 1996] states that

> "…*everyone has the right – … [a] to an environment that is not harmful to their health or well-being; and … [b] to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that … [c] secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."

This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in the NEMA and given further expression.

4.2. NATIONAL ENVIRONMENTAL MANAGEMENT ACT [ACT NO. 107 OF 1998]

The National Environmental Management Act [Act No. 107 of 1998] [as amended], or otherwise known as NEMA, is South Africa's overreaching environmental legislation and, as per its primary objective,provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state, and to provide for matters connected therewith.

The principles of the Act are the following:

- Environmental management must place people and their needs at the forefront of its concern;
- Development must be socially, environmentally and economically sustainable;
- Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated;
- Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person;
- Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued;
- Responsibility for the environmental health and safety consequences of a policy, programme, project or activity exists throughout its life cycle.
- The participation of all interested and affected parties in environmental governance must be promoted;
- Decisions must take into account the interests needs and values of all interested and affected parties, and this includes recognizing all forms of knowledge including traditional and ordinary knowledge;
- Community well-being and empowerment must be promoted through environmental education, the raising of environmental awareness;
- The social, economic and environmental impacts of activities including disadvantages and benefits, must be considered, assessed and evaluated and decisions must be appropriate in the light of such consideration and assessment;
- The right of workers to refuse work that is harmful to human health or the environment;
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the low;
- There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment;
- The environment is held in public trust for the people, the beneficial use of the environment resources must serve the public interest and the environment must be protected as the people's common heritage;
- The cost of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment; and

- The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.

4.2.1. EIA REGULATIONS [2014] [AS AMENDED IN 2017]

On April 7th of 2017, the Minister of Environmental Affairs, Bomo Edith Edna Molewa, made amendments to the EIA Regulations, 2014, published under Government Notice No. 982 in Gazette No. 3822 of 4 December 2014, in terms of sections 24[5] and 44 of the NEMA, 1998 [Act No. 107 of 1998], as well as to Listing Notice 1 of 2014, published under Government Notice No. 983 in Gazette No. 38282 on 4 December 2014, as well as Listing Notice 2 of 2014, published under Government Notice No. 984 in Gazette No. 38282 on 4 December 2014, and Listing Notice 3 of 2014, published under Government Notice No. 985 in Gazette No. 38282 on 4 December 2014 in terms of sections 24[2], 24[5], 24D and 44, read with section 47A[1][b] of the NEMA, 1998 [Act No. 107 of 1998]. For ease of reading, the 2017 Amendments of the EIA Regulations, 2014 are published in full, inclusive of amendments made thereto. These amendments commenced on the date that these regulations were published in the Gazette, 07 April 2017.

The nature of the proposed project includes activities listed in the following Listing Notices – GNR 327 [Listing Notice 1] of the EIA Regulations [2014 as amended in 2017] – refer to the table below:

Table 10: Listed activities of the EIA Regulations [2014 as amended in 2017]

Relevant notice	Activity No[s]	Description [Verbatim and as per applicability to proposed development]
Government Notice Regulation No. [GNR] 327 of 2017	Activity 12	The development of- (iii) bridges exceeding 100 square meters in size. (xii) infrastructure or structures with a physical footprint of 100 square meters or more. Where such development occurs; within a watercourse
Government Notice Regulation No. [GNR] 327 of 2017	*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.*

4.3. NATIONAL WATER ACT [ACT NO. 36 OF 1998] [AS AMENDED]

The National Water Act [NWA] is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country, which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations.

Water use in South Africa is managed through a water use authorisation process, which requires that every water use is authorised by the Department of Water and Sanitation [DWS, previously known as the Department of Water Affairs] or an established Catchment Management Agency [CMA, if applicable for that region] once the water requirements for the Reserve have been determined.

A water use must be licenced unless it [a] is listed in Schedule 1, [b] is an existing lawful use, [c] is permissible under a general authorisation [GA], or [d] if a responsible authority waives the need for a licence. If none of these are relevant a so-called water, use licence [WUL] must be applied for and obtained prior to

the commencement of such listed activity. In terms of such a WUL, the Minister may choose to limit the amount of water, which a responsible authority [e.g., CMA, water board, municipality] may allocate. In making regulations and determining items such as GAs, the Minister may differentiate between different water resources, classes of water resources, and geographical areas.

The NWA defines a water resource to be a watercourse, surface water, estuary, or groundwater [aquifer]. Included under surface water are manmade water channels, estuaries, and watercourses.

4.4. NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT [ACT NO. 10 OF 2004]

The project must comply with the National Environmental Management: Biodiversity Act [Act No. 10 of 2004] [NEM: BA] in providing the cooperative governance in biodiversity management and conservation.

NEM: BA provides for the Minister to publish a notice in the Government Gazette that issues norms and standards, and indicators for monitoring progress for the achievement of any of the objectives of the Act.

The NEM: BA also provides for:

- The National Biodiversity Framework
- Bioregional Plans
- Biodiversity Management Plans
- Biodiversity Management Agreements
- The identification, listing and promotion of threatened or protected ecosystems; and

- Alien invasive species control and enforcement.

4.5. NATIONAL SPATIAL BIODIVERSITY ASSESSMENTS [2004, 2011]

This informs the policies, plans and day-to-day activities of a wide range of sectors both public and private. A spatial biodiversity assessment can take place at different spatial scales, from global to local.

It involves mapping information about biodiversity features such as species, habitats, and ecological processes, protected areas and current and future patterns of land and resource use. It provides a national context for assessments at the sub national scale and points to broad priority areas where further investigation, planning and action are warranted.

It identifies three keys' strategies for conserving South Africa's biodiversity existence from the assessment, namely:

- Pursuing opportunities to link biodiversity and socio-economic development in priority geographic areas.
- Focusing on emergency action on threaten ecosystem, to prevent further loss of ecosystem functioning; and
- Expanding of the protected area network.

4.6. NATIONAL BIODIVERSITY STRATEGY AND ACTION PLANS [2005]

The National Biodiversity Strategy and Action Plans [NBSAP] aims to conserve and manage terrestrial and aquatic biodiversity to ensure sustainable and equitable benefits to the people of South Africa, now and in the future.

In South Africa, terrestrial, inland water, coastal and marine ecosystems, and their associated species are widely used for commercial, semi-commercial and subsistence purposes through both formal and informal markets.

While some of this use is well managed and / or is at levels within the capacity of the resource for renewal, much is thought to be unsustainable. "Use" in this case refers to direct use, such as collecting, harvesting, hunting, fishing, etc. for human consumption and production, as well as more indirect use such as ecotourism.

4.7. NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT [ACT NO. 57 OF 2003]

Protected areas are a fundamental tool for achieving biodiversity objectives and protecting essential natural heritage areas and ecosystems services, since these often provide greater security for

conservation-worthy land than the agreements or land use limitations provided for in the National Environmental Management: Biodiversity Act.

The National Environmental Management: Protected Areas Act [Act No. 57 of 2003] [NEM: PAA] creates a legal framework and management system for all protected areas in South Africa as well as establishing the South African National Parks [SANParks] as a statutory board. Each conservation area will have its own set of land use restrictions or regulations that stem either from generic restrictions under NEM: PAA, or customized regulations for individual protected areas.

4.8. KZN NATURE CONSERVATION ORDINANCE [ORDINANCE NO. 15 OF 1974]

Protected indigenous plants in general are controlled under the relevant provincial Ordinances or Acts dealing with nature conservation.

In KwaZulu-Natal, the relevant statute is the 1974 Provincial Nature Conservation Ordinance. In terms of this Ordinance, a permit must be obtained from Ezemvelo KZN Wildlife to remove or destroy any plants listed in the Ordinance.

If, protected plant species are to be disturbed, the Applicant must pursue the necessary permit / licencing requirements from the Department of Forestry, Fisheries, and the Environment [DFFE] and Ezemvelo KZN Wildlife [EKZNW] prior to clearing of vegetation.

4.9. NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT [ACT NO. 59 OF 2008] [AS AMENDED]

The National Environmental Management Waste Act [Act No. 59 of 2008] [NEM:WA] – the 'Waste Act' reforms the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licencing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

The objectives of this Act are:

a) *"To protect health, well-being, and the environment by providing reasonable measures for –*

   i. *minimising the consumption of natural resources*

   ii. *avoiding and minimising the generation of waste*

iii. *reducing, re-using, recycling, and recovering waste*

iv. *treating and safely disposing of waste as a last resort*

v. *preventing pollution and ecological degradation*

vi. *securing ecologically sustainable development while promoting justifiable economic and social development*

vii. *promoting and ensuring the effective delivery of waste services*

viii. *remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and*

ix. *achieving integrated waste management reporting and planning*

b) *to ensure that people are aware of the impact of waste on their health, well-being and the environment.*

c) *to provide for compliance with the measures set out in paragraph [a]; and*

d) *generally, to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.*"

The NEM: WA has been considered; however, no activities have been identified for the proposed development. Construction waste will be disposed of at a registered landfill and not dumped illegally.

4.10. NATIONAL HERITAGE RESOURCES ACT [ACT NO. 25 OF 1999]

In terms of Section 38 of the National Heritage Resources Act [NHRA] [subject to the provisions of subsections [7], [8] and [9] of the Act], any person who intends to undertake a development categorised as:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length
- The construction of a bridge or similar structure exceeding 50 m in length
- Any development or other activity which will change the character of a site:
- Exceeding 5 000 m² in extent
- Involving three or more existing erven or subdivisions thereof; or
- Involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- The costs of which will exceed a sum set in terms of regulations by the South African Heritage Resource Agency [SAHRA] or a provincial heritage resource authority.
- The re-zoning of a site exceeding 10 000 m² in extent; or

- Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development.

4.11. NATIONAL FORESTS ACT [ACT NO. 84 OF 1998]

According to this Act, the Minister may declare a tree, group of trees, woodland, or a species of trees as protected. The prohibitions provide that:

> *'No person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'*.

In essence the National Forests Act [NFA] prohibits the destruction of indigenous trees in any natural forest without a licence.

In terms of the NFA and Government Notice 1339 of 6 August 1976 [promulgated under the Forest Act, 1984 [Act No. 122 of 1984] for protected tree species], the removal, relocation or pruning of any protected plants will require a licence.

4.12. OCCUPATIONAL HEALTH AND SAFETY ACT [ACT NO. 85 OF 1993]

The Occupational Health and Safety Act [OHSA] provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work.

4.13. SUSTAINABLE DEVELOPMENT

The principle of Sustainable Development has been established in the Constitution of the Republic of South Africa [Act No. 108 of 1996] and given effect by NEMA. Section 1[29] of NEMA states that sustainable development means the integration of social, economic, and environmental factors into the planning, implementation, and decision-making process so as to ensure that development serves present and future generations.

Therefore, Sustainable Development requires that:

- The disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised, and remedied.
- That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied.

- The disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied.
- Waste is avoided, or where it cannot be altogether avoided, minimised, and re-used or recycled where possible and otherwise disposed of in a responsible manner.
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people's environmental rights be anticipated; and, prevented and where they cannot altogether be prevented, are minimised, and remedied.

4.14. NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT [ACT NO. 39 OF 2004]

The NEMA Air Quality Management Act [NEM: AQA] states the following as its primary objective:

> *"To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management, and control by all spheres of government, for specific air quality measures, and for matters incidental thereto.*
>
> *Whereas the quality of ambient air in many areas of the Republic is not conducive to a healthy environment for the people living in those areas let alone promoting their social and economic advancement and whereas the burden of health impacts associated with polluted ambient air falls most heavily on the poor, And whereas air pollution carries a high social, economic and environmental cost that is seldom borne by the polluter, And whereas atmospheric emissions of ozone-depleting substances, greenhouse gases and other substances have deleterious effects on the environment both locally and globally, and whereas everyone has the constitutional right to an environment that is not harmful to their health or well-being, and whereas everyone has the constitutional right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*
>
> - *Prevent pollution and ecological degradation.*
> - *Promote conservation; and*
> - *Secure ecologically sustainable development and use of natural resources.*
>
> *And whereas minimisation of pollution through vigorous control, cleaner technologies and cleaner production practices is key to ensuring that air quality is improved, and whereas additional legislation is necessary to strengthen the Government's strategies for the protection of the*

environment and, more specifically, the enhancement of the quality of ambient air, in order to secure an environment that is not harmful to the health or well-being of people."

4.15. HAZARDOUS SUBSTANCE ACT [ACT NO. 15 OF 1973] AND REGULATIONS

The object of the Act is *inter alia* to

'Provide for the control of substances which may cause injury or ill health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature or the generation of pressure thereby in certain circumstances; for the control of electronic products; for the division of such substances or products into groups in relation to the degree of danger; for the prohibition and control of such substances'.

In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity, and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule.

Pollution control in South Africa is affected through numerous national statutes, provincial ordinances, and local authority by-laws. Only the more significant legislation pertaining to the regulation of water, air, noise, and waste pollution is dealt with in this section.

5. THE STUDY

5.1. PROJECT ALTERNATIVES

In terms of the EIA Regulations [2014 as amended in 2017], feasible alternatives are required to be considered as part of the environmental investigations. In addition, the obligation that alternatives are investigated is also a requirement of Section 24[4] of the NEMA [Act No. 107 of 1998] [as amended].

An alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- the property on which or location where it is proposed to undertake the activity.
- the type of activity to be undertaken
- the design or layout of the activity
- the technology to be used in the activity.
- the operational aspects of the activity; and
- the option of not implementing the activity.

5.2. SITE AND TYPE OF ACTIVITY ALTERNATIVES

The proposed project site has been identified as a site requiring intervention in terms of infrastructure. No off-site or other site-specific alternatives have been investigated since the proposed development is site specific.

5.3. LAYOUT AND DESIGN ALTERNATIVES

For the purposes of this BA, no alternatives were considered and evaluated. The preferred alternative was deemed appropriate for the receiving environment. Selection of this alternative was influenced by similar structures within the municipality jurisdiction which served as a precedent.

5.3.1. DESIGN ALTERNATIVE CONSIDERATIONS

In selecting alternative structural forms, the following design goals were considered:

- Safety [strength and robustness]
- Constructability
- Durability and sustainability
- Economy; and
- Aesthetics.

The preferred structures had to adequately meet all of the above motioned design goals. The criteria, upon which the design of the infrastructure is based, encumber numerous factors such as:

- Surrounding topography
- Geology
- Construction costs associated with dimensions of the infrastructure.
- Environmental sensitivities
- Impact to watercourses
- Impact to structure [predicted]
- Consideration of future maintenance of the structure
- Socio-economic need; and
- Hydrology / Aquatics.

When selecting an appropriate design for infrastructure required, several factors need to be considered. To begin with, the need for such a structure must be demonstrated from a socio-economic perspective, notwithstanding the considerations given to the guidelines for assessing and demonstrating the needs and desirability of the project and development as a whole [General Notice 891 [DEA, 2014]]. The location must ensure that the proposed structure adds value by creating key linkages for as many communities as possible, and specifically, for the target communities.

In this way, the aspect of safety is also addressed, as the structures are designed taking into consideration safety design requirements. Once a location is identified that is suitable to address the needs of the target communities, structural and environmental factors must be considered. These factors include: [I] the use of existing structures and infrastructure; [ii] identifying hydrological, geological, and ecological constraints and ensuring the design is according to engineering best practice guidelines and principles; [iii] carrying out an assessment of various options to ensure a cost-effective solution is obtained; and [iv] implementing best practice procedures during detailed design and construction.

Engineering requirements can be addressed in a number of ways. It is a basic principle of best practice to consider a range of options to address any river engineering problem or need and to carry out an options appraisal. Without considering a range of options it is not possible to determine if the chosen approach represents the most suitable option [i.e., the option that minimises ecological harm at a cost that is not disproportionately expensive]. With the above taken into consideration, the preferred alternative was selected for implementation.

5.3.1.1. PREFERRED ALTERNATIVE

The purpose of this section is to outline the design parameters that will be considered for the formalization of the concept design and suggest application of new infrastructure. The Bridge have been designed to conform to the accepted best industry engineering practices. The integration and impact of the proposed infrastructure to the existing infrastructure in the vicinity will also be brought to the fore (See Appendix C3: Facility Illustration for more information).

5.3.1.2 NO-GO ALTERNATIVE

This alternative entails that no development takes place, and the status quo will remain.

5.4. DESCRIPTION OF THE STUDY AREA

5.4.1. BIOPHYSICAL ENVIRONMENT

5.4.1.1. CLIMATE

The climate in Ladysmith is warm and temperate. The summers are much rainier than the winters in Ladysmith. This location is classified as Cwb by Köppen and Geiger. The average annual temperature is 17.3 °C | 63.1 °F in Ladysmith. In a year, the rainfall is 1057 mm | 41.6 inch. Ladysmith is situated in the southern hemisphere. Summer begins in December and ends at the end of January. The months of summer are December, January, February, March.

5.4.1.2. TOPOGRAPHY AND GEOLOGY

Site Topography:

The site is generally mountainous and rolling in some sections.

ROAD NAME	SV to SV	TERRAIN DESCRIPTION
L3340	km 0.000 to km 3.851	Mountainous and rolling in some sections

Site Geology:

ILZ (PTY) LTD conducted a geotechnical investigation Report contains the results of a material investigation carried out for the proposed construction of Emangweni Culvert Bridge and approach road. Prior to field investigation, a site walkover and mapping exercise was conducted. Several rock exposures were mapped and profiled. Field investigation was conducted on the 28th of February 2023

The results indicated the following.

Weathered bedrockTwo types of bedrock were observed along the route, i.e., the sandstone and shale of the Vryheid Formation. Shale bedrock was encountered in IP3 from existing road surface to a refusal depth of 0.77m below existing road surface. It was described as dark grey, stained brown, highly weathered, highly to completely fractured, medium hard rock strength. Weathered sandstone bedrock was encountered in IP4 from existing road surface to refusal depth of 0.55m below existing road surface. It was described as light greyish brown, stained and speckled brown, moderately weathered, moderately fractured, medium grained, medium hard rock strength. Weathered sandstone was also observed in several exposures along the route.

GROUNDWATER OCCURRENCE

There was no groundwater seepage encountered in any of the trial pits put down during investigation. However, during periods of prolonged rainfall, particularly the summer season, a marked increase in the occurrence and magnitude of groundwater seepage flow can be anticipated. Perched groundwater flows are likely to become more prolific during rainy months.

LABORATORY TEST RESULTS

In order to assess more accurately the engineering properties of the various materials encountered on site and their suitability for use for construction of road layers, the following materials classification tests were carried out on selected samples during the investigation:

- Atterberg Limit and Linear Shrinkage Determinations
- Mod AASHTO and California Bearing Ratio
- Hydrometer

5.4.1.3. VEGETATION

Identification of a distinct area of vegetation change, often in close association with the macro-channel. Changes can be in relation to species diversity or physical nature (density or health).

5.4.2. SOCIO-ECONOMIC ENVIRONMENT

5.4.2.1. UNEMPLOYMENT

The employment status of the Alfred Duma Local Municipality depicts that a majority of the population are not economically active. This can be due to various social and economic factors which includes but are not limited to age, social dependency, physical impediments, lack of education, poor access to services and health and other social reasons. The number of employed people indicates that people are employed in the primary, secondary and tertiary sectors of the town.

Most people are however employed in the tertiary sector which shows an increase in the number of service and telecommunication centres in the municipality. The high number of unemployed individuals in the municipality can mainly be attributed to lack of education, poor healthcare and also the unavailability of employment opportunities in both the private and public sectors of the municipality.

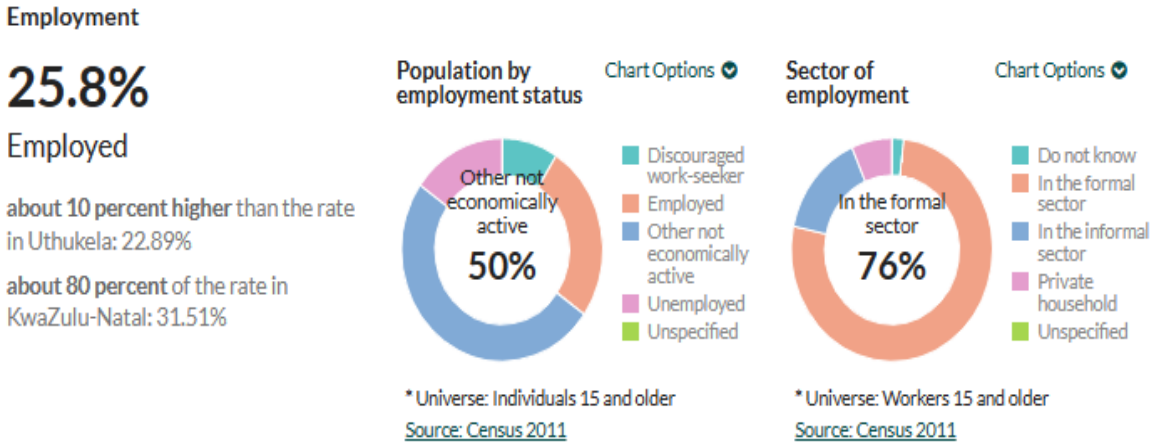


Figure 2: employment rate within Alfred Duma Municipality

SOURCE. WAZI MAPS

5.4.2.2. HERITAGE

Enquiry was sent to SAHRIS to confirm.

5.5. PUBLIC PARTICIPATION PROCESS

Public participation is a process that is designed to enable all interested and affected parties [I&APs] to make known their opinion and / or concerns which enables the practitioner to evaluate all aspects of the

proposed development, with the objective of improving the project by maximising its benefits while minimising its adverse effects.

I&APs include all interested stakeholders, technical specialists, and the various relevant organs of state who work together to produce better decisions.

The primary aims of the public participation process are:

- to inform I&APs and key stakeholders of the proposed application and environmental studies
- to initiate meaningful and timeous participation of I&APs
- to identify issues and concerns of key stakeholders and I&APs with regards to the application for the development [i.e., focus on important issues]
- to promote transparency and an understanding of the project and its potential environmental [social and biophysical] impacts [both positive and negative]
- to provide information used for decision-making.
- to provide a structure for liaison and communication with I&APs and key stakeholders
- to ensure inclusivity [the needs, interests and values of I&APs must be considered in the decision-making process]
- to focus on issues relevant to the project, and issues considered important by I&APs and key stakeholders, and
- to provide responses to I&AP queries.

The public participation process must adhere to the requirements of Regulations 41 and 42 [GNR 982] under the NEMA [as amended]. It should be noted however that there are directions regarding measures to address, prevent and combat the spread of COVID -19 relating to National Environmental Management Permits and Licences that were issued by the Department of Environment, Forestry and Fisheries. The purpose of the directions was to curtail the threat posed by the COVID-19 pandemic, contain, and minimise the effects of the national state of disaster and in particular to provide directions to ensure safe licensing processes and public participation processes as required by law.

As required by the Directions, Indaloenhle developed a Public Participation Process Plan which was submitted to the Competent Authority. The Public Participation Process has been undertaken in accordance with the measures stipulated on the plan. Where possible, the requirements of Regulations 41 and 42 (GNR 982, where adhered to, deviation are stated on the Public Participation Process Plan.

The public participation process will be undertaken according to the phases outlined below.

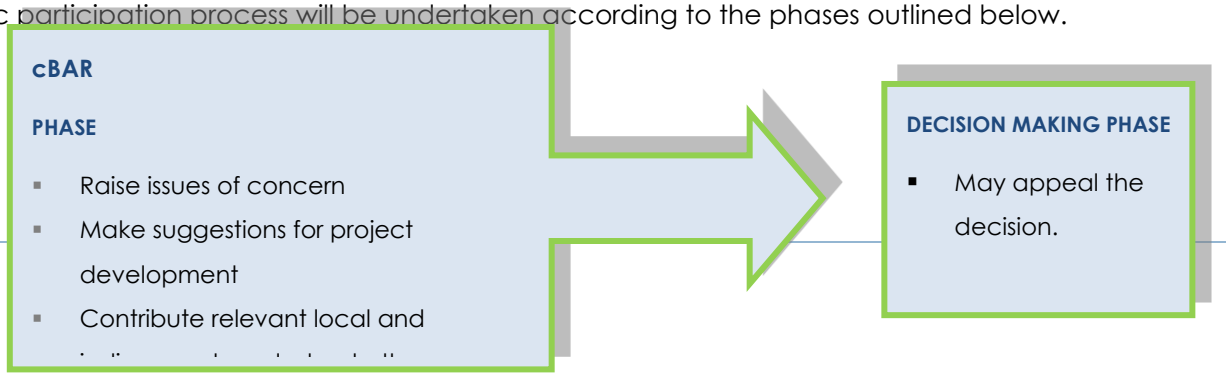


Figure 3: Responsibilities of I&APs in the different PPP stages

Figure below depicts the approach taken by Indaloenhle Environmental Consultants, where one-way information flow is avoided and information exchange is promoted, thereby enabling a higher level of engagement.

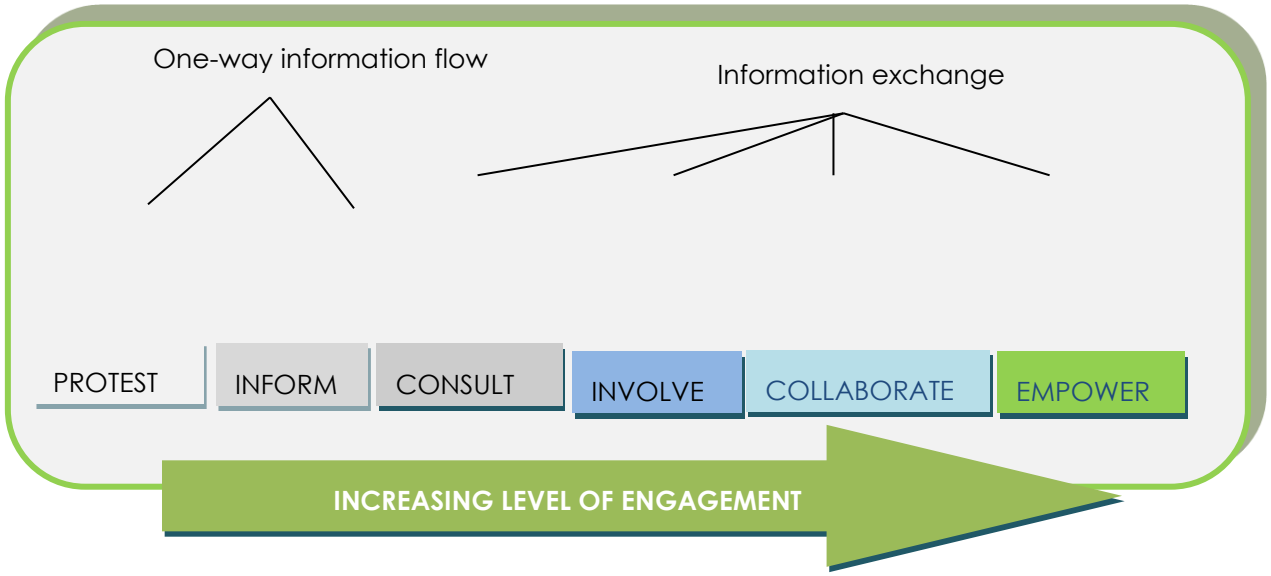


Figure 4: The stakeholder engagement spectrum [DEAT, 2002]

In order to achieve a higher level of engagement, a number of key activities have taken place. These included the following:

- The identification of stakeholders is a key deliverable at the onset, and it is noted that there are different categories of stakeholders that must be engaged, from the different levels and categories of government to the communities of wards of residential dwellings which surround the proposed development.
- The development of a living and dynamic database that captures details of stakeholders from all sectors.
- The convening of focused meetings with stakeholders during the BA process; this included engaging with community members. The continued engagement of public leaders to whom the public generally turn for information, keeping such individuals well informed about process and progress.
- The fielding of queries from I&APs and others, and providing appropriate information
- The convening of specific stakeholder groupings / forums as the need arises.
- The preparation of reports based on information gathered throughout the BA via the PPP and feeding that into the relevant decision-makers.
- The PPP includes distribution of pamphlets or Background Information Documents [BIDs] and other information packs; and

- Where appropriate site visits may be organised, as well as targeted coverage by the media.

5.5.1. AUTHORITY CONSULTATION

A pre-application meeting was held with Onwabile Ndzumo on the 10th of March 2023. The purpose of the Pre-Application Meeting was to introduce the proposed project to the EDTEA, present and confirm the relevant Listed Activities and Specialist Studies pertinent to the proposed development and that, each body, as per its guidelines and regulations can make known the recommendations pertaining the proposed project.

Key discussion items are detailed below:

- Assessing officer for the project was Onwabile Ndzumo
- Project description and scope of works
- Current land use on proposed development site
- Listed activities identified and applicability to the proposed project.
- Specialist studies and conclusive recommendations
- Stakeholders and the public participation process
- Project Approach
- Way forward

5.5.2. CONSULTATION WITH OTHER RELEVANT STAKEHOLDERS

Consultation with other relevant key stakeholders was undertaken through written email correspondence in order to actively engage these stakeholders throughout the process and to provide background information about the project during the BA process. Relevant key stakeholders were consulted and notified through BIDs. All relevant stakeholders were allowed an opportunity to comment on the dBAR.

The identified stakeholders of this project include:

Table 11: Key Stakeholders contacted as part of the Public Participation Process

LOCAL AUTHORITY	
Alfred Duma Local Municipality -Onwabile Ndzumo @kznedtea.gov.za Department of Economic Development, Tourism & Environmental Affairs, KwaZulu-Natal	
PROVINCIAL AUTHORITY	
AMAFA	Bernadetp@amafapmb.co.za

Ezemvelo KZN Wildlife	Dominic.wieners@kznwildlife.com
Department of Water and Sanitation	Buthelezis2@dws.gov.za Govenders2@dws.gov.za
Department of Transport	Simphiwe.nkosi@kzntransport.gov.za
STATE DEPARTMENTS	

5.5.3. SITE NOTIFICATION

The EIA Regulations [2017] require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity is proposed to occur. In addition, at points of access or high through traffic. The purpose of this is to notify the public of the project and to invite the public to register as Interested and Affected Parties and inform them of the PP Process. Indaloenhle Environmental Consultants erected a number of notices written in English and Zulu at publicly accessible spaces [refer to Appendix F2].

Figure 5: Empolombeni primary school at which other notices were placed

Figure 7: The main road in Mbondwana where English and isiZulu Notices were placed

5.5.4. IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES

I&APs were identified throughout the BA process primarily from responses received from the notices mentioned above. E-mails were sent to key stakeholders and other known I&APs, informing them of the application for environmental authorization for the proposed development, the availability of the dBAR for review and indicating how they may become involved in the EIA process. The contact details of all identified I&APs are recorded on the Interested and Affected Parties database, which is included in Appendix E5. This database will be on an on-going basis throughout the BA process.

5.5.5. ADVERTISING

In honour of Section 41(2) of the EIA Regulations promulgated under the National Environmental Management Act, notification of the commencement of the BA process for the project was advertised in the following newspapers on the14th April 2023 and proof of advertisement is appended to this report (see Appendix F3): I&APs have been requested to register their interest in the project and become involved in the BA process. The primary aim of the advertisement is to ensure that the widest group of I&APs possible is informed and invited to provide input, through questions and comments on the project.

5.5.6. PUBLIC MEETING

A public meeting was held on Site near Empolombeni primary school on the 31st of March 2023.

More detail on the public participation report attached.

5.5.7. ISSUES TRAIL

Issues and concerns raised in the public participation process during the BA process have been and will continue to be compiled into an Issues Trail. The Issues raised and comments is attached as Appendix F7, in which all comments received, and responses provided to date have been captured.

5.5.8. KEY ISSUES RAISED BY THE PUBLIC [SUMMARISED]

- No key issues raised.

5.5.9. PUBLIC REVIEW OF THE DRAFT BAR

All registered I&APs were notified of the availability of the report through written and verbal communication. The dBAR will be made available for authority and public review for a total of 30 days from the (28 August 2023) to the (29 September 2023). The copy of this report will be made available at publicly accessible spaces; this is to ensure limited contact with surfaces that have been previously touched. Allowance has been made for requests of hard copies of reports, these shall be couriered to Interested and Affected Parties upon request. The cost for courier services shall be incurred by the Environmental Assessment Practitioner.

5.5.10. FINAL BAR

The final stage in the BA process entails the capturing of responses and comments from I&APs on the dBAR in order to refine the BAR and ensure that all issues of significance are addressed. The final BAR [i.e., fBAR] will incorporate all comments by Interested and Affected Parties and findings of specialist studies prior to submission to KZN EDTEA for review and decision-making.

5.5.11. PPP SUMMARY

Table 12: Summary of Public Participation Process thus far

Activity	Description	Reference
Identifying stakeholders	Stakeholders were identified and a database of all I&APs were compiled (30 March 2023).	Appendix F
Publishing newspaper adverts	Advertisements regarding inter alia the proposed project scope of works, location, and date for draft Basic Assessment Report review as well as details of EAP were placed in the Newcastle Advertiser newspaper on the. Proof of advertisement is appended to this report. 14th April 2023	Appendix F
Erection of site notices	A number of site notices were erected on the perimeter of the site on (30 March 2023)	Appendix F
Preparation of an on-going Issues Trail	Comments, issues of concern and suggestions received from stakeholders thus far have been	Appendix F

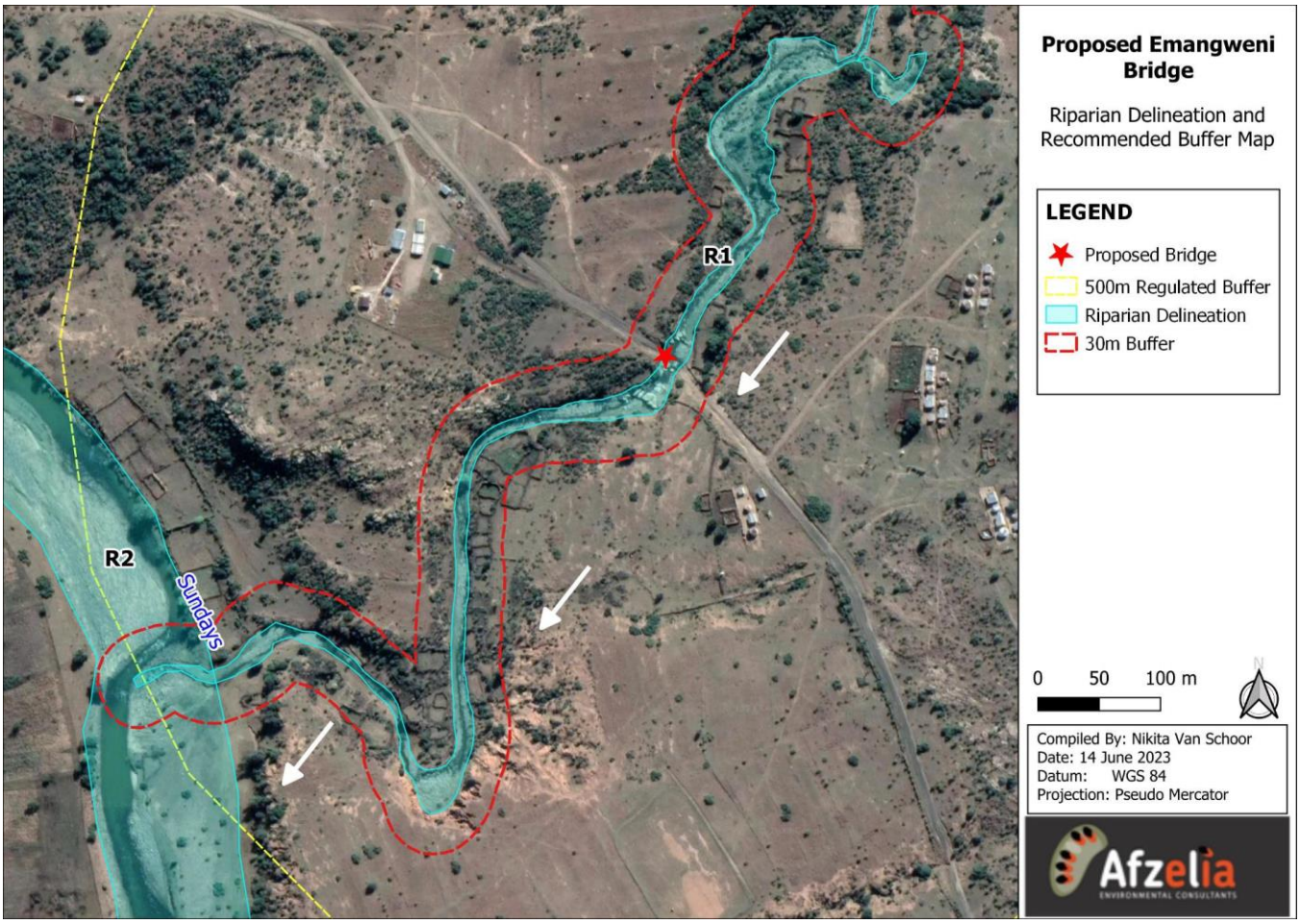
	captured in a Comment and Response Report (ongoing).	
Release of Draft Reports	This Draft Basic Assessment Report [dBAR] has been advertised and made available for a period of 30 days for public review and comment. The dBAR is available for review from the (28 August 2023- 29 September 2023	Appendix F
Public Meetings / Open Days	Public meeting was conducted on the 31st of March 2023	Appendix F
Release of final Reports	The final Basic Assessment Report will incorporate all comments by IAPs and findings of the specialist studies, before being submitted to KZN DEDTEA for review and decision-making.	__

5.6. SUMMARY OF KEY SPECIALIST FINDINGS

5.6.2 AQUATIC AND BIODIVRSITY IMPACT ASSESSMENT

Afzeila Environmental Consulting assessed the Aquatic and Biodiversity for the proposed site and provided the state of the aquatic life and environment of the river as follows:

The Emangweni Bridge site is located within sub-quaternary reach SQR V60F-03210. The SQR is considered to be in a largely modified state (Class D), whilst the ecological importance (EI) and ecological sensitivity (ES) are rated as moderate (DWS, 2021). The typical land cover surrounding the siteis natural with small rural communities and subsistence agricultural farming.



Following completion of the desktop delineation exercise the specialist undertook a ground truthing exercise on the 21st of June 2023. Topographic features and vegetation types were recorded using a handheld GPS device and used to delineate accessible watercourses and develop a map of onsite watercourses. The watercourse delineation exercise confirmed the presence of two watercourse within the 500m regulated area which would be impacted by the proposed bridge construction (Riparian Unit R1 and R2). A map showing the spatial location of all infield delineated watercourses are provided as Figure 3.9.

A national guideline for the determination of appropriate buffer zones for rivers, wetlands, and estuaries, compiled by Macfarlane *et al.* (2014), was utilized to determine an appropriate buffer from the edge of delineated riverine habitat which will constitute no-go areas for the duration of the project. The recommended buffer generated by the tool was 30m. Any construction camps, refueling or portable toilets should be located outside of this zone.

Riparian Unit R2

Riparian Unit R2 occurs within the upper foothill longitudinal zone. These zones have moderately steep gradients and different biotopes (cobble-bed or mixed bedrock-cobble bed channel, with plane bed, pool-riffle or pool-rapid) (Ollis *et al*. 2013).

The Sundays River can be classified as a perennial system. The active channel was approximately 7-10m wide at the time of sampling. An extensive band of riverbed material was observed within the floodplain

(Figure 3.11). Evidence of previous agricultural practices could be seen along the western bank of the river. Small pocket of obligate wetland species was observed along the riverbanks (*Schoenoplectus* sp.).

The active channel was free flowing with no obvious odor.

Photo 1: Overview of the Sundays River showing riverbed material **Photo 2:** View of slower flowing portion of the Sundays River.

and wetland species along banks.

Water Quality Assessment

A water sample were collected downstream of the proposed bridge within the unnamed tributary. Samples were sent for analysis at a SANAS accredited laboratory (Tabolt and Tabolt). The results are shown in Table 3.4.

All water quality results were within the Target Water Quality Ranges (TWQR) and DWS Effluent standards (Table 3.4). Nitrate concentrations were slightly elevated suggesting that some form of nutrient enrichment is occurring. This is most likely from animal waste and fertilizer runoff. The surrounding area is rural with subsistence farming and cattle grazing being the dominant land uses.

Measured Parameters	Target Water Quality Range (DWAF, 1996)	DWS General Effluent Standard	Units	Downstream
pH	pH must not vary by more than 5% or 0.5 ph. units of background pH for a specific site and time of day	**5.5 – 9.5**	**pH units**	8.26
Electrical Conductivity	Not Available	**70 – 150**	**mS/m**	28
Total dissolved Salts	TDS concentrations should not be changed by > 15 % from the normal cycles of the water body. under unimpacted conditions	**N/A**	**mg/ℓ**	140
Temperature	Must not vary by more than 10% or 2°C of average daily water temperature, whichever is more conservative	**<35°C**	**°C**	17
Suspended Solids at 105°C	Total suspended solids (TSS) must not vary by more than 10% of background TSS for a specific site and time of day. Should be less than 100. mg/ℓ for all aquatic ecosystems	**≤25**	**mg/ℓ**	<18
Free Ammonia	<0.007 mg N/ℓ	**≤6**	**mg N/ℓ**	<1.5
Nitrate	Inorganic nitrogen concentrations must not vary more than 15 % from background concentrations under unimpacted conditions at any time of the year. <0.5 will limit eutrophication	**<15**	**mg N/ℓ**	2.43
Orthophosphate	Inorganic phosphorus concentrations must not vary more than 15 % from background concentrations under unimpacted conditions at any time of the year. <0.005 will limit. eutrophication.	**<10**	**mg P/ ℓ**	<0.1
E. coli	130/100 mℓ for recreational use 10/100mℓ for domestic use	**1000**	**Colonies per 100mℓ**	115

Riparian Unit R1

The Intermediate Habitat Integrity Assessment (IHIA) scores for the instream and riparian zones of the tributary are shown in Table 3.5. The IHIA indicated that the riparian and instream habitats are in a moderately modified (Class C) state. The primary impacts affecting the instream habitat were flow modification which subsequently affects channel morphology. Although the reach is relatively natural,

subsistence agriculture and cattle grazing contribute towards sedimentation and flow modification impacts. Within the riparian zone, removal of indigenous vegetation has occurred to some degree to accommodate subsistence gardens which has contributed to bank erosion. Small pockets of invasive species also threaten the riparian zone.

Aquatic Macroinvertebrate

Biotope diversity within the tributary was rated as moderate to high and was typical of the transitional reaches of rivers. Bedrock was the most dominant followed by stones in and out of current. The vegetation biotope was not observed. (See Table 3.6., below).

The site comprised a mix of pollution tolerant and sensitive species. Sensitive species encountered included Leptophlebiidae and Oligoneuridae. The SASS data interpretation guidelines for the Northeastern Uplands – Lower indicates that the macroinvertebrate community within the study site falls within an ecological category B (Dallas, 2007; Figure 3.12)

Fish Assessment

Reference species lists were used to represent species present within the major rivers of the catchment, i.e., the Sundays River. The reference list includes two species listed as **Vulnerable** (*Oreochromis mossambicus and Labeo rubromaculatus*) and one **Near Threatened** (*Anguilla mossambica*) on the IUCN Red List (IUCN, 2019).

O. mossambicus assemblages are under pressure due to the threat of habitat invasion by *Oreochromis niloticus* within its natural range as well as hybridization (Bills, 2019). Freshwater eels are particularly vulnerable as they depend on river connectivity to complete their life cycle. Pressures facing this species include habitat loss, pollution, overexploitation, climate change and barriers to their movements (Hanzen et al., 2021). *Labeo rubromaculatus* is endemic to the Thukela River and associated tributaries. This species is currently threatened by hydrological modifications which prevent the movement of individuals through various reaches of the system (IUCN, 2018)

River Ecological Importance and Sensitivity

The ecological importance and sensitivity (EIS) of the Riparian Unit R1 is rated as 'moderate'. The tributary is non- perennial with habitats strongly influenced by seasonal flow. Although the tributaries within the surrounding catchment do support the endemic fish species, *Labeo rubromaculatus,* the sampled tributary presented few habitats and refugee types for to support this species. The area does however occur within a critical biodiversity area, a national SWA and Upstream Management Area which has important conservation status.

EIS Determinants	River Unit
Instream and Riparian Biotic Determinants	**R1**
Rare or Endangered Biota	0
Unique Biota	1
Intolerant Biota	1
Species/taxon Richness	2
Instream and Riparian Habitat Determinants	
Diversity of aquatic habitat types or features	2
Refuge value of habitat types	1
Sensitivity of habitat to flow changes	3
Sensitivity to flow related water quality changes	3
Migration route/corridor for instream and riparian biota	2
National parks, Wilderness areas, Nature reserves, Natural Heritage sites Natural areas	3
Overall, EIS Score and Category	**2** **Moderate**

5.6.3 AGRICULTURAL IMPACT STATEMENT

Johann Lanz was appointed as an independent agricultural specialist to conduct the agricultural assessment. The objective and focus of an agricultural assessment are to assess whether the agricultural impact of the proposed development will be acceptable, and based on this, to make a recommendation on whether it should be approved.

The purpose of the agricultural component in the environmental assessment process is to preserve agricultural production potential by ensuring that development does not unnecessarily exclude. existing or potential agricultural production from land, or unnecessarily impact agricultural land to the extent that its production potential is reduced. The primary focus is on preservation of the agricultural production potential of scarce, arable land. However, this project poses negligible threat to agricultural production potential.

1. **Assessment of agricultural impact**

An agricultural impact is a change to the future production potential of land. The significance of the agricultural impact is directly proportional to the extent of the change in production potential. If a development will not change the future production potential of the land, then there is no agricultural impact. The construction of a bridge over a river on an existing road will not change the future production

potential of the site, which in effect has zero agricultural production potential, anyway. The agricultural impact of the proposed development is therefore assessed as having no significance.

2. Agricultural Compliance Statement

The agricultural impact of the proposed development is assessed as being acceptable because it results in zero loss of future agricultural production potential. From an agricultural impact point of view, it is recommended that the development be approved.

5.6.4 **GEOTECHNICAL ASSESSMENT**

ILZ (PTY) LTD conducted a geotechnical investigation Report contains the results of a material investigation carried out for the proposed construction of Emangweni Culvert Bridge and approach road. Prior to field investigation, a site walkover and mapping exercise was conducted. Several rock exposures **were mapped and profiled. Field investigation was conducted on the 28th of February 2023**

The results indicated the following.

Weathered bedrock.

Two types of bedrock were observed along the route, i.e., the sandstone and shale of the Vryheid Formation. Shale bedrock was encountered in IP3 from existing road surface to a refusal depth of 0.77m below existing road surface. It was described as dark grey, stained brown, highly weathered, highly to completely fractured, medium hard rock strength. Weathered sandstone bedrock was encountered in IP4 from existing road surface to refusal depth of 0.55m below existing road surface. It was described as light greyish brown, stained and speckled brown, moderately weathered, moderately fractured, medium grained, medium hard rock strength. Weathered sandstone was also observed in several exposures along the route.

GROUNDWATER OCCURRENCE

There was no groundwater seepage encountered in any of the trial pits put down during investigation. However, during periods of prolonged rainfall, particularly the summer season, a marked increase in the occurrence and magnitude of groundwater seepage flow can be anticipated. Perched groundwater flows are likely to become more prolific during rainy months.

5.6.6 FLOODLINE ASSESSMENT

As a requirement for a proposed development of a Causeway across the Emangweni River Stream, a flood line analysis must be conducted along the river adjacent to the proposed site to determine the 1 in 100-year flood line.

The proposed development is situated in the B73C quaternary catchment. The catchment area relating to the river crossing was determined using 1 in 50 000 maps.

Reach	River Station	Profile	Q Total	Min Channel Elevation	Water Surface Elevation	Velocity Channel	Flow Area	Top Width
			(m3/s)	(m)	(m)	(m/s)	(m2)	(m)
1	11	1:100	248.96	720.45	723.23	0.45	1211.15	706.60
1	11	1:50	193.97	720.45	723.04	0.42	1001.10	705.50
1	11	1:20	142.67	720.45	722.70	0.40	776.02	704.60
1	11	1:10	109.78	720.45	722.36	0.37	513.40	703.90
1	11	1:5	82.06	720.45	722.06	0.34	128.77	703.10
1	11	1:2	56.79	720.45	721.53	0.40	98.26	701.10

Output summary for the Rational Method flood peak.

6. Impact assessment

The impact assessment must consider the nature, scale, and duration of effects on the environment, whether such effects are positive [beneficial] or negative [detrimental]. It is also imperative that each issue / impact is also assessed according to the project stages from planning, through construction and operation to the decommissioning phase. Where necessary, the proposal for mitigation or optimisation of an impact is noted.

The environmental impact assessment is focused on the following phases of the project namely: **Pre-Construction, Construction, and Operational Phases** only. The impacts associated with decommissioning phase are not applicable to this project, however, responsible methods of post-construction clean-up are provided in the EMPr. As the project entails the construction of a concrete culvert which will be permanent, decommissioning is not applicable to this project, however, impacts associated with post construction clean-up are considered and mitigation measures detailed on the EMPr.

6.1.1. METHODOLOGY

The potential environmental impacts associated with the project are evaluated according to the nature, extent, duration, intensity, probability, and significance of the impacts, whereby:

1. Nature [N]

This is a brief written statement of the environmental aspect being impacted upon by a particular action or activity.

2. Extent [E]

Extent refers to the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact.

- Site [1] – Within the construction site.
- Local [2] – Within a radius of 2 km of the construction site.
- Regional [3] – the scale applies to impacts on a provincial level and parts of neighbouring provinces.
- National [4] – the scale applies to impacts that will affect the whole South Africa.

3. Duration [D]

Duration indicates what the lifetime of the impact will be.

- Short-term [1] – less than 5 years.
- Medium-term [2] – between 5 and 15 years.
- Long-term [3] – between 15 and 30 years.
- Permanent [4] – over 30 years and resulting in a permanent and lasting change that will always be there.

4. Intensity [I]

Intensity describes whether an impact is destructive or benign.

- Very High [4] - Natural, cultural, and social functions and processes are altered to extent that they permanently cease.
- High [3] - Natural, cultural, and social functions and processes are altered to extent that they temporarily cease.
- Moderate [2] - Affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way.
- Low [1] - Impact affects the environment in such a way that natural, cultural, and social functions and processes are not affected.

5. Probability [P]

Probability describes the likelihood of an impact actually occurring.

- Improbable [1] - Likelihood of the impact materialising is very low.
- Possible [2] - The impact may occur.
- Highly Probable [3] - Most likely that the impact will occur.
- Definite [4] - Impact will certainly occur.

6. Cumulative [C]

In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

7. Significance [S]

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

6.1.2. RATING OF POTENTIAL IMPACTS

The potential impacts identified are explained per phase of the project and mitigation measures are provided.

Table 4: Significance ratings

Score		Elaboration
- [13 - 16 points]	NEGATIVE VERY HIGH	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and / or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
- [10 - 12 points]	NEGATIVE HIGH	These are impacts which individually or combined pose a significantly high negative risk to the environment. These impacts pose a high risk to the quality of the receiving environment. The design of the site may be affected. Mitigation and possible remediation are needed during the construction and / or operational phases. The effects of the impact may affect the broader environment.
- [7 - 9 points]	NEGATIVE MODERATE	These are impacts which individually or combined pose a moderate negative risk to the quality of health of the receiving environment. These systems would not generally require immediate action, but the deficiencies should be rectified to avoid future problems and associated cost to rectify once in HIGH risk. Aesthetically and / or physically non-compliance can be expected over a medium term. In this case the impact is medium term, moderate in extent, mildly intense in its effect and probable. Mitigation is possible with additional design and construction inputs.
- [4 - 6 points]	NEGATIVE LOW	These are impacts which individually or combined pose a deleterious or adverse impact and low negative risk to the quality of the receiving environment, and may lead to potential health, safety, and environmental concerns. Aesthetically and / or physical non-compliance can be expected for short periods. In this case the impact is short term,

Score		Elaboration
		local in extent, not intense in its effect and may not be likely to occur. A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction, or operating procedure.
0	NEUTRAL	Impact is neither beneficial nor adverse. These are impacts which cannot be classified as either positive or negative or classified and null and void in the case of a negative impact being adequately mitigated to a state where it no longer renders a risk.
+ [4 - 6 points]	POSITIVE LOW	These are impacts which individually or combined pose a low positive impact to the quality of the receiving environment and health, and may lead to potential health, safety, and environmental benefits. In this case the impact is short term, local in extent, not intense in its effect and may not be likely to occur. A low impact has no permanent impact of significance.
+ [7 - 9 points]	POSITIVE MODERATE	These are impacts which individually or combined pose a moderate positive effect to the quality of health of the receiving environment. In this case the impact is medium term, moderate in extent, mildly intense in its effect and probable.
+ [10 - 12 points]	POSITIVE HIGH	These are impacts which individually or combined pose a significantly high positive impact on the environment. These impacts pose a high benefit to the quality of the receiving environment and health, and may lead to potential health, safety, and environmental benefits. In this case the impact is longer term, greater in extent, intense in its effect and highly likely to occur. The effects of the impact may affect the broader environment.
+ [13 - 16 points]	POSITIVE VERY HIGH	These are permanent and important beneficial impacts which may arise. Individually or combined, these pose a significantly high positive impact on the environment. These impacts pose a very high benefit to the quality of the receiving environment and health, and may lead to potential health, safety, and environmental benefits. In this case the impact is long term, greater in extent, intense in its effect and highly likely or definite to occur. The effects of the impact may affect the broader environment

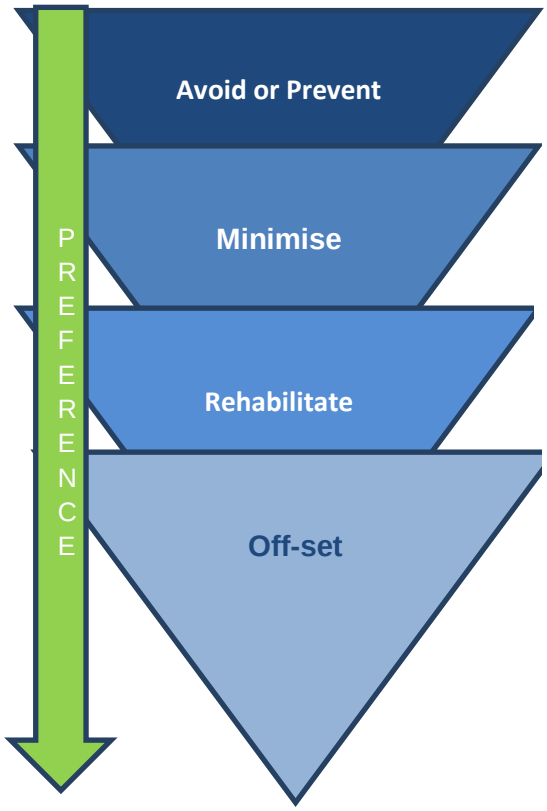
6.1.3. THE MITIGATION HIERARCHY

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented. Mitigation measures identified as necessary will be included in an EMPr.

An important aspect of impact assessment is the identification and application of methods which mitigate against the impacts. In order to aid selection of mitigation measures, the mitigation hierarchy is used. The mitigation hierarchy is a tool that guides users toward limiting as far as possible the negative impacts on biodiversity from development projects. It emphasises best practice of avoiding and minimising any negative impacts, and then restoring [rehabilitating] sites no longer used by a project, before lastly considering off-setting residual impacts. The mitigation hierarchy is crucial for all development projects aiming to achieve no overall negative impact on biodiversity or on balance a net gain [also referred to a No Net Loss and the Net Positive Approach]. It is based on a series of essential, sequential steps that must be taken throughout the project's life cycle in order to limit any negative impacts on biodiversity.

A recent cross-sector guide for implementing the Mitigation Hierarchy provides practical guidance, innovative approaches and examples to Mitigation Hierarchy support operationalizing the mitigation hierarchy effectively. The publication is aimed at environmental professionals working in, or with, extractive industries and financial institutions, who are responsible for overseeing the application of the mitigation hierarchy to biodiversity conservation, while balancing conservation needs with development priorities.

The sequential steps of the mitigation hierarchy are annotated on the diagram below.



*Refers to considering options in project location, sitting, scale, layout, technology. and phasing **to avoid impacts** on biodiversity, associated ecosystem services, and people. This is the best option but is not always possible. Where environmental and social factors give rise to unacceptable negative impacts the activity should not take place. In such cases*

Refers to considering alternatives in the project location, siting, scale, layout, technology and phasing that would minimise impacts on biodiversity and ecosystem services. In cases where there are environmental and social constraints every effort

Refers to rehabilitation of areas where impacts are unavoidable, and measures are. provided to return impacted areas to near-natural state or an agreed land use. Although rehabilitation may fall short of replicating the diversity and complexity of a natural system.

*Refers to measures over and above rehabilitation to compensate for the residual. negative effects on biodiversity, after every effort has been made to minimise and then rehabilitate impacts. **Offsets** can provide a mechanism to compensate for significant residual impacts.*

Figure 6: the mitigation hierarchy

6.1.4. IMPACT ASSESSMENT

This section presents the impact assessment according to the methodology in the preceding sections, in a tabular form.

Table 5: planning phase impact assessment – CONSTRUCTION OF EMANGWENI VEHICULAR BRIGDE

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Planning and Design – Construction of Emangweni vehicular bridge					
Sub-phase: Direct Impacts					
1	Inadequate or incompetent Planning and Design for the Low-cost houses [taking into consideration the best environmental solutions which	1	Without	-8	Negative low
			With	-6	Negative moderate

	can be accommodated by the budget assigned]				
	Mitigation: [a] Ensure best practicable solutions of design which is best suited to the study area and receiving environment which will then result in the provision of infrastructure for the use of people in the surrounding communities. [b] Consideration must still be given to design which will minimize the need for maintenance and costs associated with that. [c] Ensure correct, peer and supervisor reviewed designs are developed. Furthermore, it is paramount that the findings of this BAR and the associated specialist studies are incorporated into the design to avoid sensitive area.				
2	Consideration for national, provincial, and local plans and design standards in the planning for the development	1	Without	-7	Negative Moderate
			With	10	Positive High
	Mitigation: [a] All relevant plans for the area must be considered and adequate consultation with the relevant planning officials in the area. Design standards include but not limited to: The Engineering services will be designed to conform to eThekwini Municipality Guidelines and Specifications and Other accepted services guidelines, standards, and specifications to ensure ease of maintenance and operation.				
3	Development in sensitive habitats could lead to the diminishing of the socio-economic benefits.	1	Without	-7	Negative Moderate
			With	10	Positive high
	Mitigation: [a] All measures and considerations for the design of the proposed low-cost houses must be considered and optimization of social, economic, environmental, and practical benefits ensured. Socio-economic benefits will be enhanced. [b] Findings of the Basic Assessment Report and Associated specialist studies must influence orientation of the proposed structure and construction site camp in relation to sensitive areas. [c] All sensitive areas must be demarcated as No-Go areas; entry into these areas must be prohibited.				
4		1	Without	-11	Negative high

	Appropriate planning of exclusion of sensitive vegetation and steep areas.		With	-5	Negative low
	Mitigation: [a] Avoidance of the areas with severe degradation in the area. [b] No-go areas must be clearly marked off. [c] Use of existing road is recommended to avoid unnecessary clearance and disturbance to natural areas. [d] Disturbed areas must be rehabilitated immediately after construction. [e] Site layout plan must be developed for approval by the engineer and the ECO. [f] Encroachment into No-Go areas must be inspected, and corrective action implemented immediately.				
5	Possible lack of consideration of what the environment can accommodate.	1	Without	-10	Negative high
			With	-6	Negative low
	Mitigation: [a] All measures and considerations for the design of the houses and associated infrastructures must consider the triple bottom line and ensure optimization of social, economic, environmental, and practical benefits. [b] It is recommended that the proposed houses be founded on engineered rock fill. [c] Findings of the geotechnical assessment must influence the choice of technology alternatives.				
6	Unstable design which will require maintenance in the near future	1	Without	-8	Negative Moderate
			With	-5	Negative low
	Mitigation: [a] Ensure that the best practicable design is used.				
7	Material shortages and poor management Practices. Impacts: [a] Design change due to material shortage	1	Without	**-7**	Negative moderate
			With	-4	Negative low

	[b] Poor resource allocation and allocation of tasks to incompetent personnel.				
	Mitigation: [a] Ensure timeous consultation and sourcing of material from local and international suppliers. [b] Ensure correct allocation or positioning of competent project team members. [c] The contractor must explore as many technology/ design alternatives as possible during the design phase of the project to avoid design change due to material shortage or poor management practices.				
Sub-phase: Indirect Impacts					
8	Increased hardened surfaces within the watercourse will result to increased surface water runoff	1	Without	-8	Negative Moderate
			With	-4	Negative low
	Mitigation: [a] Under no circumstances must the structures be placed higher than the ground surface thereby creating a drop off that may cause erosion.				
Sub-phase: Cumulative Impacts					
9	Cumulative Impacts	1	Without	-10	Negative High
			With	-6	Negative low
	Cumulative impacts in relation to an activity, means the past, current, and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities. The impacts of the proposed development may not be significant or be a serious threat to the environment but a large number of projects in one area or occurring in the same vegetation type may have significant impacts (DEAT, 2004). Even though the possible extent of the cumulative impacts cannot be determined due to not knowing the number of projects that will be accepted, it is still important to try and identify the negative and positive impacts which may arise, and this includes looking at this project in conjunction with other projects in the area. There is livestock grazing in close proximity to the proposed project site, this places the watercourse at				

	risk of pollution from animal faeces. This impact coupled with improper waste management activities and hydrocarbons leakage could result to contamination of the watercourse.		
	Mitigation: [a] Refuse bins with lids must be provided and emptied as and when required. [b] Chemical toilets must not be placed within 32 meters from the watercourse. [c] No refueling of machinery or vehicles on site. [d] Concrete mixing must not be done close to the watercourse and concrete must be mixed on impermeable surfaces. [e] Layout of the construction site camp must be influenced by findings of this BAR and associated specialist studies in order to avoid placement of any structure in sensitive areas.		
	Average without mitigation	-8.4	Negative Moderate
	Average with mitigation	-1	Neutral

Table 6: planning phase impact assessment – no-go

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Planning and Design - No-go					
1	The status quo would remain, and the short-term impacts will not occur	1	N/A	10	Positive high
	Mitigation: N/A				
2	Maintaining the status quo would also mean that the provincial and local departments will not be able to plan for socio-economic opportunities.	1	N/A	-12	Negative high
	Mitigation: The development should be planned for to ensure economic growth.				
3	Road users will continue making use of rock outcrops in the riverbed as a crossing point. In	1	Without	-12	Negative high

	times of rain this crossing is submerged and unsafe to use.				
	Mitigation: [a] The development should be planned carefully to ensure that safety is addressed adequately.				
				Average without mitigation	-4.67	Negative Low
				Average with mitigation	0.0	Neutral

Table 7: construction phase impacts – construction of Emangweni vehicular bridge

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Construction of Emangweni vehicular bridge					
Sub-phase: Direct Impacts					
1	Loss of vegetation communities	1	Without	-9	Negative Moderate
			With	-6	Negative Low
	Mitigation: The scope of works does not entail clearance of vegetation. The working strip required for the construction of the houses must be effectively monitored to prevent vegetation removal. [a] Vegetation clearing, and trampling must be avoided; [b] Existing roads must be used where feasible [c] Alien vegetation is likely to invade in areas where biological disturbance took place, the area should be actively managed to prevent the growth of alien invasive species. [c] Disturbed areas must be rehabilitated immediately after construction.				
2	Soil stripping and excavation: Impacts involve compaction of the soil and loss of topsoil. Topsoil contains most organic matter and decomposed organisms and nutrients; thus, the removal of the topsoil constitutes a major loss in terms of ecosystem function.	1	Without	-10	Negative high
			With	-4	Negative low

	Mitigation: [a] Excavated areas should be demarcated and must not remain open for extended periods; this will warn the public of the inherent dangers and enhance safety for road users and livestock grazing in close proximity to the site. [b] Topsoil must not be stockpiled for an extensive period (> 3 months). This is to prevent the redundancy of the existing seed bank as well as the alteration of the soil characteristics (permeability, bulk density etc.). [c] Should any artefacts of archaeological significance be exposed during excavation, work on the area where the artefacts were found, shall cease immediately and the ECO shall be notified as soon as possible. Upon receipt of such notification, the ECO will arrange for the unearthed artefact to be examined by qualified personnel and or relevant provincial authority. [d] Under no circumstances shall archaeological artefacts be removed, destroyed, or interfered. [e] Topsoil must be separated from subsoil and topsoil must be preserved for use during rehabilitation phase.				
3	Negative ecological impacts on the aquatic environment, wetlands, and associated biodiversity of the watercourse during construction work. Impacts involve altering the characteristics of the watercourse consequently impacting aquatic life present therein.	1	Without	-13	Negative very high
			With	-5	Negative low
	Mitigation: [a] Restricting all construction activities to the construction area; this mitigation measure will minimize damage to watercourse. In the event that the impact occurs corrective actions as per the EMPr is to be implemented to ensure that the occurrence ceases. [b] No harvesting of riparian vegetation and any other vegetation in close proximity to the proposed site. [c] Biodiversity of the watercourse should be protected, animal killing for any purpose is impermissible. [d] Mixing of concrete should not be undertaken on bare grounds and concrete remains should be cleared immediately. [e] Refueling of machinery used on site should not be done near the watercourse. [d] Cleaning of material used during construction must not be undertaken on sites.				
4	Hydrocarbons – leakages from petrol/diesel stores and machinery/vehicles, spillages from poor dispensing practices. Oils and grease - leakages from oil/grease stores and machinery/vehicles, spillages from poor handling and disposal practices. These can cause negative ecological impacts to the natural vegetation in close proximity to the proposed site and riparian.	1	Without	-10	Negative High
			With	-5	Negative low

	Mitigation: The following measures should be implemented in conjunction with the generic pollution prevention measures provided in the Construction EMPr: [a] Hazardous storage and refueling areas must be bunded prior to their use on site during the construction period following the appropriate SANS codes. [b] The bund wall should be high enough to contain at least 110% of any stored volume. [c] The surface of the bunded surface should be graded to the center so that spillage may be collected and satisfactorily disposed of. [d] The proper storage and handling of hazardous substances [e.g., Fuel, oil, cement, bitumen, paint, etc.] needs to be administered. [e] Storage containers must be regularly inspected so as to prevent leaks. [f] Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface and must be protected from the ingress and egress of stormwater.
	[f] Staff environmental induction must take place prior to construction commencing and any subcontractors utilized must be inducted before starting work onsite. [g] All contractor employees must receive basic environmental awareness training and shall be educated on the requirements of the EMPr. [h] The environmental induction training is the responsibility of the project manager and the contractor and should be undertaken by the EO or a suitably qualified person. [I] The ECO must oversee and monitor the induction training to ensure that the training is sufficient, and that adequate training is provided prior to construction commencing. [j] All staff involved in work within the freshwater habitats must receive specific inductions related to the detailed methods statements. [k] All managers, contractors, laborers, and personnel involved during the project are to be familiarized with the method statement. [l] It is vital that all personnel are adequately trained to perform their designated tasks to the accepted standards. [m] The ECO must monitor the compliance of the contractors and instruct the Contractors where necessary. [n] The ECO may request that the Project Manager suspend part or all the works if the Contractors repeatedly cause damage to the environment. [o] The suspension should be enforced until such time as the offending actions, procedure or equipment is corrected and the environmental damage repaired.

	[p] A copy of the method statement will always need to be made available at the construction site offices/site camp.
	[q] Drip trays should be utilized at all dispensing areas and must be placed under all stationary machinery and or vehicles. [r] No refueling, servicing nor chemical storage should occur within 50 m of the delineated wetland/aquatic habitat or within the 100-year flood line, whichever is applicable. [s] No vehicles transporting concrete, asphalt or any other bituminous product may be washed on site. [t] Vehicle maintenance should not take place on site unless a specific bunded area is constructed for such a purpose. [u] Ensure that transport, storage, handling, and disposal of hazardous substances is adequately controlled and managed. [v] Correct emergency procedures and cleaning up operations should be implemented in the event of accidental spillage. [w] If a water pump is required, the water pump must operate inside or on top of a drip tray to prevent any spillage of fuel and limit the risk of soil/water contamination. [x] The drip tray will need to be lined with absorbent pads and checked daily while in use. [y] All equipment to be used within the sensitive working areas [within the channel] must be checked daily for oil and diesel leaks before gaining access to these working areas. [z] An emergency spill response procedure must be formulated, and staff are to be trained in spill response. [aa] All necessary equipment for dealing with spills of fuels/chemicals must be available at the site. [ab] Spills must be cleaned up immediately and contaminated soil/material disposed of appropriately at a registered site. [ac] 44-gallon drums must be kept on site to collect contaminated soil. [ad] These should be disposed of at a registered hazardous waste site. [ae] Fire prevention facilities must be present at all hazardous storage facilities. [af] The Material Safety Data Sheet (MSDS) for all hazardous substance, including hydrocarbon, shall be kept on site. Procedures detailed in the MSDS shall be followed in the event of an emergency situation. [ag] All hazardous chemical substance waste must be disposed of in accordance with the Hazardous Chemical Substances Regulations, 1995 (Regulation 15). [ah] The waste, resulting from the use of hazardous materials, shall be collected by a licenced hazardous waste service provider for disposal at a registered hazardous waste management facility.

5	Alien plant invasion as a result of biological disturbance. Impact includes reduced habitat quality and irreparable damage to the ecosystem	1	Without	-8	Negative Moderate
			With	-4	Negative low
	Mitigation: [a] Prevention of damage or disturbance to the natural environment. [b]Removal of alien plant invaders which are present in the area, prior to construction. [c] Areas with alien vegetation which have not been removed during the construction should be cleared and rehabilitated. This will improve the current status of these areas and also prevent the introduction of alien invasive species in the area. [d] Ongoing monitoring of the project site for inspection of alien plan invasion, eradication of these species should be done as an when required to prevent the spread.				
6	Nuisance caused by Dust and Air pollution during construction of the road	1	Without	-8	Negative moderate
			With	-4	Negative low
	Mitigation: [a] Dust is likely to be generated during construction phase, frequent and effective dust-suppression is advised. [b] Dust must be suppressed on the construction site during dry periods by the regular application of water. [c] Water used for this purpose must be used in quantities that will not result to ponding and runoff. [d] Active work areas, stockpiles and loads of soil being transported must be watered to reduce dust. [e] Measure must be taken to immediately mitigate a situation in which excessive fugitive dust is observed. Works being undertaken must be undertaken with caution, or phase down while the source is being actively investigated and suppression measures be implemented. [f] Disturbed soils, slopes and areas of open excavation must be minimised to avoid wind erosion. [g] Limit the height of stockpiles. [h] Diesel exhaust emissions from heavy machinery on site (excavators, front end loaders and hauling trucks) must be controlled and minimised by regular checks and servicing of vehicles. [I] Any construction vehicle found to be emitting excessive smoke should be stopped from the operations for some mechanical attention before it could continue.				

7	Concrete mixing, pouring and disposal practices.	1	Without	-12	Negative high
			With	-6	Negative low
	Mitigation: [a] Cement/concrete batching is to be located in an area to be hardened and must first be approved by the ECO. [b] No batching activities shall occur directly on the ground. [c] The land surface to be protected from the negative impact that may arise due to concrete mixing activities. [d] Concrete pouring activity to be done in such a way that concrete spillages are avoided. If concrete spills occur, the affected areas must be rehabilitated immediately. [e] Cleaning of concrete mixer chutes only to be done in such way that it does not cause pollution or concrete spillages on to the ground. [f] Concrete remains should be cleared and disposed of appropriately.				
8	Negative ecological impacts on watercourses and wetlands and associated biodiversity in the study area due to illegal dumping of waste material. Impacts involve physical damage to watercourse and wetland habitats and the mortality of aquatic, wetland and terrestrial plants and animals and also impact the aesthetics of the natural environment.	1	Without	-10	Negative High
			With	-5	Negative low
	Mitigation: [a] Eating areas must not be located near wetlands/riparian habitats. [b] Provide adequate rubbish bins and waste disposal facilities on-site and educate/encourage workers not to litter or dispose of solid waste in the natural environment but to use available facilities for waste disposal. [c] Clear and completely remove from site all general waste, constructional plant, equipment, surplus rock, and other foreign materials once construction has been completed. [d] Recycling/re-use of waste is to be encouraged.				

<table>
<tr><td></td><td colspan="5">[e] Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered sites by a registered waste management company.

[f] No litter, refuse, wastes, rubbish, rubble, debris, and builder's wastes generated on the premises must be placed, dumped, or deposited on adjacent/surrounding properties during or after the construction period, but disposed of at an approved dumping site.

[g] The construction site must be kept clean, tidy, and free from rubbish.

[h] Provide adequate rubbish bins and waste disposal facilities on-site and educate/encourage workers not to litter or dispose of solid waste in the natural environment but to use available facilities for waste disposal. Litter bins must be equipped with a closing mechanism to prevent their contents from blowing out or animals from accessing the contents.

[I] Clear and completely remove from site all general waste, constructional plant, equipment, surplus rock, and other foreign materials once construction has been completed. No litter, refuse, wastes, rubbish, rubble, debris, and builders waste must be placed, dumped, or deposited on adjacent/surrounding properties during or after the construction period.

[l] The construction site must be kept clean and tidy and free from rubbish. Empty litter bins weekly [or as required before they reach capacity].

[j] Recycling/re-use of waste is to be encouraged.

[k] No solid waste may be burned on site.

[k] No building material, soils or rubble is to be disposed of within or close to any watercourse, including rivers, streams, and riparian habitats.

[l] No burning of waste is allowed on site.</td></tr>
<tr><td rowspan="3">9</td><td rowspan="2">Negative ecological impacts on vegetation and associated biodiversity in close proximity to the proposed site due to invasion by alien plant species resulting from damaged and disturbed habitat near the project area</td><td rowspan="2">1</td><td>Without</td><td>-10</td><td>Negative high</td></tr>
<tr><td>With</td><td>-5</td><td>Negative low</td></tr>
<tr><td colspan="5">Mitigation:

[a] Restricting all construction activities to the construction area; removing alien plant invaders which are present in the vicinity of the construction area; checking the area regularly for new growth of alien plant invaders during the construction and once the proposed project is completed.

[b] An on-going monitoring programmed must be implemented. This monitoring plan can be incorporated into the routine inspection activities.

[c] No weeds to grow in disturbed (rehabilitated) soils.</td></tr>
</table>

	[d] No herbicides to be used on aliens, manual removal is recommended.				
10	All road users are at risk during the construction phase due to exposure to heavy duty vehicles and increased traffic.	1	Without	-7	Negative Moderate
			With	-4	Negative low
	Mitigation: [a] Social responsibility by the construction staff must be ensured at all times. [b] A safety officer must be delegated specific safety management tasks and the CLO must maintain a regularly open channel of communication with the surrounding homesteads. [c] Furthermore, all applicable safety regulations must be adhered to and clear signage in a local language erected. [d] In areas of open excavation, signage restricting movement is advised and the area must be clearly demarcated. [e] The project sites are currently of use by the public, it is therefore recommended that residents be informed of use of alternative routes during construction phase and safety of road users must be ensured through barricading of excavations and implementation of other safety measures.				
11	All free roaming livestock are at risk during the construction phase due to exposure to heavy duty vehicles, increased traffic, and open excavations.	1	Without	-9	Negative Moderate
			With	-4	Negative low
	Mitigation: [a] Due care must be taken to protect animals from construction hazards. [b] No animals are to be harmed, snared, or caught and killed. [c] Excavations should not be left open for excessive periods. [d] open excavation should be barricaded using nets high enough to prevent entry of roaming livestock.				
12	Noise pollution caused by construction activities and machinery	1	Without	-8	Negative Moderate
			With	-4	Negative low

	Mitigation: [a] Surrounding communities and adjacent landowners are to be notified upfront of noisy construction activities. [b] Provide all equipment with standard silencers. [c] Maintain silencer units on vehicles and equipment in good working order. [d] Construction staff working in areas where the 8-hour ambient noise levels exceed 60 dBA should wear ear protection equipment. [e] Select vehicle routes carefully at selected intervals to avoid excessive disturbances to the surrounding community. [d] Construction activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused by mechanical equipment. In the absence of bylaws, national regulations on noise control must be complied with. [f] Ensure that the construction vehicles are under the control of competent personnel.				
13	Potential for fires	1	Without	-7	Negative moderate
			With	-4	Negative low
	Mitigation: [a] No open fires to be permitted within the construction footprint. [b] Ensure that no refuse waste is burnt on the site or on surrounding premises. [c] Ensure that all workers on site are aware of the proper procedure in case of a fire occurring on-site. [d] Ensure adequate fire-fighting equipment is available and train workers on how to use it. [e] The statutory requirements of provincial ordinances, municipal by-laws and the National Veld and Forest Fire Act, 1998 [Act No. 101 of 1998] must be complied with. [f] Firefighting equipment to be placed at strategic areas relevant to the points where cooking fires are allowed. [g] A firebreak has to be created in high-risk areas such as camp sites and material storage areas.				
14	If runoff and erosion control measure are not effectively implemented by the contractors, erosion rills and gullies may form along the cleared and exposed soils within the	1	Without	-9	Negative Moderate
			With	-5	Negative low

	construction footprint and lead to increased rates of erosion and sedimentation.				
	Mitigation: [a] Unnecessary clearing of vegetation resulting in exposed soil prone to erosive conditions to be avoided. [b] Trees or existing grass strata outside of the construction corridor must not to be removed as they will reduce the destructive force of water which can cause erosion. [c] Indigenous vegetation that does not interfere with the construction activities, to be left undisturbed. [d] All cleared areas must be ripped and rehabilitated after construction. [e] The top 200mm layer of topsoil must be removed and stockpiled in small heaps and replaced on the construction areas once the activities have been completed. [f] The affected areas have to be vegetated with a grass mixture indigenous to the area. [g] The eradication of any alien vegetation to be followed by replacement with indigenous vegetation as soon as possible to ensure quick and sufficient coverage of exposed soil.				
	Sub-phase: Indirect Impacts				
15	Health and safety	1	Without	-6	Negative low
			With	-4	Negative low
	Mitigation: [a] The Contractor shall comply with all standard and legally required health and safety regulations as promulgated under the Occupational Health and Safety Act and associated regulations. [b] Programs raising awareness on COVID-19 should be undertaken. [c] Number of laborers should be kept to a minimum where possible. [d] All personnel coming to site must be cleared of Flu-like symptoms. [e] Temperature screening to be done on site and upon arrival of each personnel. [f] Attendance registers for all coming to site or site office including vehicle details should be kept at all times. [g] Personal Protective Equipment to be supplied to all employees and should be worn at all times. [h] Work tools such as spades and other hand-held tools should be cleaned after every use. [I] No cluster of people working closed together should be allowed.				

	[j] Official training in the correct fit, use, care, storage, and limitations of all Personal Protective Clothing, Respiratory and Hearing Equipment must be given to the employees.				
16	Due to an increased worker population and potentially non-locals in the area, there may be incidents of increased crime, violence [domestic], and security incidents.	1	Without	-6	Negative low
			With	-4	Negative low
	Mitigation: [a] To as great an extent as possible, local labor must be sourced. [b] The CLO must be regularly engaged, and the community must be encouraged to work together to limit any possible crime.				
	Sub-phase: Cumulative Impacts				
17	Cumulative impacts in relation to an activity, means the past, current, and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities. The impacts of the proposed development may not be significant or be a serious threat to the environment but a large number of projects in one area or occurring in the same vegetation type may have significant impacts (DEAT, 2004). Even though the possible extent of the cumulative impacts cannot be determined due to not knowing the number of projects that will be accepted, it is still important to try and identify the negative and positive impacts which may arise, and this includes looking at this project in conjunction with other projects in the area.	1	Without	-10	Negative high
			With	-6	Negative low

	Currently, there are no developments being undertaken on the proposed site or in close proximity to the proposed site. Based on the findings of the site investigations, there seems to be no evidence of detrimental impacts attributed to the previous developments that occurred on site. There are animals grazing in close proximity to the project site, watercourse is at risk of contamination by animal faces; this coupled with improper waste management practices and leakage of hydrocarbons to the watercourse could result to significant pollution of the watercourse.				
	Mitigation: [a] Mixing of concrete should not be done near the watercourse. [b] Refueling of machinery and vehicles should not be undertaken on site. [c] Tools should note be washed near the watercourse. [d] Bins with lids should be provided and emptied as and when required.				
Average for construction of Low-cost Houses without mitigation				-8.9	Negative moderate
Average for construction of Low-cost Houses with mitigation				-4.6	Negative low

Table 8: construction phase impact assessment – no-go

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Construction - No-go					
1	The status quo would remain, and the short-term impacts will not occur	1	N/A	12	Positive high
	Mitigation: N/A				

2	Maintaining the status quo would also mean that the provincial and local departments will not be able to plan for socio-economic opportunities.	1	N/A	-13	Negative very high
	Mitigation: The development should be planned for ensure economic growth.				
3	Conditions that threaten safety of road users will remain.	1	Without	-13	Negative very high
	Mitigation: The development should be planned carefully to ensure that safety is addressed adequately.				
				Average without mitigation	-4.6	Negative Low
				Average with mitigation	0.0	Neutral

Table 9: Construction Socio-economic impacts

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Construction – Socioeconomic impacts					
1	Employment opportunities	1	Without	6	Positive low
			With	10	Positive high
	Mitigation: [a] Employment should be managed by selecting suitable employees according to a selection system that ensures transparent recruitment from local and impacted communities. This will ensure a fair recruitment process. [b] Human Resources policies and procedures should be developed and implemented to ensure that recruitment is done in a fair and transparent way, and that employment opportunities are maximised. [c] Attention should be paid to employment opportunities for women and disabled persons. [e] Local employment opportunities should be maximised, with appropriate skill transfers for outside or migrant workers to pass those skills onto local workers.				

2	Local economic development	1	Without	6	Positive low
			With	12	Positive High
	Mitigation: [a] Business opportunities should be advertised in order for the community members to be informed about opportunities in the area.				
			Average without mitigation	6	Positive Low
			Average with mitigation	11	Positive high

Table 10: Construction Socio-economic: NO-GO

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Construction – No-go					
1	The status quo would remain with no resultant employment opportunities.	1	N/A	-6	Negative low
	Mitigation: N/A				
2	The status quo would remain with no resultant business opportunities.	1	N/A	-6	Negative low
	Mitigation: The development should be planned for to ensure economic growth.				
			Average	-6	Negative Low

Table 11: operation phase impact assessment

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Operational – Construction of Emangweni vehicular bridge					

<table>
<tr><th colspan="6">Sub-phase: Direct Impacts</th></tr>
<tr><td rowspan="3">1</td><td rowspan="2">Degradation, loss, and fragmentation of habitat with regards to the secondary effects of vegetation disturbance, including but not limited to erosion risk and encroachment/colonization of terrestrial habitats by Invasive Alien Plants. Possible ecological consequences associated with this impact may include:
[a] Reduction in representation and conservation of vegetation. types/communities;
[b] Reduction/loss of habitat for fauna; and
[c] Reduction in and/or loss of species of conservation concern [i.e., rare, threatened/endangered species.</td><td rowspan="2">1</td><td>Without</td><td>-9</td><td>Negative moderate</td></tr>
<tr><td>With</td><td>-4</td><td>Negative low</td></tr>
<tr><td colspan="5">Mitigation:
[a] Removal of vegetation must be kept to a minimum.
[b] Environmental awareness training must be undertaken by a competent ECO when construction commences.
[c] Machinery must be operated with responsibility.</td></tr>
<tr><td rowspan="3">2</td><td rowspan="2">Increased hardened surfaces within the watercourse will result to increased surface water runoff but more significantly, it will result in increased runoff velocities at discharge points that will become areas at risk from erosion</td><td rowspan="2">1</td><td>Without</td><td>-8</td><td>Negative moderate</td></tr>
<tr><td>With</td><td>-5</td><td>Negative low</td></tr>
<tr><td colspan="5">Mitigation:
[a] Outlet erosion protection structures must be designed to reduce outflows to energy levels that do not pose an erosion risk to downslope soils.
[b] Outlet erosion structures must be properly installed along grade and elevation of the slope.
[c] Under no circumstances must the structures be placed higher than the ground surface thereby creating a drop off that may cause erosion.</td></tr>
</table>

3	The proposed bridge will enhance safety of users.	1	Without	12	Positive high
			With	14	Positive very high
	Enhancement: [a] The proposed bridge will increase the safety of road users. Guardrails must be erected to enhance safety of road users.				
4	Pollution of soil, water, and vegetation This refers to the alteration or deterioration in the physical, chemical, and biological characteristics of water, soil, and air resources which inevitable impacts on vegetation.	1	Without	-8	Negative moderate
			With	-4	Negative low
	Enhancement: [a] The infrastructure must be maintained responsibly by the local authority to mitigate against littering and pollution which could lead to prolonged pollution.				
5	Impacted communities will have continued access to facilities to which their access was limited by weather conditions. Implementation of the project will result to mushroomed development due to increased mobility or accessibility.	1	Without	11	Positive high
			With	15	Positive very high
	Enhancement: [a] Overall the development will lead to beneficial impacts for the indigent area.				
	Sub-phase: Indirect Impacts				
6	Impact to indigenous vegetation- Activities involving the clearing/harvesting of natural vegetation could result in the destruction or loss of plants and animal species of conservation significance.	1	Without	-8	Negative moderate
			With	-4	Negative low
	Mitigation:				

	[a] No clearing of vegetation and harvesting should be allowed within the construction footprint and within 500m radius of the proposed site. [b] No animals are to be harmed, snared, or caught and killed. [c] Use of existing roads is recommended as this will avoid fragmentation of natural habitats and consequently habitat loss. [d] Construction of temporary access roads should be avoided to limit unnecessary clearance of natural vegetation.		
	Average without mitigation	-1.7	Negative low
	Average with mitigation	2	Positive low

Table 12: Operational Phase - NO-GO

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Operational - No-go					
1	The status quo would remain, and the short-term impacts will not occur	1	N/A	12	Positive high
	Mitigation: N/A				
2	Maintaining the status quo would also mean that the provincial and local departments will not be able to plan for socio-economic opportunities.	1	N/A	-12	Negative high
	Mitigation: The development should be planned for ensure economic growth.				
3	The condition that threatens safety of road users during appreciable rainfall events will remain.	1	Without	-12	Negative high
	Mitigation: The development should be planned carefully to ensure that safety is addressed adequately.				
	Average without mitigation			-4.0	Negative Low
	Average with mitigation			0.0	Neutral

Table 13: Decommissioning phase impact assessment – all aspects

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Decommissioning					
Not Applicable					

7. STUDY FINDINGS AND CONCLUSIONS

7.1. ENVIRONMENTAL IMPACT STATEMENT

7.1.1. INTRODUCTION

Potential environmental impacts [biophysical and social] associated with the proposed construction of Emangweni Bridge under Alfred Duma Local Municipality have been identified herein.

This BA assesses and addresses all potentially significant environmental issues in order to provide KZN EDTEA with sufficient information to make an informed decision regarding the proposed project.

Table 14. Summary of Impacts

Impact	Significance without mitigation	Significance with mitigation
Watercourse ecology	Medium	Low -
fauna and flora	Low-Medium	Low -
Noise and air quality	Low	Low -
Waste management	Low-Medium	Low -
Heritage	Low	Low -
Soil and erosion	Low-Medium	Low -
Socio-economic safety and security	Low	Medium +

7.1.2. KEY FINDINGS OF THE STUDY

Overall, the results of the BA process emerge as having a "***negative low***" environmental significance after mitigation. The socio-economic impacts are however strongly positive, in that the development will result in safe conditions for the receiving community.

7.1.3. KEY CONCLUSIONS AND RECOMMENDATIONS OF THE SPECIALIST STUDIES

7.1.3.1. AQUATIC IMPACT ASSESSMENT AND ECOLOGICAL ASSESSMENT STUDY

During the site investigation it was determined that one watercourse would be directly impacted by the development (Riparian Unit R1). A second watercourse was observed downstream, the Sundays River, which could potentially receive indirect impacts. However, the distance from the development and the watercourse would make this unlikely. Assessments were therefore largely focused on the Riparian unit R1.

The PES of the tributary (Riparian Unt R1) was rated as moderately modified with moderate ecological importance and sensitivity. Factors contributing to this rating including extensive cattle grazing in the area and subsistence farming. Water abstraction from farming activities has altered natural flows of the tributary to a degree whereas cattle grazing has resulted in increased nutrient levels of the water and habitat modifications. The tributary does occur within important areas of conservation and does host a vulnerable endemic fish species.

The significance impacts associated with this project ranged from high to low without mitigation. Majority of these impacts can be reduced to low with the exception of habitat transformation and natural flow changes which remain at a medium impact. The nature of the bridge construction which involves physical alterations to the river and riverbanks, along with the diversion of natural flows to safely begin the construction in the case, make these impacts unavoidable. A similar outcome was observed for the DWS risk matrix with the diversion of the flows and laydown of construction components in stream having a moderate risk level. All operational impacts however were identified as low. The moderate risk ratings therefore imply that a full WULA must be applied for before construction can commence.

In conclusion, the Emangweni Bridge Construction presented no fatal flaws. Potential adverse impacts to aquatic resources were identified, however, mitigation measures recommended in this report will reduce their significance to an environmentally acceptable level. Therefore, it is the opinion of the specialist that the proposed development be approved provided recommended mitigation measures are adhered to.

7.1.3.2. ACCORDING TO THE SPECIALIST HERITAGE IMPACT ASSESSMENT

7.1.3.3. GEOTECHNICAL ASSESSMENT

ILZ (PTY) LTD conducted a geotechnical investigation Report contains the results of a material investigation carried out for the proposed construction of Emangweni Culvert Bridge and approach road. Prior to field investigation, a site walkover and mapping exercise was conducted. Several rock exposures were mapped and profiled. Field investigation was conducted on the 28th of February 2023

The results indicated the following.

Weathered bedrock.

Two types of bedrock were observed along the route, i.e., the sandstone and shale of the Vryheid Formation. Shale bedrock was encountered in IP3 from existing road surface to a refusal depth of 0.77m below existing road surface. It was described as dark grey, stained brown, highly weathered, highly to completely fractured, medium hard rock strength. Weathered sandstone bedrock was encountered in IP4 from existing road surface to refusal depth of 0.55m below existing road surface. It was described as light greyish brown, stained and speckled brown, moderately weathered, moderately fractured, medium grained, medium hard rock strength. Weathered sandstone was also observed in several exposures along the route.

GROUNDWATER OCCURRENCE

There was no groundwater seepage encountered in any of the trial pits put down during investigation. However, during periods of prolonged rainfall, particularly the summer season, a marked increase in the occurrence and magnitude of groundwater seepage flow can be anticipated. Perched groundwater flows are likely to become more prolific during rainy months.

7.1.4. SENSITIVITY MAP (APPENDIX B)

The following map consolidates the sensitivities of the study area as identified in the BA process and by each of the specialist studies. The sensitivity map must be considered when assessing this application, noting that each of these sensitivity findings have been addressed and mitigation measures have been provided for any possible impacts associated with these areas of sensitivity.

7.1.5. EAP OPINION

This BAR provides an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed construction of Emangweni vehicular bridge project under Alfred Duma Local Municipality.

Based on the findings of environmental impact assessment, there is unlikely to be any significant negative environmental impacts and the socio-economic benefits are evident. Mitigation measures contained herein have been informed by the extent, nature, duration, and probability of impacts identified. Implementation of mitigation measures and conditions of the Environmental Management Programme appended to this document which is intended for the management of the impacts of construction of the proposed project and operation thereof, will result to minimal impacts attributed to the proposed project. Assessment findings, therefore, present no fatal flaws; the development will have long term positive impacts than negative impacts, the latter of which are short termed.

The following recommendations / conditions, although not exhaustive, may be considered for inclusion in the environmental authorisation:

- An Environmental Control Officer (ECO) must be appointed to oversee those conditions of the Environmental Authorization are carried out properly.
- Preconstruction environmental awareness training must be provided to all construction staff on site.
- Construction footprint should be clearly demarcated; works outside the construction footprint is prohibited.
- All construction vehicles should adhere to clearly defined and demarcated roads.
- Dust suppression and erosion management should be an integrated component of the construction approach.
- No dumping of building waste or spoil material from the development should take place on areas other than a licenced landfill site or spoil site approved by the engineer.
- All hazardous materials should be stored appropriately to prevent contamination of the project site. Any accidental chemical, fuel and oil spills that occur at the project site should be cleaned up appropriately as related to the nature of the spill; significant spills to be reported to the relevant department.
- Weed control measures must be applied to eradicate the noxious weeds (category 1a &1b species) on disturbed areas.
- Rehabilitation plan must be costed for in tender documents.
- Sensitive areas should be marked as no-go areas and entry to such areas should be prohibited.
- Construction Footprint Limit & Demarcation

i. Prior to construction, the footprint must be demarcated to prevent work being undertaken within the watercourse riparian zone downstream.
ii. The demarcation must be signed off by the Environmental Control Officer (ECO).
iii. The demarcation must be maintained until the repairs are completed.
iv. Laydown, site offices and other storage areas must be clearly demarcated and located at least

30m from the boundary of any riverine or wetland habitat, ideally on flat surfaces.

- **Soil Erosion Control Measures**

v. Sediment barriers must be installed in areas sensitive to erosion such as near water supply points and actively eroding areas nearby stream banks. These measures include but are not limited to - the use of sandbags, hessian sheets, silt fences, geotextiles, rock gabions, etc.
vi. The silt fence / curtain must be maintained regularly to ensure that they function effectively.
vii. After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage recorded.
viii. Unnecessary clearing of natural areas should be kept to a minimum in order to make use of natural erosion suppressors, such as good grassland cover.

- **Soil Management**

i. Prior to commencing with earthworks, the topsoil must be stripped and stockpiled separately from subsoil.
ii. Topsoil must be kept for use during rehabilitation of landscaped areas.
iii. Topsoil must be stockpiled in stockpiles not exceeding 2m in height.
iv. All stockpiles must be kept free of weeds and invasive alien plants.
v. If soil stockpiles are at risk of being eroded, they must be secured with sandbags around the base of the stockpile.
vi. All stockpiles must be established outside the 30m buffer of the Riparian Zone and on flat ground.

- **Pollution Prevention Measures**

- Any soil contaminated by hydrocarbons (fuel and oils), asphalt, bitumen, binding agents, concrete and/or any other chemical must be removed, and the affected area rehabilitated immediately.
- Chemical toilets must be provided to workers during the construction phase. A single chemical toilet must be provided for every 10 employees.
- Chemical toilets must be placed away from sensitive areas and must be serviced regularly by a registered service provider and waybills must be retained as proof of servicing.
- Fuel must be stored in a bunded structure with a roof. The bund must be able to contain at least 110% of the volumes of fuel.
- Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface.
- Drip trays should be utilised at all dispensing areas.
- A chemical spill kit must be present onsite at all times.
- All solid waste must be collected and placed in bins.

- Temporary River/Stream Diversion

- A method statement must be compiled to guide the river diversion process from start to finish.
- Use of coffer dams and gravity flume pipes is recommended for the project. A whole section of the river channel is isolated using barriers that span the full width of the river. This keeps a stretch of the river dry, and the water is transferred downstream of the works area through gravity fed flumes/pipes. The flume is normally placed on the bed of the watercourse through the works area and outfalls at the downstream barrier, if present, or far enough downstream to prevent the water backing up into the work area.

iii. Safety requires that every cofferdam, and every component thereof, shall be of robust design and construction, of suitable and sound materials and of sufficient strength and capacity for the site conditions in which it is used.

iv. Proper construction of the cofferdam, verification that the structure is being constructed as planned, monitoring the behaviour of the cofferdam and surrounding area, provision of adequate access, light and ventilation, and attention to safe practices on the part of all workers and supervisors is required.

v. The cofferdam construction shall be properly maintained.

vi. Diversions shall be temporary in nature and no permanent walls, berms or dams may be installed.

vii. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.

viii. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns, and the channel and riparian zone rehabilitated/restored to their original configurations as soon as practically possible.

ix. If excess debris and sediment has collected upstream of the structure, remove the material before the dam is removed and dispose of the material properly.

7.1.6. CONCLUSION

This study provided a quantified analysis of the impacts associated with the proposed development. The EAP is of the opinion that the project should be positively authorised, outlining the key findings of the study.

The BA process and report complies with the EIA Regulations of 2014 [as amended in 2017], under which this project has applied and therefore meets all relevant requirements.

The project is foreseen to have a "***negative low***" significance rating post application of mitigations proposed by the relevant specialists.

7.1.7. ASSUMPTIONS, GAPS AND LIMITATIONS OF THE STUDY

The BA process followed the legislated process required and as governed and specified by the EIA Regulations [2014 as amended in 2017]. Inevitably, when undertaking scientific studies, challenges and limitations are encountered. For this specific BA, the following challenges were encountered:

The information and recommendations contained herein are based upon information provided by the client and the assumption that all relevant information has been provided by all relevant sources consulted for requisition of such information. Furthermore, field investigation work has been restricted to a level of detail that satisfies the objectives of the study.

The document has been developed with due reference to the following:

- Site visits and assessments - Indaloenhle Environmental Consultants and Abazingeli Engineering Consultants (Pty) Ltd
- Information on biophysical environment – Indaloenhle Environmental Consultants
- Information on the proposed works – Abazingeli Civils Project Management and Engineering Consultants (Pty) Ltd
- Recommendations from the Authorities – Department of Economic Development, Tourism and Environmental Affairs (uThukela Municipality Office).

7.1.8. RECOMMENDATIONS

7.1.8.1. RECOMMENDATIONS TO THE CA

It is advised that the application be assessed holistically, taking into consideration the study area and the fact that the development at the proposed sites is confined to existing informal settlement, roads and servitude required in order to meet infrastructural planning needs of the area. The impacts associated with the proposed developments are significantly low.

The project, in the EAP's opinion, does not pose a detrimental impact on the receiving environment and its inhabitants and can be mitigated to acceptable levels.

The Applicant should be bound to stringent conditions to maintain compliance and a responsible execution of the project.

No post-construction monitoring is specified in this BA; however, it remains the duty of the Applicant to ensure the infrastructure is kept in sound condition.

7.1.8.2. RECOMMENDATIONS TO THE APPLICANT

The Applicant must adhere to the recommendations provided by the specialist and the EAP. The EMPr details these recommendations.

The Applicant must take full responsibility for the execution of the project in a manner which does not negatively impact on the environment by ensuring that responsible decisions are made.

7.2. DECLARATIONS BY THE EAP

I, Divhani declare that:

- I act as the independent environmental practitioner in this application
- I do not have and will not have any vested interest (either business, financial, personal, or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I have expertise in conducting environmental impact assessments, including knowledge of the National Environmental Management Act (Act 107 of 1998), Environmental Impact Assessment regulations, 2014 (as amended) and any guidelines that have relevance to the proposed activity
- I will comply with the Act, Regulations, and all other applicable legislation
- I have no, and will not engage in, conflicting interests in the undertaking of the activity
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority; all the particulars furnished by me in this report are true and correct.

Signature of the EAP:

_____

Divhani Ramovha [EAP]